# Environmental and Social Impact Assessment – Vol III

Huadian Dak Lak Wind Power Project

China Huadian Engineering Co., Ltd

28 March 2022

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*The business of sustainability*

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28 March 2022

# Environmental and Social Impact Assessment – Vol III

Huadian Dak Lak Wind Power Project

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## Acronyms and Abbreviations

| | |
|---|---|
| ACSR | Aluminium Conductor Steel Reinforced |
| ACTIP | ASEAN Convention Against Trafficking in Persons, Especially Women and Children |
| ACWC | ASEAN Commission on the Promotion and Protection of the Rights of Women and Children |
| AHP | ASEAN Heritage Park |
| AHRD | ASEAN Human Rights Declaration |
| AICHR | Intergovernmental Commission on Human Rights |
| AIIB | Asian Infrastructure Investment Bank |
| ALARP | As Low As Reasonably Practicable |
| AMS | ASEAN member states |
| AoI | Area of Influence |
| APF | Asia Pacific Forum of National Human Rights Institutions |
| ASEAN | Association of Southeast Asian Nations |
| AZE | Alliance for Zero Extinction |
| CAT | Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment |
| CAT-Committee | Committee against Torture |
| CED, Art.32 | Interstate communication procedure under the International Convention for the Protection of All Persons from Enforced Disappearance |
| CEDAW | Convention on the Elimination of All Forms of Discrimination against Women |
| CED-Committee | Committee on Enforced Disappearances |
| CEMA | Committee for Ethnic Minority Affairs |
| CERD-Committee | Committee on the Elimination of Racial Discrimination |
| CESCR-Committee | Committee on Economic, Social and Cultural Rights |
| CHEC | China Huadian Engineering Co., Ltd |
| CI | Cumulative impacts |
| CIA | Cumulative Impact Assessment |
| CMS | Central Monitoring System |
| CMW-Committee | Committee on the Protection of the Rights of All Migrant Workers and Members of Their Families |

| | |
|---|---|
| CN1 | Cu Ne No.1 Wind Farm |
| CN2 | Cu Ne No.2 Wind Farm |
| COMMIT | Coordinated Mekong Ministerial Initiative Against Trafficking |
| COVID-19 | Coronavirus Disease of 2019 |
| CPC | Commune People's Committee |
| CPED | International Convention for the Protection of All Persons from Enforced Disappearance |
| CR | Critically Endangered |
| CRC | Convention on the Rights of the Child |
| CRC-Committee | Committee on the Rights of the Child |
| CRPD | Convention on the Rights of Persons with Disabilities |
| CRPD-Committee | Committee on the Rights of Persons with Disabilities |
| CSR | Compensation, Support and Resettlement |
| CWU | Communal Women's Union |
| DD | Data Deficient |
| DEDAW | Declaration on the Elimination of Discrimination against Women |
| DMS | Detailed Measurement Survey |
| DOFA | Department of Foreign Affairs |
| DOLISA | Department of Labour, Invalid, and Social Affairs |
| DOLISA | Department of Labour, Invalid, and Social Affairs |
| DONRE | Department of Natural Resources and Environment |
| DONRE | Department Of Natural Resources And Environment |
| DPC | District People's Committee |
| DSRE | The Development Strategy for Renewable Energy of Vietnam |
| EAAA | Ecologically Appropriate Area of Assessment |
| EBA | Endemic Bird Area |
| EBRD | European Bank for Reconstruction and Development's |
| EHS | Environmental Health and Safety |
| EIA | Environmental Impact Assessment |
| EMF | Electric and Magnetic Fields |
| EMI | Electromagnetic Interference |

| | |
|---|---|
| EN | Endangered |
| EOO | Extent of Occurrence |
| EOR | Energy Outlook Report |
| EP | Equator Principles |
| EPC | Engineering Procurement and Construction |
| EPP | Environmental Protection Plan |
| ERM | Environmental Resources Management Ltd. |
| ESF | Environmental and Social Framework |
| ESIA | Environmental and Social Impact Assessment |
| ESIA | Environmental and Social Impact Assessment |
| ESMP | Environmental and Social Management Plan |
| ESMPF | Environmental and Social Management Planning Framework |
| ESP | Environmental and Social Policy |
| ESS | Environmental and Social Standards |
| FGDs | Focus Group Discussions |
| FI | Financial Intermediary |
| FiTs | Feed-in-Tariffs |
| FOA | Freedom of Association |
| FPIC | Free, Prior and Free Consent |
| FPIC | Free, Prior and Informed Consent |
| GBIF | Global Biodiversity Information Facility |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| GIIP | Good International Industry Practice |
| GISD | Global Invasive Species Database |
| GN | Guidance Note |
| GRDP | Gross Regional Domestic Product |
| HDI | The Human Development Index |
| IA | Impact Assessment |
| IBA | Important Bird and Biodiversity Area |

| | |
|---|---|
| IBAT | Integrated Biodiversity Assessment Tool |
| ICCPR | International Covenant on Civil and Political Rights |
| ICCPR-OP1 | Optional Protocol to the International Covenant on Civil and Political Rights |
| ICCPR-OP2 | Second Optional Protocol to the International Covenant on Civil and Political Rights, aiming at the abolition of the death penalty |
| ICERD | International Convention on the Elimination of All Forms of Racial Discrimination |
| ICESCR | International Covenant on Economic, Social and Cultural Rights |
| ICESCR - OP | Optional Protocol to the Covenant on Economic, Social and Cultural Rights |
| ICMW | International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (known as the Migrant Workers Convention) |
| ICP | Informed Consultation and Participation |
| ICPD | International Conference on Population and Development |
| ICRMW | International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families |
| IFC | International Finance Corporation |
| ILO | International Labour Organization |
| IOL | Inventory of Losses |
| IPA | Important Plant Area |
| IPIECA | International Petroleum Industry Environmental Conservation Association |
| IPs | Indigenous Peoples |
| ISO | International Organisation for Standardisation |
| IUCN | International Union for the Conservation of Nature |
| KBA | Key Biodiversity Area |
| KIIs | Key Informant Interviews |
| LEP | Law on Environmental Protection |
| LFDC | Land Fund Development Centre |
| LURC | Land use right certificate |
| MARD | Ministry of Agriculture and Rural Development |
| MDGs | Millennium Development Goals |
| MIP | Ministry of Investment and Planning |
| MOCST | Ministry of Culture, Sports and Tourism |

| | |
|---|---|
| MOET | Ministry of Education and Training |
| MOIT | Ministry of Industry and Trade |
| MOLISA | Ministry of Labour, War Invalids and Social Affairs |
| MW | Megawatt |
| n.d. | No date |
| NCFAW | Committee for Advancement of Women |
| NDVI | Normalised Differential Vegetation Index |
| NE | Not Evaluated |
| NGOs | Non-governmental Organisations |
| NHRIs | National Human Rights Institutions |
| NL | Not Listed |
| NT | Near Threatened |
| NTFPs | Non-timber Forest Products |
| ODA | Official Development Assistance |
| OECD | Economic Co-operation and Development |
| OHCHR | Office of the United Nations High Commissioner for Human Rights |
| OHS | Occupational Health and Safety |
| OP-CAT | Optional Protocol to the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment |
| OP-CEDAW | Optional Protocol to the Convention on the Elimination of Discrimination against Women |
| OP-CRC-AC | Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict |
| OP-CRC-IC | Optional Protocol to the Convention on the Rights of the Child on a communications procedure |
| OP-CRC-SC | Optional Protocols to CRC on the involvement of children in armed conflict and on the sale of children, child prostitution and child pornography |
| OP-CRPD | Optional Protocol to the Convention on the Rights of Persons with Disabilities |
| PAPs | Project Affected Persons |
| PC | People’s Committee |
| PDP | National Power Development Master Plan |
| PIM | Potential Interactions Matrix |

| | |
|---|---|
| POP | Persistent Organic Pollutants |
| PPC | Provincial People's Committee |
| PSs | IFC Performance Standards |
| RE | Renewable Energy |
| RSZ | Rotor Swept Zone |
| SAARC | South Asian Association for Regional Cooperation |
| SCADA | Supervisory Control and Data Acquisition |
| SDGs | Sustainable Development Goals |
| SEA | Strategic Environmental Assessment |
| SEDP | Social and Economic Development Plan |
| SEDS | Social and Economic Development Strategy |
| SPT | Subcommittee on the Prevention of Torture and other Cruel, Inhuman or Degrading Treatment or Punishment |
| STD | Sexually Transmitted Diseases |
| TCFD | Task Force on Climate Related Financial Disclosure |
| TL | Transmission line |
| TPES | Total Primary Energy Supply |
| UN | United Nations |
| UNDP | United Nations Development Program |
| UNEP | United Nations Environmental Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNFCC | Kyoto Protocol on Climate Change |
| UNWOMEN | United Nations Entity for Gender Equality and the Empowerment of Women |
| USAID | United States Agency for International Development |
| UXO | Unexploded Ordnance |
| VEC | Valued Environmental and Social Components |
| VRDB | Vietnam Red Data Book |
| VSSID | Vietnam Social Security Identification |
| VU | Vulnerable |
| VWU | Vietnam Women's Union |

| | |
|---|---|
| WBG | World Bank Group |
| WHO | World Health Organisation |
| WPP | Wind Power Project |
| WRO | Independent Worker Representative Organization |
| WTG | Wind Turbine Generator |
| WWF | World Wildlife Fund |

# 10. ENVIRONMENTAL IMPACT ASSESSMENT

This chapter presents an assessment of impacts for key environmental aspects identified in the scoping process in Chapter 7 in Vol 2 ESIA. The impact assessment method is also described in Chapter 4 in Vol 1 ESIA. The outcomes of the assessment will inform the development of the ESMP, which will be used to implement relevant management plans.

## 10.1 Air Quality Impact Assessment

### 10.1.1 Scope of Assessment

Activities in the construction phase causing the potential impacts to air quality and stakeholders who are identified as receptors of the impacts are listed in Table 10.1. Activities during the operation phase is likely to have an insignificant impact on air quality. Therefore, the scope for impact assessment on air quality is limited to only activities in the pre-construction and construction phases for this ESIA.

**Table 10.1 Scope of Air Quality Impact Assessment**

| Phases | Potential Activities | Potential Impacts | Potential Consequences | Receptor |
|---|---|---|---|---|
| Pre-Construction and Construction | Land preparation and civil works such as land clearance, demolition, earthworks | ■ Increased dust (e.g. $PM_{10}$) from ground preparation, work sites and material / equipment transportation<br>■ Exhaust emissions (e.g. $SO_x$, CO, $NO_x$) from movement and operation of construction vehicles, machinery and other heavy equipment such as bulldozers, excavators, compactors and diesel generator. | ■ Annoyance and nuisance to the general public as a result of dust deposition on properties, dwellings, cultural heritage sites and places of business<br>■ Increased effects of morbidity/ reduced health due to exposure to dust and exhaust emissions. | ■ Nearby residents<br>■ Construction workers |
| | Transmission line, access road, internal road, laydown area construction | | | |
| | Operation of ancillary facilities such as the concrete batching plant, diesel generator for power supply | | | |
| | Transportation of equipment and materials, workers daily movement. | | | |

### 10.1.2 Relevant Guidelines and Criteria

#### 10.1.2.1 Vietnam Regulations

- *QCVN 05:2013/BTNMT* - National Technical Regulation on Ambient Air Quality, and
- *QCVN 06:2009/BTNMT* - National Technical Regulation on Hazardous Substance in Ambient Air.

#### 10.1.2.2 International Guidelines

- AIIB ESS1 (2019): Environmental and Social Assessment and Management: To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimise, mitigate, offset or compensate for them
- IFC Performance Standards 3: Resource Efficiency and Pollution Prevention requires to the Project to consider ambient conditions and apply technically and financially feasible resources efficiency

and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimise adverse impacts on human health and environment

- IFC EHS General Guidelines (Section 1.1, 2007): Air Emission and Ambient Air Quality contains common techniques for emission management that can be applied to a range of industry sectors. The guideline provides suggested approaches for the management of potentially significant emission sources and includes specific guidance for monitoring and assessment of impacts, and
- IAQM Guidance on the assessment of dust from demolition and construction, Version 1.1

### 10.1.3 Baselines Conditions

As stated in the Feasibility Study Report, the air quality condition of the baseline environment in the preliminary survey conducted by the Project's owner is fairly good. Also mentioned in the Dak Lak Provincial Environmental Monitoring Report 2020, the air monitoring results after three campaigns show that all air parameters are under the regulated threshold of National Technical Regulation *QCVN 05:2013/BTNMT* on Ambient Air Quality.

### 10.1.4 Impact Assessment

#### 10.1.4.1 Impact during the Pre-construction and Construction Phase

##### *10.1.4.1.1 Potential Impact*

The assessment identified the following impacts that may arise from pre-construction and construction activities:

- Increased dust and particulate matter emission (TSP, $PM_{2.5}$, and $PM_{10}$) from the earthworks, site preparation activities (land clearing, levelling, excavation, concrete batching plant, etc.) and construction activities of project components such as wind turbine foundation, transmission towers, internal roads, and transportation of equipment and materials
- Elevated gaseous pollutants from fuel combustion by equipment and machines
- Exhaust emissions from construction machinery and other heavy equipment such as bulldozers, excavators, compactors, and diesel generator
- Exhaust emission ($SO_2$, CO, $NO_2$, $NH_3$) from road transport of equipment and material
- Smoke from burning vegetation clearance, should this occur, and
- Strengthening and maintenance of access roads.

##### *10.1.4.1.2 Existing Controls*

Regarding the Feasibility Study (FS) Report, Environmental Protection Plan (EPP) Report, and the Safe & Civilized Construction Plan[1], there are some existing controls recommended by the Project's owner to minimise the impact of the air pollution generated by the construction activities as following:

- All transportation vehicles, machinery and equipment used for the construction activities shall be certified by the Vietnam Registry Department. Avoid using old fashion vehicles or equipment which can induce high level of emission
- National Regulation *TCVN 6438 – 2001* shall be applied to evaluate the concentration of some air pollutants such as CO and hydrocarbons emitted by the transportation vehicles and construction equipment. All equipment shall be granted with the Emission Certification issued by the National Certification Authority of Vietnam in accordance to the *Decision No. 35/2005/QD-BGTVT*

[1] Provided by the Project's Owner – China Huadian Engineering Co., Ltd (CHEC)

- Construction vehicles should be washed before leaving the construction site to minimise dust being produced in the outside roads and nearby residential areas
- Water sprinkling shall be enhanced as transportation, excavation, levelling, and compaction during drying season (two times per day). Avoid overloaded transportation, and travelling during night time and peak hour
- A canvas shall be used to cover the truck compartment while travelling to avoid construction material (sand, stone, cement, and brick) spillage to the roads
- Machine and equipment should be stored in a covered storage to avoid flying dust caused by strong wind during the construction phase
- Incineration of waste or construction materials (plastic bags) inside the construction site is prohibited, and
- Substation location shall be fenced and isolated to the surrounding areas to avoid dust and debris released to the environment.

### *10.1.4.1.3 Significance of Impacts*

Among the dominant contributor effects to the human and ecology receptors during the demolition and construction phases is dust emission. In terms of the evaluation of the Impact significance, the method to assess the risk of dust emission which is developed by the Institute of Air Quality Management (IAQM)[2] should be adopted. The procedure to perform Dust Assessment is described as below:

- Step 1: Screen the need for detailed assessment;
- Step 2: Assess the risk of dust impacts separately for four main activities including demolition[3], earthworks[4], construction[5] and track-out[6]. The assessment will be proceeded under three following steps:
  - Step 2A: Define potential dust emission magnitude
  - Step 2B: Define sensitivity of the area, and
  - Step 2C: Define the total risk of impacts based on the magnitude and sensitivity results.

#### *10.1.4.1.3.1 Screening the Need for a Detailed Assessment (Step 1)*

The screening criteria states that a detailed assessment will normally be required where there is:

**Table 10.2 The Need for Detailed Assessment**

| Aspect | IAQM | Project |
|---|---|---|
| Human Receptor | ■ 350 m of the boundary of the site, or<br>■ 50 m of the route(s) used by construction vehicles on the public | ■ The nearest residential areas in Cu Pong and Cu Ne Communes are about 74 m from WTG A6 in KB1, 39 m from WTG B2 in KB2, 57 m from WTG |

2 Institute of Air Quality Management Guidance, https://iaqm.co.uk/guidance/
3 Demolition is any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.
4 Earthworks covers the processes of soil-stripping, ground-levelling, excavation and landscaping.
5 Construction is any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc.
6 Track-out is the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto Lathe road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

| Aspect | IAQM | Project |
|---|---|---|
| | highway, up to 500 m from the site entrance(s). | C16 in CN1, and 63 m from WTG D11 in CN2, respectively<br>■ A part of the equipment and material transportation route will be passed by densely residential area living along the access road and coffee forests on the way to the Project Site. |
| Ecological Receptor | ■ 50 m of the boundary of the site, or<br>■ 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) | ■ During the bio baseline survey, there is a Tokey Geckko gecko (IUCN NE, VRDB VU) found 18.45 m away from the internal road systems |

Therefore, the construction activities of the project will likely bring some impacts to the ecology system and the communities residing along the transportation routes. A detailed impact assessment will be necessary.

#### *10.1.4.1.3.2 Determine the Magnitude of the Impact (Step 2A)*

### Methodology

The IAQM defines the dust emission magnitude based on the scale of the anticipated works. The criteria for estimating the magnitude of dust impacts from demolition, earthworks, construction and track-out as per the IAQM guidance note is presented in Table 10.3 and is used to inform the impact assessment.

**Table 10.3 Dust Emission Magnitude**

| Activity | Impact Magnitude | | |
|---|---|---|---|
| | **Small** | **Medium** | **Large** |
| Demolition[7] | Total building volume <20,000 $m^3$, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above the ground, demolition during wetter months. | Total building volume 20,000 $m^3$ – 50,000 $m^3$, potentially dusty construction material, demolition activities 10-20 m above ground level. | Total building volume > 50,000 $m^3$, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level. |
| Earthworks | Total site area <2,500 $m^2$, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months. | Total site area 2,500 $m^2$ – 10,000 $m^2$, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes –100,000 tonnes. | Total site area >10,000 $m^2$, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes. |
| Construction | Total building volume <25,000 $m^3$, construction | Total building volume 25,000$m^3$ – 100,000$m^3$, | Total building volume >100,000 $m^3$, on site |

[7] In this Project, no construction at the area required demolition. Hence, demolition is not applicable in this Section.

| Activity | Impact Magnitude | | |
|---|---|---|---|
| | Small | Medium | Large |
| | material with low potential for dust release (e.g. metal cladding or timber). | potentially dusty construction material (e.g. concrete), on site concrete batching. | concrete batching, sandblasting. |
| Track-out | <10 HDV (>3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m. | 10-50 HDV (>3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m. | >50 HDV (>3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m. |

## Assessment

Earthwork

There has been estimated approximately 55,730.5 m$^3$ (156,045.4 tonnes[8]) of excavated soil taken from 61.47 hectares (~ 614,700 m$^2$) of fixed-term land for the construction of transportation routes, laydown area, and wind turbine foundations. According to the construction plan of the Project, soil volume excavated was stored at the temporary soil stockpiling sites at WTGs' areas for being reused and recycled mostly for ground levelling and backfiling. Only 1 – 5% of excavated soil will be transported out of the Project site by an authorised local agency for their further treatment. The Project singed a contract with a local agency for transportation and treatment of the spoil construction materials. (See Table 10.4); hence, the impact magnitude is evaluated as **Large** according to the Table 10.3.

Construction

The largest source of emission in the construction phase is the fugitive dust emission from the construction activities, including construction of wind turbine foundation and the operation of onsite concrete batching plant. The area of construction within the Project site is relative medium. The construction activities have been also going to occur for a short period of time (about 18 months). As mentioned in the Project Description Section, the total concrete volume for the construction of 73 wind turbine foundations made in the concrete batching plant is approximately 69,800 m$^3$ which makes the impact significance as **Medium** in accordance to Table 10.3.

Track-out

According to the construction plan of the Project, excavated soil volume in four Project's area is approximately 55,730 m$^3$, of which 95 – 99% to be reused and recycled for ground levelling and road renovation (See Table 10.4) and 1 – 5% will be tracked out. Hence, there has been only a small amount of soil (1,384.3 m$^3$) to be transported out of the Project site.

The amount of construction materials to be used for the project was estimated about 5,550 m$^3$ (sand, stones, cement, bricks, etc.) and 661 m$^3$ (equivalent to approximately 5,189 tonnes of iron and steel). As provided by the Project's owners, 98 – 99% of the materials was reused and recycled at the Site. Only 1 – 2% which was equivalent to 85.5 m$^3$ of sand, stones, cement, bricks and 8.54 m$^3$ of iron and steel to be tracked out of the Site (See Table 10.4). Regarding the transportation plan of materials, the 20-30 m$^3$ truck has been used to transport sand, stones, cement, bricks, etc., and 5-30 ton truck to transport iron and steel via National Highway No.14 and the access road. Based on the above transportation demand relating to the volume of tracked-out construction materials, it is estimated that there is less than ten heavy and non-heavy duty vehicles inward and outward movements per day, given the period of equipment and material transportation is estimated about 18 months for the construction phase.

[8] Provided in the Geological Study Report, the bulk density of soil in Dak Lak Province is average of 2.8 g/cm$^3$.

Considering that the main transportation road, National Highway No.14, is in very good condition with the surface width of more than 8 km which will unlikely generate any dust from the road surface, while the access road with the total length of 6.75 km is basalt red soil which may increase dust from the road surface. However, the access roads is to be expanded and renovated with clay-bound macadam layer serving the construction and operation phases. According to Table 10.3, the impact magnitude of dust emission during materials transportation period is considered **Small**.

**Table 10.4 Construction Material Reuse Plan**

| Construction materials | Site | Total volume of materials ($m^3$) | % reuse of construction at site | % recycle[9] | Final treatment |
|---|---|---|---|---|---|
| Excavated soil | KB1 | 12540 | 90% | 8% | 2% |
| | KB2 | 12540 | 95% | 4% | 1% |
| | CN1 | 17540 | 85% | 10% | 5% |
| | CN2 | 13110 | 95% | 4% | 1% |
| Sand, stones, cement, bricks, etc. | KB1 | 850 | 99% | 0 | 1% |
| | KB2 | 850 | 99% | 0 | 1% |
| | CN1 | 3000 | 98% | 0 | 2% |
| | CN2 | 850 | 99% | 0 | 1% |
| Iron and steel | KB1 | 155.1732 | 92% | 7% | 1% |
| | KB2 | 155.1732 | 92% | 7% | 1% |
| | CN1 | 193.3932 | 90% | 8% | 2% |
| | CN2 | 157.339 | 92% | 7% | 1% |

Source: China Huadian Engineering Co., Ltd, 2021

In conclusion, the magnitude of dust emission from construction activities to air quality is summarised in Table 10.5.

**Table 10.5 Dust Emission Magnitude for Huadian Dak Lak Wind Power Project's Site**

| Activity | Dust Emission Magnitude |
|---|---|
| Demolition | - |
| Earthworks | Large |
| Construction | Medium |
| Track-out | Small |

[9] According to the EPP, the spoil construction materials which are reusable and recycled such as cement bags, iron debris will be collected, stored at the temporary place and further transported for scarp purchasing. The remaining of reusable construction materials including wood panel or timber pillar will be collected, stored and reused for other future constructions.

#### *10.1.4.1.3.3 Determine the Sensitivity of the Area (Step 2B)*

## Methodology

The IAQM defines the sensitivity of the area based on receptor type and the number of receptors within a certain distance from the source. Residential properties, schools, and hospitals are classified as high sensitivity to dust soiling and health effects. Locations where there are particularly important plant species (i.e. rice paddy) are classified as medium sensitivity. The criteria for estimating the sensitivity of the area as per IAQM guidance is presented in Table 10.6 and Table 10.7. The guidance provides a screening criterion of 350 m and 50 m from the construction site and access road to the nearest receptors respectively, beyond which impacts are not considered likely.

**Table 10.6 Criteria for Assessing the Sensitivity of the Area to Dust Soiling Effects on People and Property**

| Receptor Sensitivity | Number of Receptors | Distance from the Source (m) | | | |
|---|---|---|---|---|---|
| | | <20 | <50 | <100 | <350 |
| High | >100 | High | High | Medium | Low |
| | 10-100 | High | Medium | Low | Low |
| | 1-10 | Medium | Low | Low | Low |
| Medium | >1 | Medium | Low | Low | Low |
| Low | >1 | Low | Low | Low | Low |

*Note: For track-out the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, track-out may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider track-out impacts up to 50 m from the edge of the road.*

**Table 10.7 Criteria for Assessing the Sensitivity of the Area to Human Health Impacts**

| Receptor Sensitivity | Annual Mean $PM_{10}$ concentration | Number of Receptors | Distance from the Source (m) | | | | |
|---|---|---|---|---|---|---|---|
| | | | <20 | <50 | <100 | <200 | <350 |
| High | >32 μg/m$^3$ | >100 | High | High | High | Medium | Low |
| | | 10-100 | High | High | Medium | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 28-32 μg/m$^3$ | >100 | High | High | Medium | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 24-28 μg/m$^3$ | >100 | High | Medium | Low | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | Medium | Low | Low | Low | Low |
| | <24 μg/m$^3$ | >100 | Medium | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| Medium | >32 μg/m$^3$ | >10 | High | Medium | Low | Low | Low |

| Receptor Sensitivity | Annual Mean $PM_{10}$ concentration | Number of Receptors | Distance from the Source (m) | | | | |
|---|---|---|---|---|---|---|---|
| | | | <20 | <50 | <100 | <200 | <350 |
| | | 1-10 | Medium | Low | Low | Low | Low |
| | 28-32 μg/m$^3$ | >10 | Medium | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| | 24-28 μg/m$^3$ | >10 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| | <24 μg/m$^3$ | >10 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| Low | - | >=1 | Low | Low | Low | Low | Low |

*Note: For track-out the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, track-out may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider track-out impacts up to 50 m from the edge of the road.*

### Table 10.8 Criteria for Assessing the Sensitivity of the Area to Ecological Impacts

| Receptor Sensitivity [ab] | Distance from the Source (m)[c] | |
|---|---|---|
| | <20 | <50 |
| **High** | High | Medium |
| **Medium** | Medium | Low |
| **Low** | Low | Low |

[a] The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and track out and for each designated site.

[b] Only the highest level of area sensitivity from the table needs to be considered.

[c] For track out, the distances should be measured from the side of the roads used by construction traffic. Without site-specific mitigation, track out may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site.

## Assessment

The scoping study, information from the FS report and the satellite imagery identified that:

- In terms of the criteria for assessing the sensitivity of the Area to Dust soiling Effects on People and Property:
  - The nearest identified residential areas is about 39 m away from the WTG B2 (KB2) in Cu Ne Commune, Krong Buk District. Within the radius range of 20 – 50 m from the Wind turbines footprint, there are two households. According to Table 10.6, the sensitivity of the Area induced by Dust Soiling Effect on People and Properties is ranked as **Low** for the earthwork and construction activities.
  - The track-out of construction material transportation can likely cause impacts to more than hundred households in Buon Dhia 1, Buon Dhia 2, and Ea Nguoi villages, Cu Ne Commune; which located less than 50 m from the edge of the access road. However, the amount of construction material released during the construction phase is not too much. Therefore, the

Sensitivity of the Area to Dust Effects on People living along transportation route is considered as **High**.

- In terms of criteria for assessing the sensitivity of the Area to Human Health Impacts:
  - According to the FS Report, the air quality of environmental baseline in the Project's area was quite good abided by the National Technical Regulation *QCVN 05:2013/BTNMT* on Ambient Air Quality. However, the current data on air quality at the Project's area was unavailable at the time of developing this ESIA. Assuming that the $PM_{10}$ concentration monitored in 24 hours in Dak Lak Province is relatively similar to the concentration monitored in Gia Lai Province[10] which is approximately 7 – 22 µg/m$^3$. In order to make a comparison with the IAQM standard (Refer Table 10.7), an average $PM_{10}$ concentration monitored in 24 hours should be converted into Annual mean $PM_{10}$ concentration[11]. After the conversion, the Annual Mean $PM_{10}$ concentration for the Project site ranged from 5.93 µg/m$^3$ to 18.64 µg/m$^3$. According to Table 10.7, considering that the Annual Mean concentration is < 24 µg/m$^3$, medium sensitivity of receptors, about two affected households, distance of 20 – 50 m from the source, the Sensitivity of the Area to Human Health Impacts of these receptors is considered **Low** to all activities (earthwork, construction and track-out) (Refer to Table 10.9).
- To the Criteria for assessing the sensitivity of the Area to the Ecological Impacts,
  - According to the 2021 biodiversity field survey report (See Chapter 7), there is no recorded endangered wild population of plant within the distance of 50 m away from the sources (WTG) (See Figure 8.6). Therefore, the sensitivity receptor is considered as **Low** for all activities (earthwork, construction, and track-out).

Overall, the sensitivity of the Area to Dust Soiling Effect and Human Health Impact are summarized in Table 10.9.

**Table 10.9 Sensitivity of the Surrounding Area**

| Potential Impact | Sensitivity of the Surrounding Area | | |
|---|---|---|---|
| | Earthwork | Construction | Track-out |
| **People and Properties** | Low | Low | High |
| **Human Health** | Low | Low | Low |
| **Ecological Impact** | Low | Low | Low |

*10.1.4.1.3.4 Determine the Risk of Impacts (Step 2C)*

## Methodology

The risk of impacts will be determined by combining the assessment of dust emission magnitude and the assessment of the sensitivity of the area. The risk matrices in Table 10.10, Table 10.11, and Table 10.12, provide a method of assigning the level of risk for each activity.

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10 https://aqicn.org/city/vietnam/gia-lai/phuong-thong-nhat-pleiku/vn/

11 According to UK Guidance of Air emissions risk assessment (Air emission risk assessment for your environmental permit – GOV.UK – www.gov.uk), annual Mean $PM_{10}$ (long-term concentration) is assumed to be a half of short-term concentration (1hr Average $PM_{10}$). Therefore, the Annual Mean $PM_{10}$ concentration for the Project site will be calculated using the same principle (i.e. by dividing 24hr average $PM_{10}$ by 0.59 to 1hr average $PM_{10}$, then diving by 2).

**Table 10.10 Risk of Dust Impacts – Earthwork**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Medium Risk | Low Risk |
| Low | Low Risk | Low Risk | Negligible |

**Table 10.11 Risk of Dust Impacts – Construction**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Medium Risk | Low Risk |
| Low | Low Risk | Low Risk | Negligible |

**Table 10.12 Risk of Dust Impacts – Track out**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Low Risk | Negligible |
| Low | Low Risk | Low Risk | Negligible |

## Assessment

In terms of combination of Dust Emission Magnitude and the sensitivity of the areas, the risks ranking of Impacts for each activities (including earthworks, construction, and track-out) are summarized and presented in Table 10.13.

**Table 10.13 Risks of Impacts on Air Quality during Pre-Construction and Construction Phases**

| Potential Impact | Risk | | |
|---|---|---|---|
| | Earthwork | Construction | Track-out |
| People and Properties | Low Risk | Low Risk | Low Risk |
| Human Health | Low Risk | Low Risk | Negligible |
| Ecological Impact | Low Risk | Low Risk | Negligible |

#### 10.1.4.2 Additional Mitigation Measures

The following mitigation measures are designed to minimise the impact, as follows:

- Prioritise materials to be supplied by local suppliers
- Water sprays should be applied at land preparation area, access roads and any other exposed surfaces which could be source of dust are to be watered
- The speed limit of trucks and other vehicles should be control not to exceed 10 km/h within the Project boundary
- Areas of construction, stockpile areas and other exposed soils will be designated as such in order to minimise vehicle movements over these to the minimum amount possible
- No cleared vegetation to be burnt. Cleared vegetation will either be composed or reused for stabilisation purposes
- Ensure valid inspection certification for transport vehicles and construction machines
- Cover construction material deliveries or loads entering and leaving the construction site by an appropriate cover for the purpose of preventing materials and dust spillage
- Vehicles transporting materials inside or outside the construction site will not to be overloaded
- Vehicle engines need to be properly maintained to ensure minimization in vehicular emissions
- Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, taking into account intensity of use and operating environment)
- Minimising stockpiling by coordinating excavations, spreading, and regrading and compaction activities
- Excavation, handling and transport of erodible materials shall be avoided under high wind conditions where practicable. Where not feasible, transported erodible materials shall be covered
- Where possible, any soil stock piles should be located in sheltered areas where they are not exposed to wind. If not feasible, stock piles of soil (or other erodible materials) should be securely covered, and
- Rehabilitation or replanting of opened up areas that will no longer be used during the operation phase of the project.

#### 10.1.4.3 Residual Impacts

With the implementation of the above mitigation measures, the residual impacts would be expected to decrease to Negligible.

#### 10.1.4.4 Monitoring and Auditing

- In according to the EPP, some monitoring parameters including temperature, humidity, wind speed, noise, dust, CO, $NO_x$, $SO_2$ shall be monitored once per six months at three locations (Applicable standard: *QCVN 05:2013/BNTMT* on Ambient Air and *QCVN 26:2010/BTNMT* on Noise)
- Wind turbine construction site
- 220 kV substation, and
- Transmission line.
- Some additional monitoring is recommended based on Good Industry Practice[12] as follows:

[12] IAQM

- Carry out daily on-site inspections and off-site inspection, where receptors are nearby, to monitor dust deposition, record inspection results and make an inspection log available to the local authority when asked, and
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on the site when activities with a high potential to procedure dust are being carried out and during prolonged dry or windy conditions.

The Project's Owner shall supervise the implementation of all proposed mitigation measures and monitoring by the Contractors.

#### 10.1.4.5 Impact during Operation Phase

The potential impacts on air quality from operation activities (e.g. Wind Turbine Generator operations, inspection and maintenance) are considered negligible, so no further assessment is needed.

## 10.2 Noise Impact Assessment

### 10.2.1 Scope of the Assessment

The Scope of Noise Impact assessment which listed potential impacts and consequences as well as identified receptors is described in Table 10.14.

**Table 10.14 Scope of Noise Impact Assessment**

| Phases | Potential Activities | Potential Impacts | Potential Consequences | Receptor |
|---|---|---|---|---|
| Construction | Equipment and material transport and supply | Short-term increase in noise levels (only 18 months of construction phase) | Potential consequences to human health can vary and depend on other factors such as noise level, human health conditions and age. Some studies showed that noise exposure had associated with hearing loss (ADLWD 2019), tinnitus, hypertension, vasoconstriction and other cardiovascular adverse effects (University of California 2019), changes in immune system and birth effects (Passchier 2000).<br>Chronic noise exposure can cause in sleep disturbances and increased rate of diabetes. | Nearby residents Construction workers and local people living within noise contour |
| | Land preparation and civil works such as land clearance, demolition, earthworks | | | |
| | Transmission line and laydown area construction | | | |
| | Operation of associated facilities such as the concrete batching plant | | | |
| | Transportation of equipment, workers and materials | | | |
| | Foundation construction and Installation work of the WTGs | | | |
| Operation | Operation of the WTGs | Long-term increase in noise levels | | |

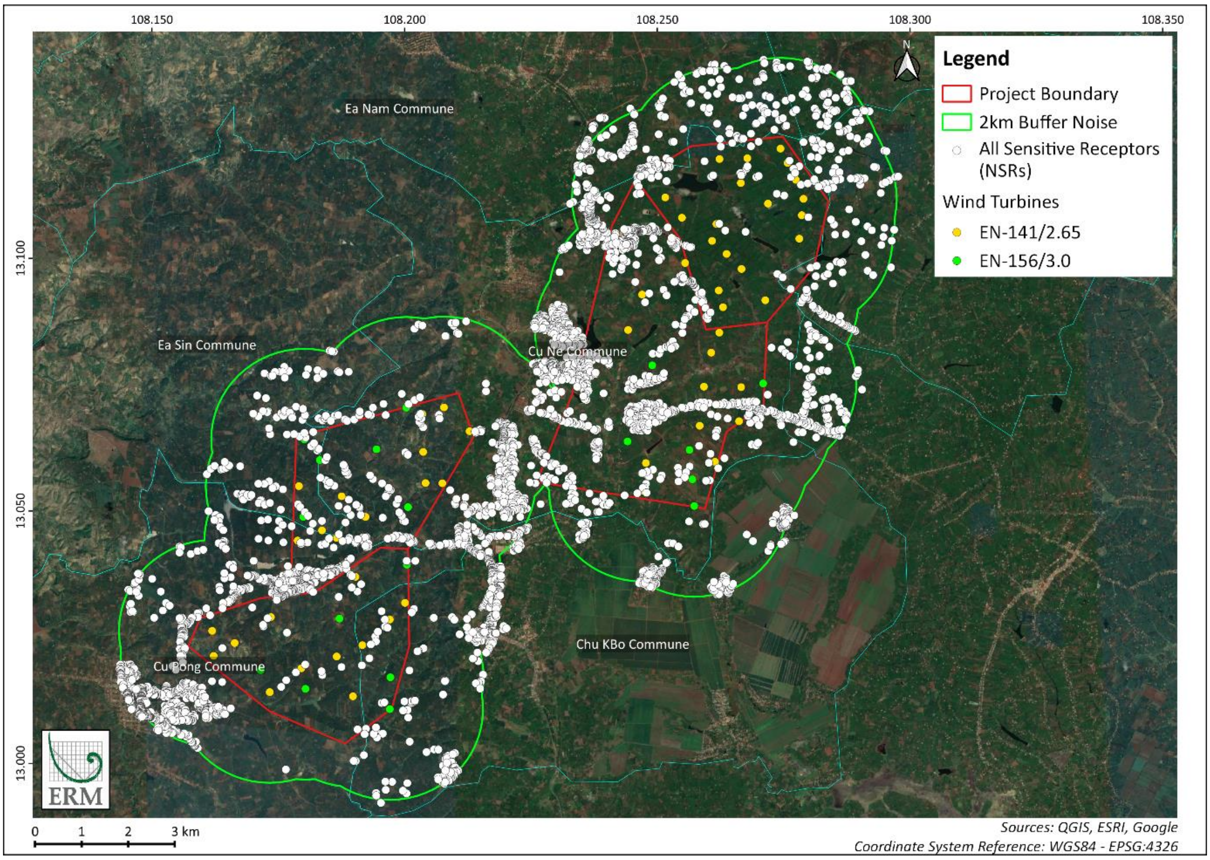
### 10.2.2 Background Noise Conditions

#### 10.2.2.1 Introduction of Regression Analysis

Regression analysis of the background noise data and the hub height wind speed data were also carried out to determine a line of 'best fit' from the baseline noise measurements, from which the noise impact assessment criteria have been established as a function of wind speed. Hence, the regression analysis allows for modification of the criteria with wind speed. Regarding the noise monitoring data results, measured noise levels were generally lower than daytime IFC guidelines (55 dB $L_{Aeq}$) at all six monitoring points. Measured levels were almost higher than night-time IFC guidelines (45 dB $L_{Aeq}$) at NML1, NML3, NML4, NML5, NML6, only noise levels monitored at NML2 were lower than the night-time value according to IFC 45 dB $L_{Aeq}$ guidelines.

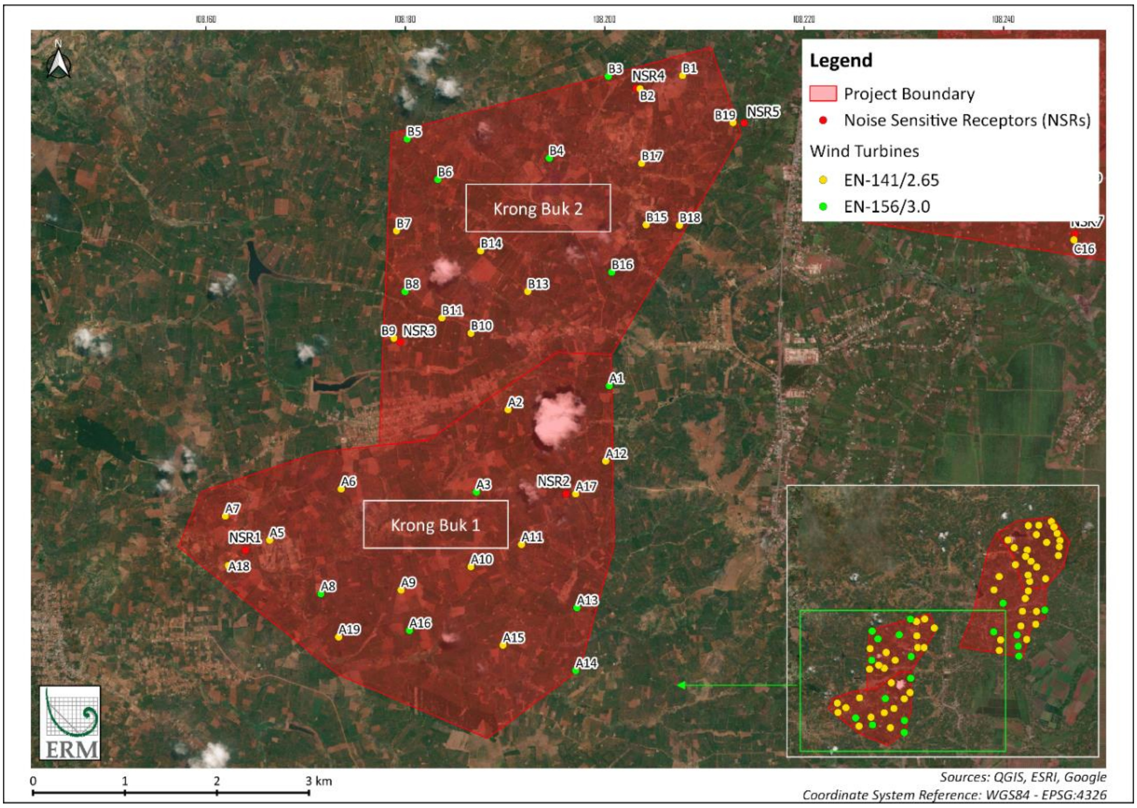
The high noise levels observed at five monitoring points during night-time except for NML2 were caused mainly by motorbikes, rooster crowing, cicadas and other insects and occasionally by loudspeaker and karaoke singing during the monitoring period. This indicates that noise levels were influenced by non-wind affected sources. Measurement data from the "Baseline Noise Report of Huadian Dak Lak Wind Power Project, Krong Buk District, Dak Lak Province" baseline report suggests the non-wind driven noise was present intermittently for large portions of the 48-hour measurement.

According to the research on satellite image, there are 4,602 potential sensitive receptors observed within 2 km noise buffer which is presented in Figure 10.1. Among 4,602 receptors, nine selected Noise Sensitive Receptors (NSRs) representing for nine groups from the 4,602 receptors based on the environmental setting at each receptors. The representative sensitive receptors (NSRs) in the four Project's areas including KB1 and KB2, and CN1 and CN2 were featured in Figure 10.2 and Figure 10.3, respectively.



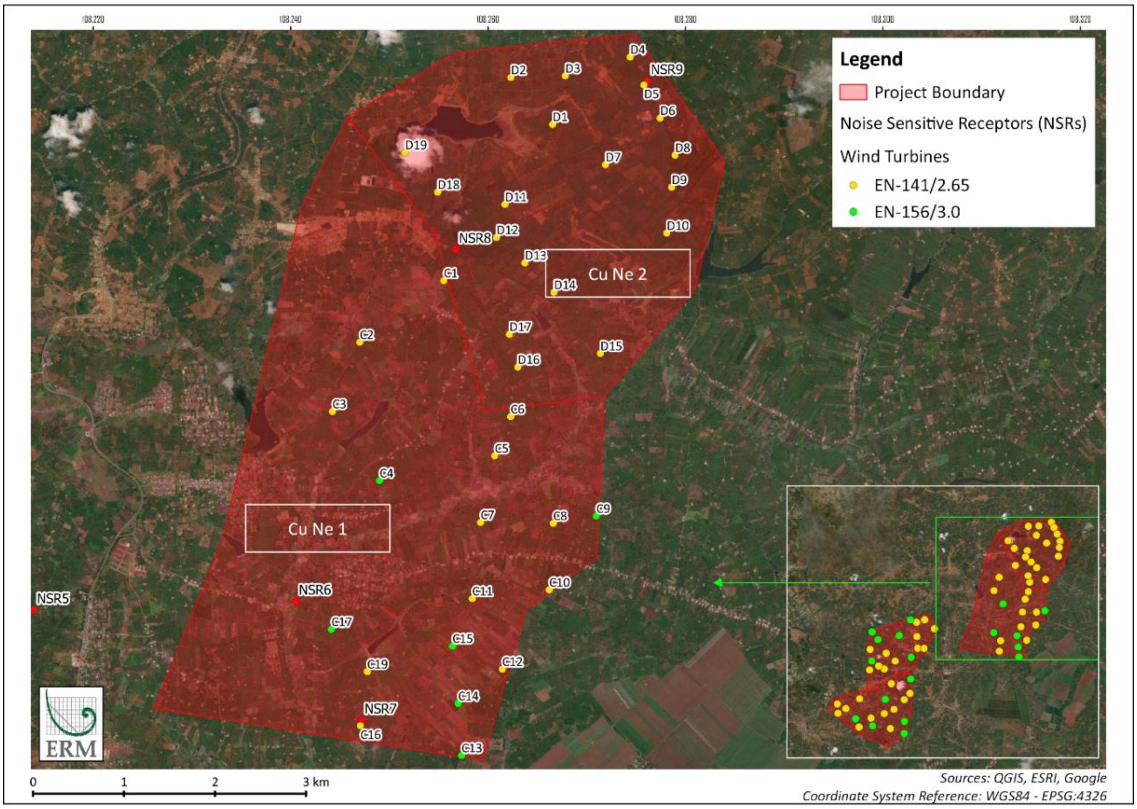

Source: QGIS, ESRI, Google, June 2021

**Figure 10.1 Potential Sensitive Receptors within 2 km Noise Buffer**




Source: QGIS, ESRI, Google, August 2021

**Figure 10.2 Noise Sensitive Receptors in KB1 and KB2**




Source: QGIS, ESRI, Google, August 2021

**Figure 10.3 Noise Sensitive Receptors in CN1 and CN2**

### 10.2.2.2 Background Noise Plots and Regression Analysis Results

Background noise is typically expected to increase as wind speed increases, as a result of wind-induced noise generated around objects or vegetation. The measured background noise levels ($L_{A90}$) for the night-time are plotted against the wind speed at a hub height of 130 metres to obtain a background versus wind speed characteristic.

The line of best fit for the data set is determined using a linear trend line. It provided the most realistic correlation between wind speed and background noise level.

The results of the background noise monitoring and analysis showing the measured noise data points are presented in Figure 10.4 to Figure 10.9 for NML1 to NML6. These plots show the line of 'best fit' curve during night-time given the threshold for noise level at night-time (45dbA) is more stringent than daytime (55dbA).

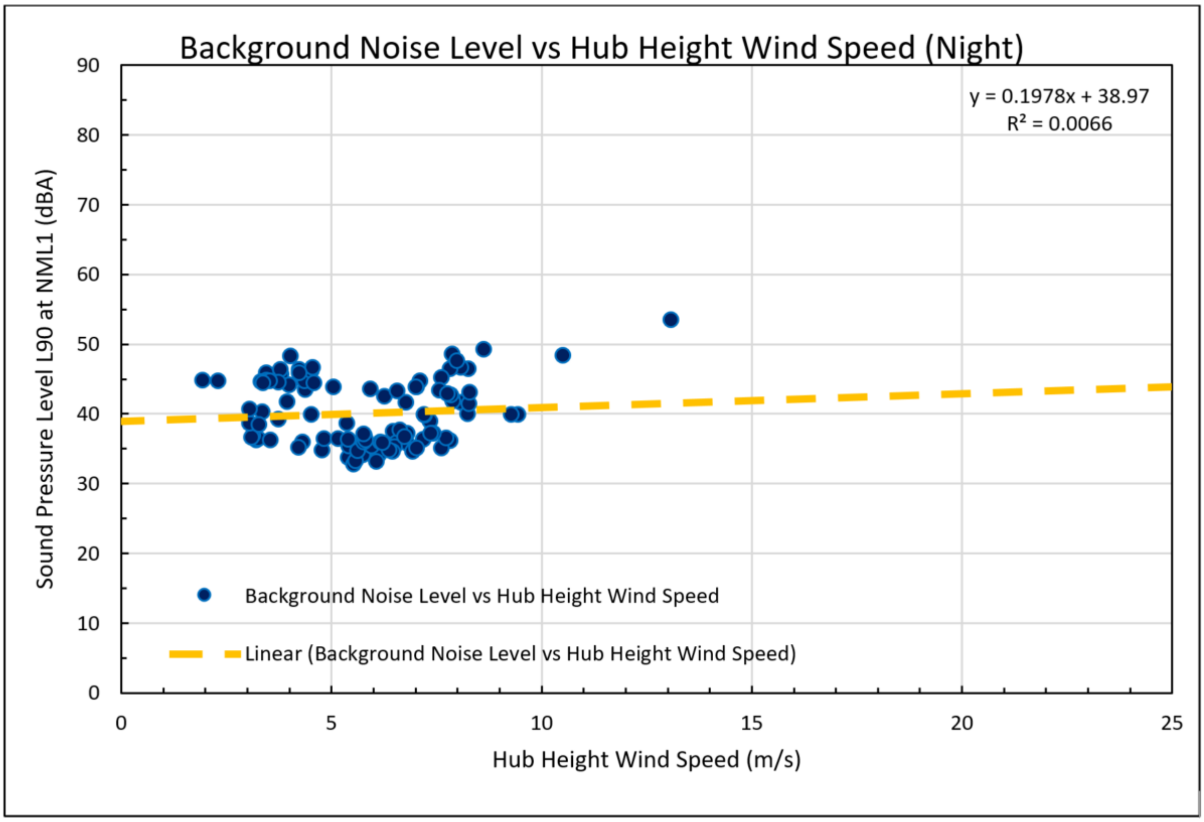



**Figure 10.4 NML1 Background Noise Curve**

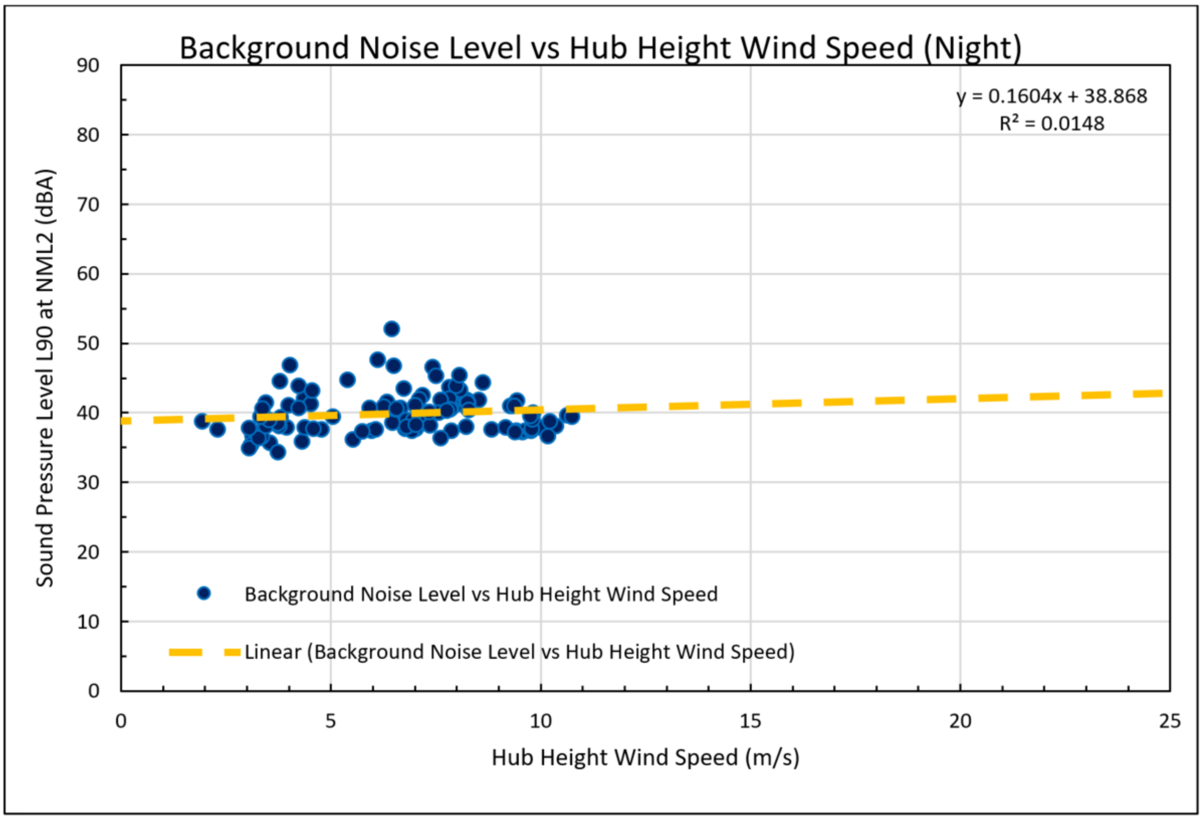



**Figure 10.5 NML2 Background Noise Curve**

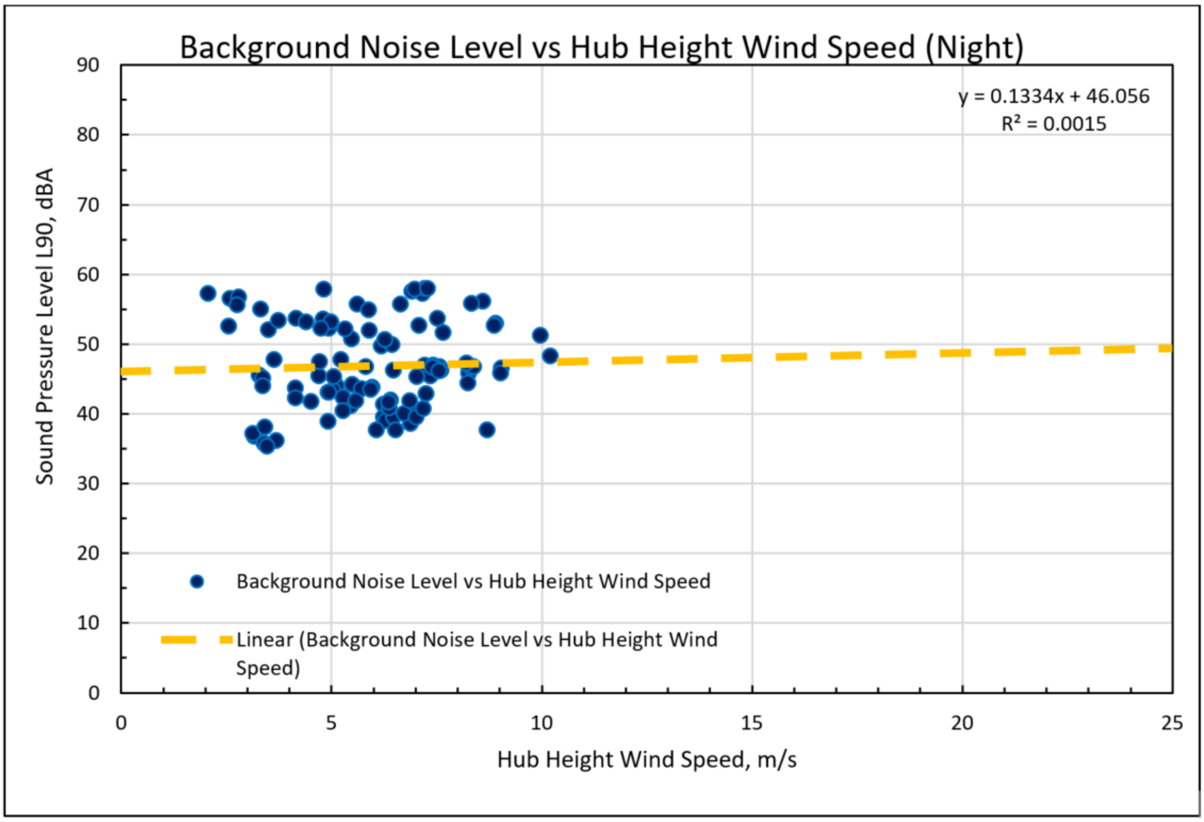



**Figure 10.6 NML3 Background Noise Curve**

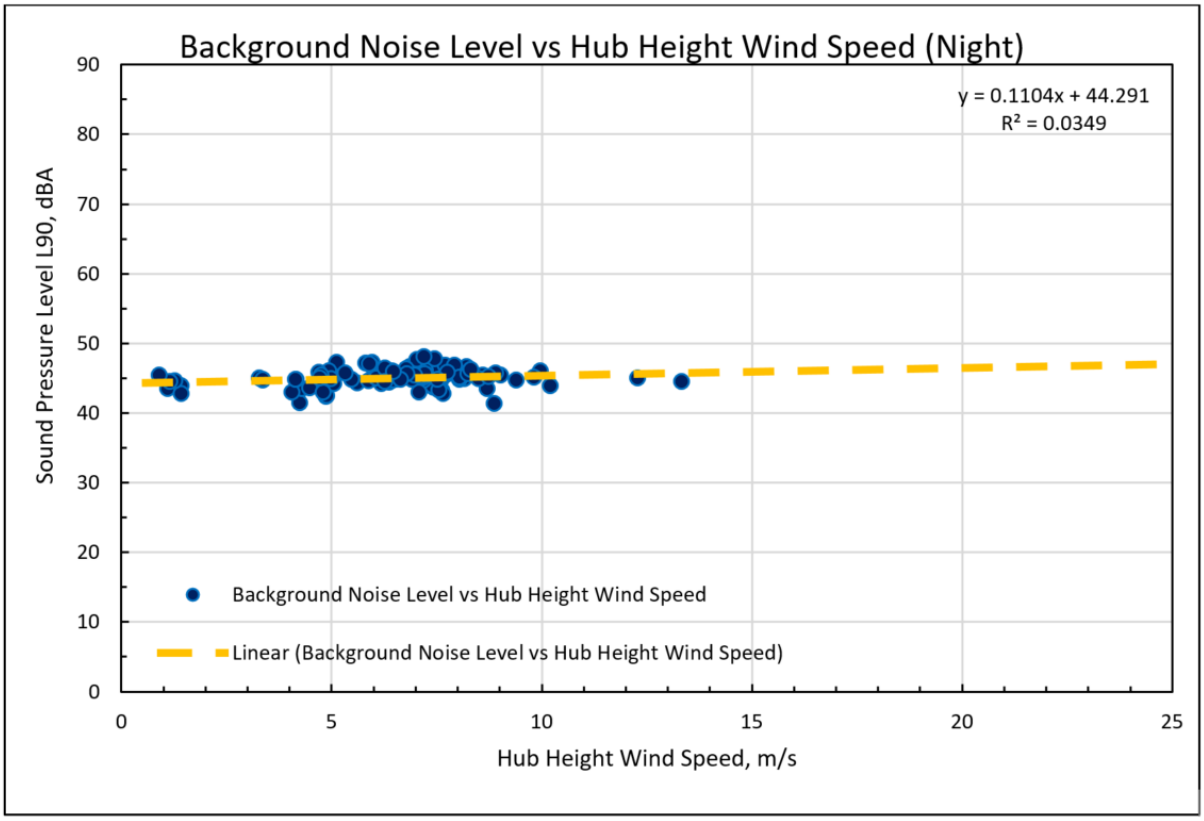



**Figure 10.7 NML4 Background Noise Curve**

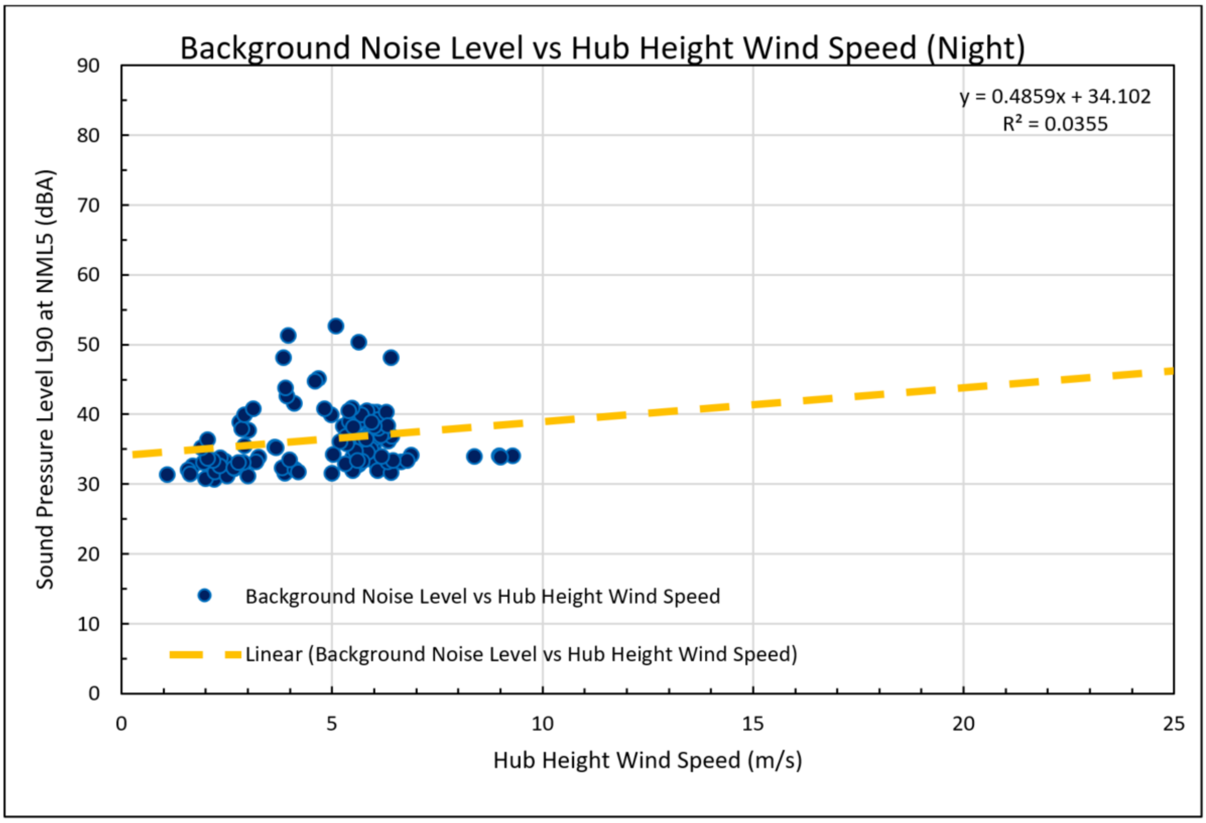



**Figure 10.8 NML5 background Noise Curve**

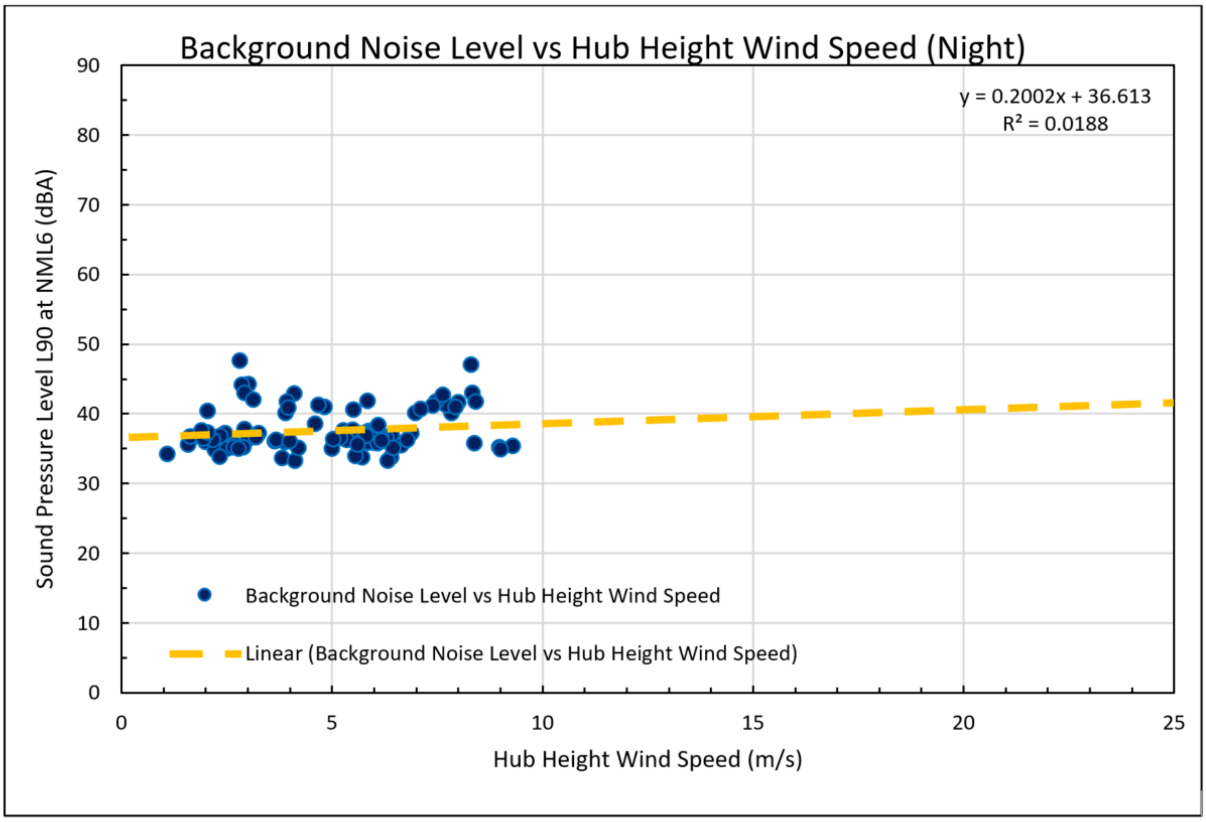



**Figure 10.9 NML6 Background Noise Curve**

## 10.2.3 Impact Assessment

### 10.2.3.1 Impacts during Construction Phase

#### *10.2.3.1.1 Potential Impacts*

During a Project's construction, a range of works and activities will be required at various locations within the area. Those with the potential to generate significant noise emissions include:

- Site preparation, construction and installation works associated with each of the proposed wind turbines
- Site preparation and building construction works associated any permanent facilities
- Construction and installation of the internal electrical network (between turbines) and any associated transmission lines, and
- Use of specialised (e.g. concrete batching plants) or unforeseen wind farm construction equipment, or activities that are to be undertaken.

#### *10.2.3.1.2 Existing Control*

The mitigation measures identified in the Feasibility Study Report and document namely Safe and Civilised Construction Plan provided by the Client include:

- Large noise sources such as concrete batching plant and motors should be reasonably arranged for operation time and placed at least 200 meters away from the residential areas
- Any traffics passing through the national roads, provincial roads and trails shall be abided by regulations of National Technical Standard *TCVN 5949-1998*. The speed and transportation time (only after 20:00) shall be in accordance to the regulated limitation

- All motor vehicles, heavy trucks, and construction equipment used in the Project must be checked regularly for noise and vibration
- Avoid construction works from 22:00 to 6:00AM in the next day, and
- Provide adequate PPEs (ear plugs) for workers as working in noisy areas.

### *10.2.3.1.3 Significance of Impacts*

A quantitative noise modelling assessment has not been conducted for construction phase; however, these works and activities (or similar activities) are expected to generate noise levels that would potentially generate direct and negative impacts. This is typical of many construction works associated with major developments. Elevated levels will not represent a constant or long-term emission that would be experienced by the community throughout the projects construction schedule, or for the operational life of the wind farm. Construction noise levels would only be experienced for limited periods of time (18 months) when works are occurring at only select locations; they would often not be experienced for full daytime, evening or night-time periods. Any impacts associated with these works would be temporary and will not represent a permanent impact on the community and the surrounding environment. The impact magnitude accordingly is assessed as **Small** for the noise impact in the construction phase.

The noise level is accelerated by many construction activities, in particular the wind turbine foundation construction which significantly affects to nearby residential areas. Based on the satellite image and data collected during the site survey, there are potentially 4,602 sensitive receptors within the 2 km noise buffer defined by the IFC EHS Guidelines, in which, 147 sensitive receptors are identified to locate in the radius of 300 m of wind turbines. The nearest identified sensitive receptor is only approximately 39 m away from WTG B2 in Krong Buk 2, Cu Ne Commune, Krong Buk District, Dak Lak Province. Sensitive receptors (147 as mentioned above) are not only permanent residential buildings but also temporary houses and/or places for local people to stay and rest during their cultivation. According to the social baseline survey, many people were still moving to live in these houses to take care of their cultivating land nearby the construction site. In addition, the presence of a large labour forces at the construction site attracts many other services as local people come and sell beverage for workers at the site. Hence, the receptor sensitivity is considered as **High** level during the construction phase.

Some noise from construction sites is inevitable, such that good construction management practices usually focus on minimising noise impacts, rather than only on achieving numeric noise levels. Good-practice construction noise management and noise mitigation techniques may be required for construction of the Project to reduce noise levels as far as reasonably practicable. These would need to be considered and then implemented, where necessary.

Based on the findings discussed above, suitable recommendations which can be considered and potentially implemented on-site are provided in Section 10.2.3.1 of this report. Construction noise and vibration levels would be reduced and impacts during this stage be minimised with the successful implementation of these recommendations. Impacts may not be reduced to negligible levels for all receptors during all construction activities; however, the recommendations are designed to ensure that any residual impacts are minimised as far as is reasonably applicable.

**Table 10.15 Noise Impact during Construction Phase**

<table>
<tr><th>Impact Description</th><th colspan="6">Noise impacts during Construction Phase</th></tr>
<tr><td>Impact Nature</td><td colspan="2">Negative</td><td colspan="2">Positive</td><td colspan="2">Neutral</td></tr>
<tr><td>Impact Type</td><td colspan="2">Direct</td><td colspan="2">Indirect</td><td colspan="2">Induced</td></tr>
<tr><td>Impact Duration</td><td>Temporary</td><td colspan="2">Short-term</td><td colspan="2">Long-term</td><td>Permanent</td></tr>
<tr><td>Impact Extent</td><td colspan="2">Local</td><td colspan="2">Regional</td><td colspan="2">International</td></tr>
<tr><td>Impact Frequency</td><td colspan="6">Intermittent over the construction period (18 months)</td></tr>
</table>

| Impact Description | Noise impacts during Construction Phase | | | |
|---|---|---|---|---|
| Impact Magnitude | Negligible | **Small** | Medium | Large |
| Receptor Sensitivity | Low | Medium | **High** | |
| Impact Significance | Negligible | Minor | **Moderate** | Major |

### *10.2.3.1.4 Additional Mitigation Measures*

Based on the findings of the qualitative construction noise assessment presented in the section above noise mitigation will be adopted as follows:

- Community engagement during the construction phase:
  - Engage with the community at the earliest to get their consent on some noisy activities and negotiate the best time to conduct some noisy work as the residents are not at home
  - Arrange the respite period for the noisy activities (5 – 10 minutes break every working hour), and
  - Alleviate community concern as construction noise is short-term and day time only. The noisiest is only at the place where the construction activities occur.
- During construction of the Project good practice construction noise mitigation and management measures should be implemented to reduce noise levels and minimise any impacts as far as reasonably practicable. A range of mitigation and management measures are available and those that are considered feasible, reasonable and practical to implement the specific tasks:
  - avoid unnecessary noise due to idling diesel engines and fast engine speeds when lower speeds are sufficient
  - ensure all machines used on the site are in good condition with limited number of allowed equipment at one location, with particular emphasis on exhaust silencers, covers on engines and transmissions and squeaking or rattling components. Excessively noisy machines should be repaired or removed from the site, and/or
  - ensure that all plant, equipment and vehicles movements are optimised in a forward direction to avoid triggering motion alarms that are typically required when these items are used in reverse.
- High noise generating construction works and activities should be limited to the daytime period (7:00 to 22:00), and work should be avoided on Sundays or public holidays if possible.
- Any works that are required during the night time period (22:00 to 7:00) should be justified and task-specific noise mitigation and management measures should be implemented to reduce noise impacts to the acceptable levels. These additional measures should consider the potential for sleep disturbance impacts that could occur during the night time period due to “peak” or “maximum” noise level events e.g. metal on metal contact, or general clangs and bangs.
- Works associated with transmission line and access road construction often require activities in closer proximity to receptors that are not affected by construction works at wind turbines, or permanent facilities. In these circumstances task-specific noise mitigation and management measures should be implemented (when works are close to receptors) to reduce noise impacts to acceptable levels.
- Construction road traffic and heavy vehicle movements have the potential to generate high “peak” or “maximum” noise level events and these should be limited during the night-time period, and avoided if possible. Where possible, significant noise generating vehicle movements should be limited to the daytime period. Where it is not possible for this to occur drivers should be instructed to arrive and depart as quietly as possible. Whilst on-site and in close proximity to receptors the

drivers should be instructed to implement good-practice noise management measures to reduce peak noise levels and minimise any impacts as far as reasonably practicable. During the works, instruct drivers to travel directly to site and avoid any extended periods of engine idling at or near residential areas, especially at night.

- If any validated noise complaints and grievances are received, the problem source and any potential noise reducing measures should be identified and evaluated for implementation during the works. If the noise complaint cannot be validated, no further mitigation or management measures are required.
- Limit unauthorised local people or any person coming near the construction site in order to reduce the unnecessary physical and mental health-related impact during the construction time.

No further recommendations for construction noise mitigation and management measures to those established by the findings of this assessment, and documented in this report, are provided or warranted for the Project. The Project personnel should, however remain aware of the potential for nuisance, or an unacceptable impact on amenity, to occur due to construction noise, continue to plan for and then manage construction works accordingly.

##### *10.2.3.1.5 Residual Impacts*

With the proposed mitigation measures, the residual impacts are supposed to be Minor.

##### *10.2.3.1.6 Monitoring and Audit*

Monitoring of Noise shall be conducted monthly at the same locations of the baseline monitoring survey and the starting point of Project access road from National Road No.14 during the construction phase till it finishes. The monitored parameters include $L_{Aeq}$ in accordance to *QCVN 26:2010/BTNMT* – National Technical Regulation on Noise and IFC EHS Guidelines. The EPC company shall conduct weekly checks (e.g. monitoring locations to cover nearest sensitive areas to project boundary and along the National Road and access road) to determine if corrective actions or additional measures should be put in place.

#### 10.2.3.2 Impacts during Operational Phase

##### *10.2.3.2.1 Impact Assessment Criteria*

Wind farm noise assessment criteria for receptors were based on the background noise plot against wind speed with the omission of non-wind sources, and on the limits defined in the ETSU-R-97 "*The Assessment & Rating of Noise from Wind Farms*" document referenced in the IFC Environmental, Health and Safety Guidelines for Wind Energy, 2015. Using this approach a noise limit was derived based on background noise which was 5 dBA above background noise ($L_{A90}$). Since wind turbine noise specification data are provided in terms of $L_{Aeq}$, the predicted $L_{Aeq}$ noise levels from the wind turbines cannot be compared directly to the $L_{A90}$ criteria. A further 2 dB has been added to convert the $L_{A90}$ criteria to enable direct comparison to the predicted $L_{Aeq}$ noise levels. This factor is based on the approximate difference between the two parameters for a typical wind farm based on the UK Institute of Acoustics (IOA) document "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise" (2013).

The IFC General EHS Guideline noise guidelines are also referenced in the IFC wind energy guidance, which are 55 dB $L_{Aeq,1\ hour}$ during the day (7:00 to 22:00) and 45 dB $L_{Aeq,1\ hour}$ at night (22:00 to 7:00). If the noise level measured at the noise sources exceeds the threshold regulated by IFC, the background noise will be applicable for assessment. Based on this methodology, the plots showing the impact assessment criteria relationship with hub height wind speed for each noise survey location (NML1 to NML6 for night-time only), where a line of 'best fit' was chosen with the omission of non-wind affected sources) are mentioned in Figure 10.4 to Figure 10.9.

### *10.2.3.2.2 Noise Prediction Method*

The noise model used in this study to predict wind farm noise levels at sensitive receptors is based on ISO 9613-2:1996 as implemented in the computer-based Predictor noise model. The model predicts noise level through spherical spreading and includes the effect of air absorption (as per ISO 9613-2:1996), ground attenuation and shielding. The further advice provided by the UK IOA which is referenced in the IFC wind farm guidance has also been adopted.

Predicted $L_{Aeq}$ noise levels were calculated based upon sound power levels determined in accordance with the recognised standard IEC-61400-11:2012 "*Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques*", where available, for the wind range of 3 m/s to 20 m/s (referred to cut-in and cut-out wind speed specs of two wind turbine types).

Key features, inputs and assumptions that have informed the noise modelling and assessment are reproduced or outlined in Table 10.16 below.

**Table 10.16 Assessment Features, Inputs and Assumptions**

| ID | Features | Description |
|---|---|---|
| 1 | General Acoustics | All sound pressure levels presented in this report (e.g. noise levels predicted at a receptor) are in decibels referenced to 2 x $10^{-5}$ Pa, with A-weighting applied. All sound power levels presented in this report (e.g. noise levels assigned to specific sources) are decibels referenced to $10^{-12}$ W, with A-weighting applied. |
| 2a | Noise Modelling | Predictor noise modelling software package was utilised to calculate noise levels using the ISO 9613:2 noise propagation algorithms (international method for general purpose, 1/1 octaves). For sound calculated using ISO 9613:2, the indicated accuracy is ± 3dBA at source to receiver distances of up to 1000 metres and unknown at distances above 1000 metres. |
| 2b | | The Predictor software package allows 3D elevation data to be combined with ground regions, water, foliage, barriers, significant building structures etc. and receptor locations, to create a detailed and accurate representation of the wind farm and surrounding area. The noise model allows for the quantification of noise levels from multiple sources, based on sound levels emitted from each source. It computes the noise propagation in the assessment area of influence to specifically quantify A-weighted decibels, $L_{eq}$ in dBA at identified noise-sensitive receptors. |
| 2c | | A ground absorption factor of 0.5 was adopted across the entire modelled region, which represents an absorption factor for partly soft ground. |
| 3 | Noise Source Data | ■ Sound Power Level ($L_W$, dBA) data (overall $L_W$ values) incorporated into the project-specific noise model for the Envision wind turbine model was provided for use in this assessment by the manufacturer. The Envision data identified the $L_W$, dBA value of:<br>- each wind turbine model (standard blades) at wind speeds between cut-in and cut-out e.g. 3 to 20 metres per second (m/s); and<br>- operation mode of wind turbine EN-141/2.65 (calculated for worst case scenario)<br>■ The key document referenced to quantify main source emissions for the Envision turbines provided by the Project owners is Document No.: EN-141/2.65 MW Wind Turbine General Specification and EN-156/3.0 MW Wind Turbine Generator Product Manual.<br>■ Spectral data (dBA per frequency band in 1/1 octaves).<br>■ Hub height of 130 metres has been adopted for all EN-156/3.0 and EN-141/2.65 wind turbines.<br>■ Potential cumulative wind farm noise impacts:<br>- Noise modelling of potential cumulative wind farm noise takes into account predicted noise levels from nearby wind farms including Tay Nguyen and Ea Nam wind farms, given their potential to contribute to noise levels at NSRs associated with the Project. The cumulative impact assessment will be further assessed in later Chapter<br>- Sound power level data was assumed in this report, adopting a worst-case approach for the candidate turbines.<br>■ A conservative hub height was adopted for all WTGs where data supplied by the client were unavailable |

#### *10.2.3.2.3 Noise Emission Sources*

The noise specifications adopted for the purpose of this assessment are presented in Table 10.17. These specifications are for wind speeds between 3 m/s and 20 m/s. Below 3 m/s significant differences in levels and impacts are not anticipated and above 20 m/s noise level results are expected to be equal to that modelled for the 20 m/s wind speed scenario.

The reference spectrum (noise level in dBA for each 1/1 octave band between 31.5 Hz and 8000 Hz), was taken from the Envision EN-141/2.65 MW and EN-156/3.0 MW wind turbine corrected to 109.1 and 106.99 dB(A), respectively and is also presented in Table 10.17. This spectrum is from Predictor V2020 wind turbines database. The sound power levels are presented for the highest overall sound power value used in the assessment (109.1 and 106.99 dBA) which applies at 9 m/s wind speed and above. The sound power spectrum has been adjusted at lower wind speeds to represent the lower sound power values that are generated.

**Table 10.17 Envision Reference Spectrum Used to Represent Envision EN-141/2.65 MW and EN-156/3.0 MW**

| Make, Model, Mode, Wind Speed | Spectral Data – dBA in 1/1 Octave Bands: 31.5 to 8kHz | | | | | | | | | Overall $L_W$ (dBA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| EN-156/3.0 MW | 78.35 | 85.99 | 91.42 | 97.24 | 102.25 | 98.53 | 92.8 | 89.74 | 86.16 | 106.99 |
| EN-141/2.65 MW | 68.4 | 80.3 | 89.9 | 97.4 | 102.2 | 98.1 | 90.8 | 80.7 | 67.1 | 109.1 |

#### *10.2.3.2.4 Representative Noise Sensitive Receptors for Modelling*

A total of four representative Noise Sensitive Receptors (NSRs) were chosen as the closest in each group of receptors within areas most likely to be affected. These are described in Table 10.18 below.

**Table 10.18 Representative Noise Sensitive Receptors**

| Receptor ID | Coordinates (WGS 84) | | Comments |
|---|---|---|---|
| | Longitude | Latitude | |
| NSR 1 | 108.16395 | 13.02287 | Representative of closest residential properties in Buon Druong Village, Cu Pong Commune, Krong Buk District. NSR 1 is located approximately 253 metres of the nearest wind turbine A18. Associated noise monitoring location is NML6. |
| NSR 2 | 108.19611 | 13.02850 | Representative of closest residential properties in Buon Moi Village, Cu Pong Commune, Krong Buk District. NSR 2 is located approximately 106 metres of the nearest wind turbine A17. Associated noise monitoring location is NML5. |
| NSR 3 | 108.17946 | 13.04375 | Representative of closest residential properties in Buon Moi Village, Cu Pong Commune, Krong Buk District. NSR 3 is located approximately 80 metres of the nearest wind turbine B9. Associated noise monitoring location is NML5. |
| NSR 4 | 108.20317 | 13.06922 | Representative of closest residential properties in Buon Kdro 2 Village, Cu Ne Commune, Krong Buk District. NSR 4 is located approximately |

| Receptor ID | Coordinates (WGS 84) | | Comments |
|---|---|---|---|
| | Longitude | Latitude | |
| | | | 39.2 metres of the nearest wind turbine B2. Associated noise monitoring location is NML4. |
| NSR 5 | 108.21397 | 13.065752 | Representative of closest residential properties in Buon Kdro 2 Village, Cu Ne Commune, Krong Buk District. NSR 5 is located approximately 120 metres of the nearest wind turbine B19. Associated noise monitoring location is NML4. |
| NSR 6 | 108.24051 | 13.06662 | Representative of closest residential properties in Buon Dhia 1 Village, Cu Ne Commune, Krong Buk District. NSR 6 is located approximately 504 metres of the nearest wind turbine C17. Associated noise monitoring location is NML3. |
| NSR 7 | 108.24717 | 13.054590 | Representative of closest residential properties in Buon Kdro 2 Village, Cu Ne Commune, Krong Buk District. NSR 7 is located approximately 64.3 metres of the nearest wind turbine C16. Associated noise monitoring location is NML4. |
| NSR 8 | 108.25673 | 13.102260 | Representative of closest residential properties in Ea Nguoi Village, Cu Ne Commune, Krong Buk District. NSR 8 is located approximately 374 metres of the nearest wind turbine C1. Associated noise monitoring location is NML2. |
| NSR 9 | 108.27617 | 13.119350 | Representative of closest residential properties in Quang Trung Village, Ea Tan Commune, Krong Nang District. NSR 9 is located approximately 62 metres of the nearest wind turbine D5. Associated noise monitoring location is NML1. |

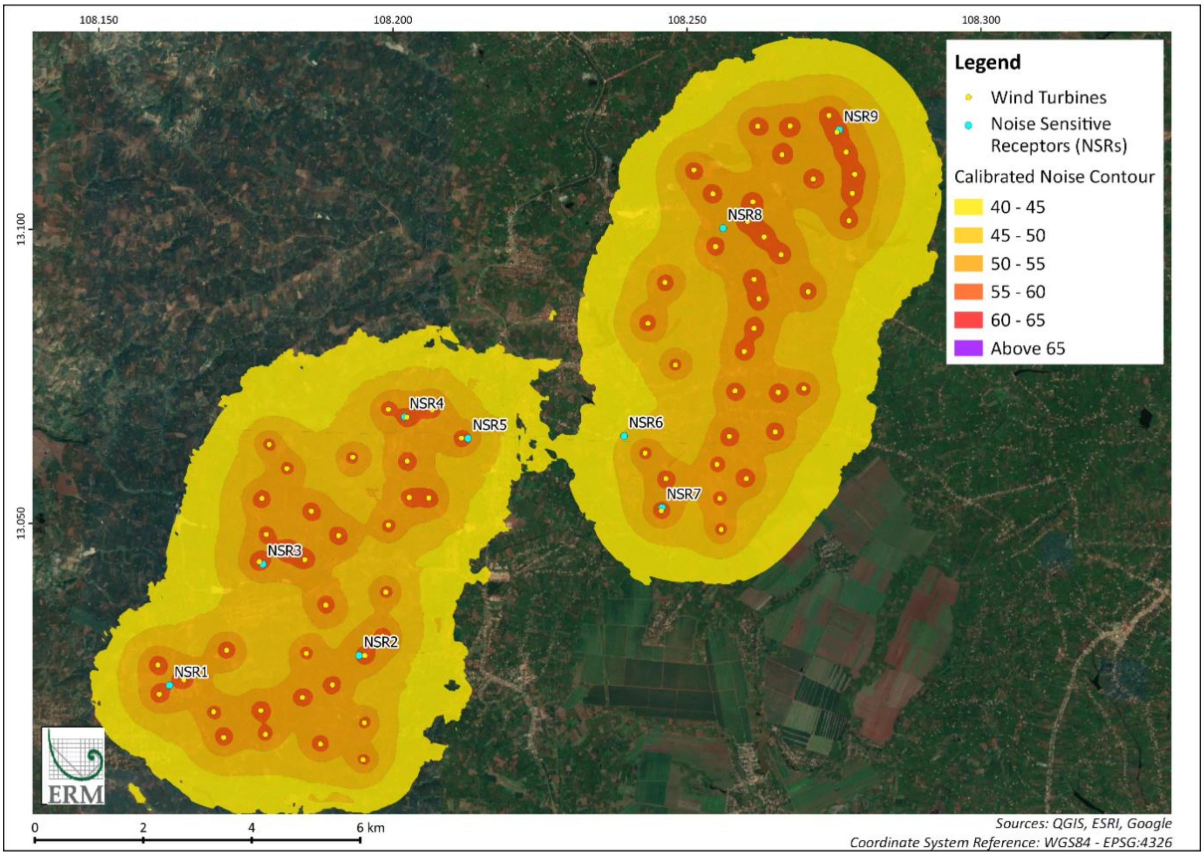
*Note 1: Universal Transverse Mercator coordinate system*

#### *10.2.3.2.5 Predicted Wind Farm Operational Noise Levels*

The resultant worst-case operational noise levels from the Project for each NSR are presented in Table 10.20. Noise contour maps for the Project operating in the acoustically worst-case mode, are provided in Figure 10.10.

**Table 10.19 Predicted Operational Noise Levels at NSRs (LAeq)**

| Wind Speed at Hub Height (m/s) | Predicted Noise Level at NSR 1 | Predicted Noise Level at NSR 2 | Predicted Noise Level at NSR 3 | Predicted Noise Level at NSR 4 | Predicted Noise Level at NSR 5 | Predicted Noise Level at NSR 6 | Predicted Noise Level at NSR 7 | Predicted Noise Level at NSR 8 | Predicted Noise Level at NSR 9 |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 49 | 51 | 52 | 53 | 52 | 40 | 53 | 47 | 53 |
| 4 | 49 | 51 | 52 | 53 | 52 | 40 | 53 | 47 | 53 |
| 5 | 49 | 51 | 52 | 53 | 52 | 40 | 53 | 47 | 53 |
| 6 | 49 | 51 | 52 | 53 | 52 | 40 | 53 | 47 | 53 |
| 7 | 55 | 57 | 58 | 58 | 57 | 46 | 58 | 52 | 59 |
| 8 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 9 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 10 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 11 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 12 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 13 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 14 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 15 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 16 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 17 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 18 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 19 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 20 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 21 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 22 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 23 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 24 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |
| 25 | 55 | 57 | 58 | 59 | 57 | 46 | 58 | 53 | 59 |




Source: QGIS, ESRI, Google, August 2021

**Figure 10.10 Worst-case and Operational Noise Contours of the Project**

### *10.2.3.2.6 Discussion of Predicted Wind Farm Noise*

Wind farm noise predictions have been undertaken at each of the representative receptors (NSRs) for operations. Figure 10.11 to Figure 10.16 show the predicted noise levels without mitigation and a comparison with night-time impacts assessment criteria at four NSRs (as assumed that night-time is the most stringent noise level regarding IFC standard). These results are discussed further below.

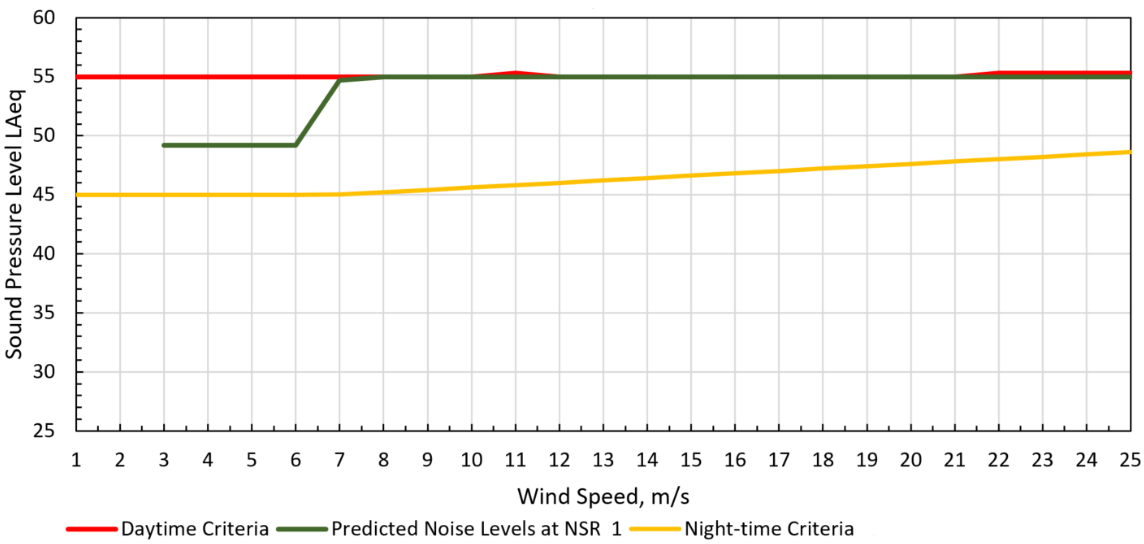



**Figure 10.11 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR 1 (which refers to Baseline Location NML 6)**

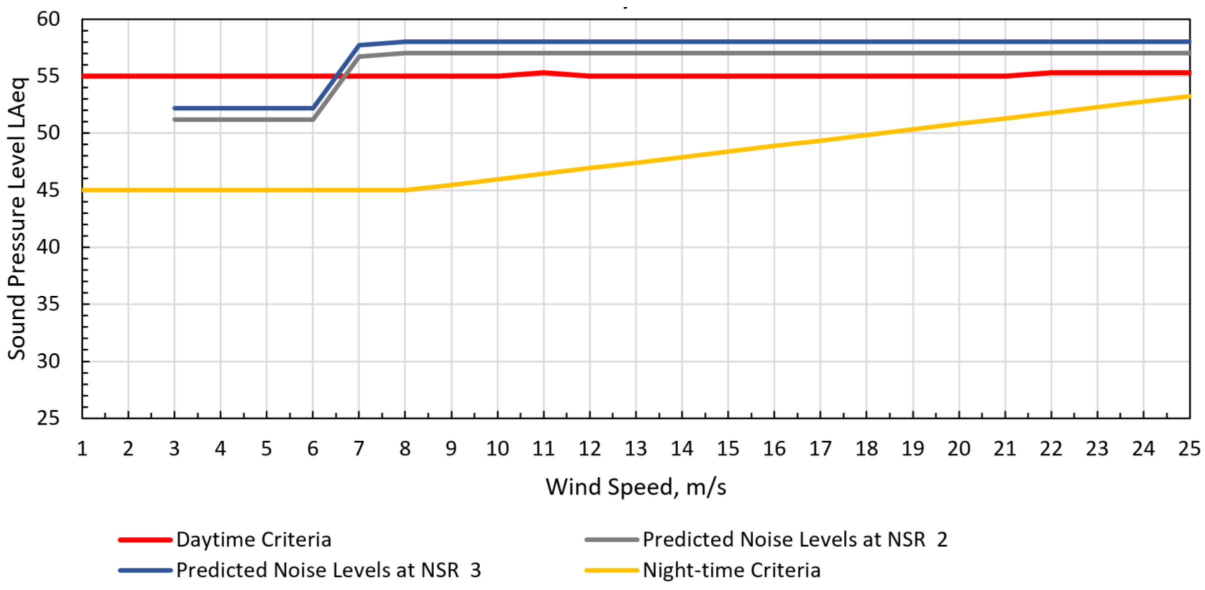



**Figure 10.12 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR 2 and NSR 3 (which refer to Baseline Location NML 5)**

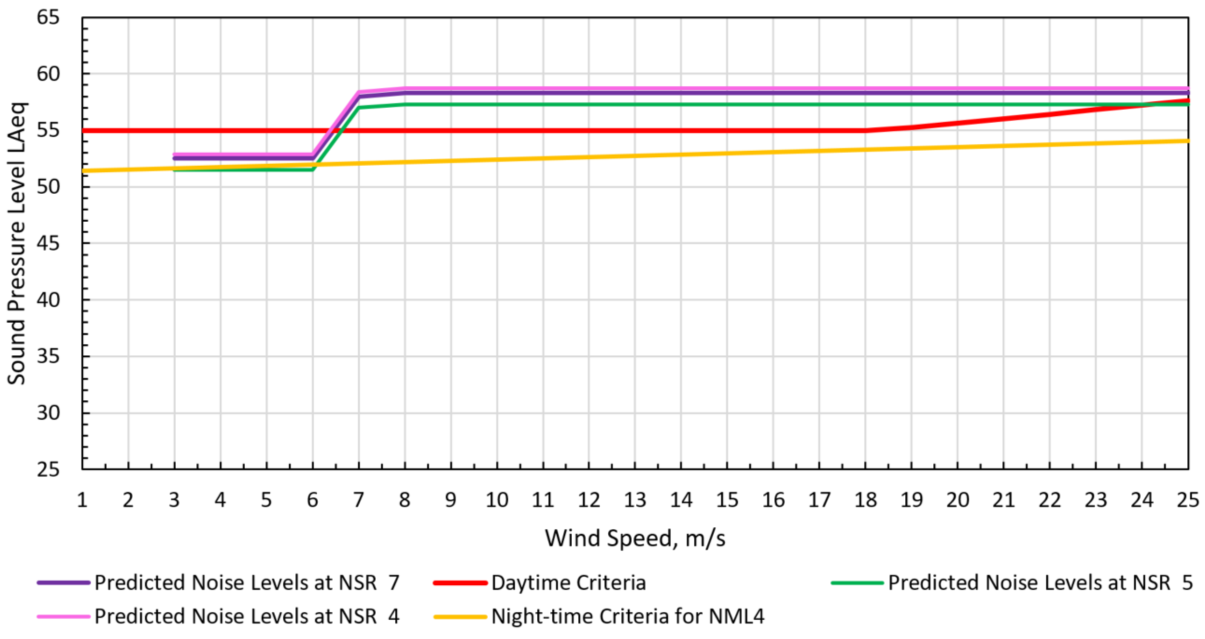



**Figure 10.13 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR 4, NSR 5, and NSR 7 (which refers to Baseline Location NML 4)**

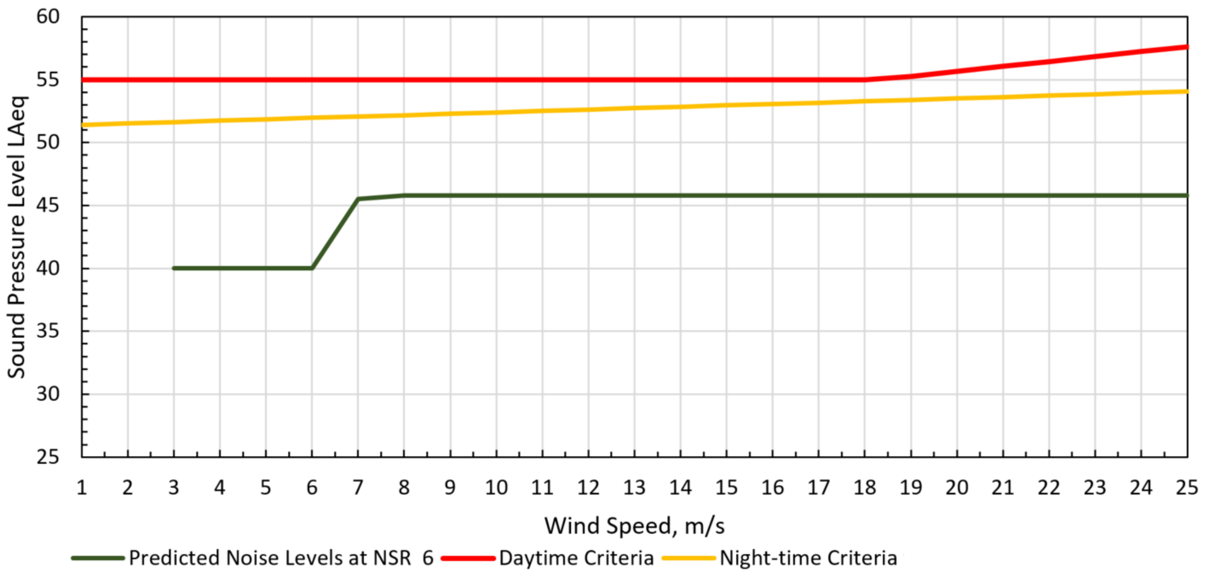



**Figure 10.14 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR6 (which refers to Baseline Location NML3)**

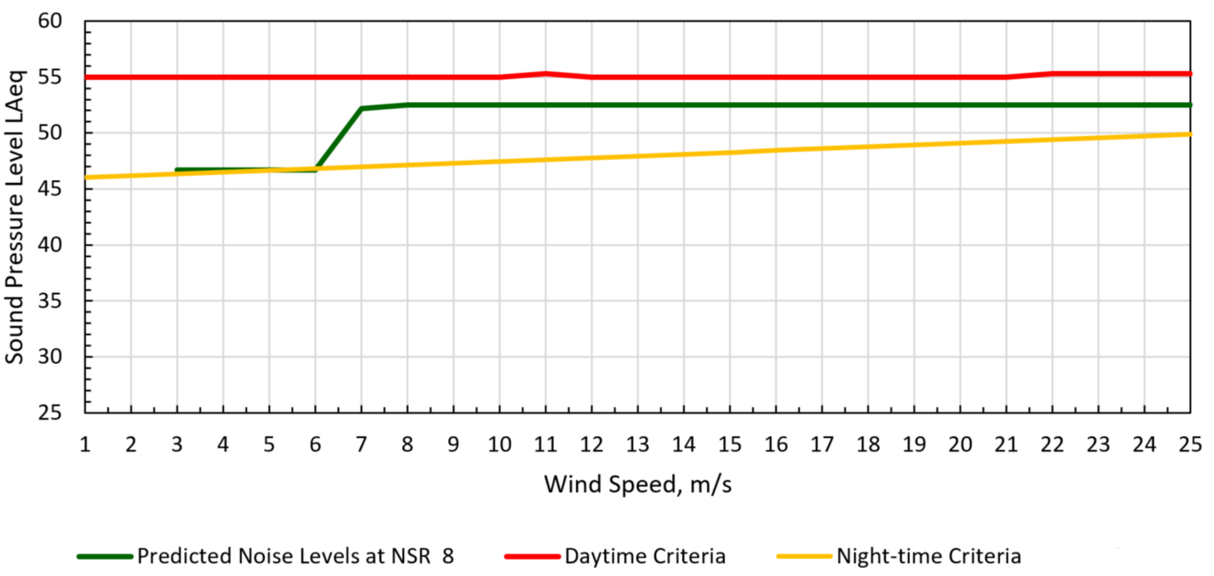



**Figure 10.15 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR8 (which refers to Baseline Location NML2)**

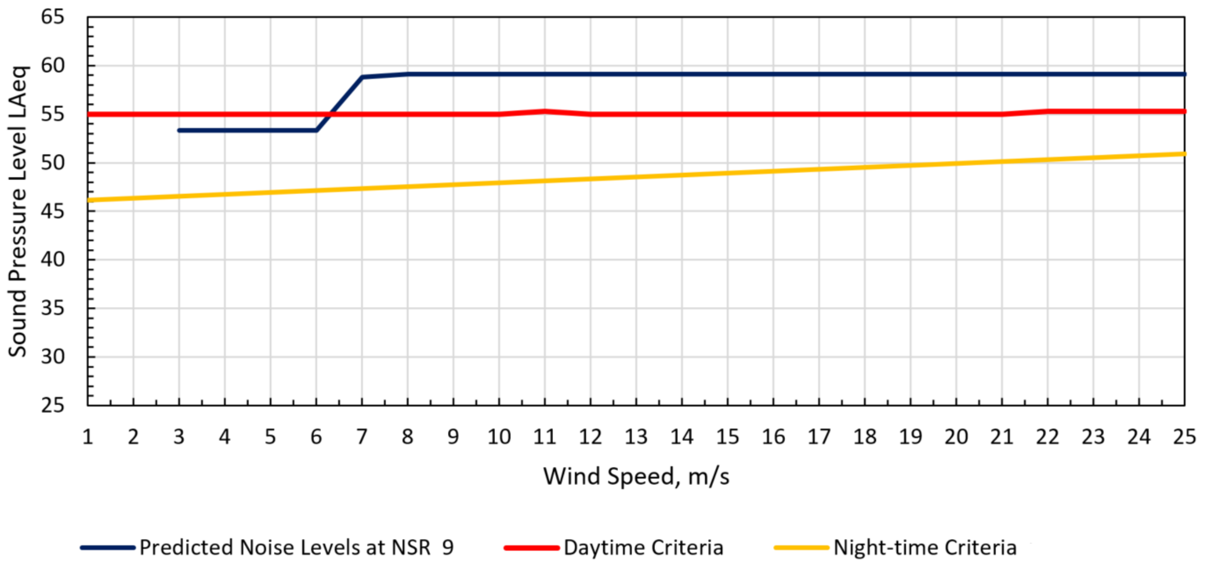
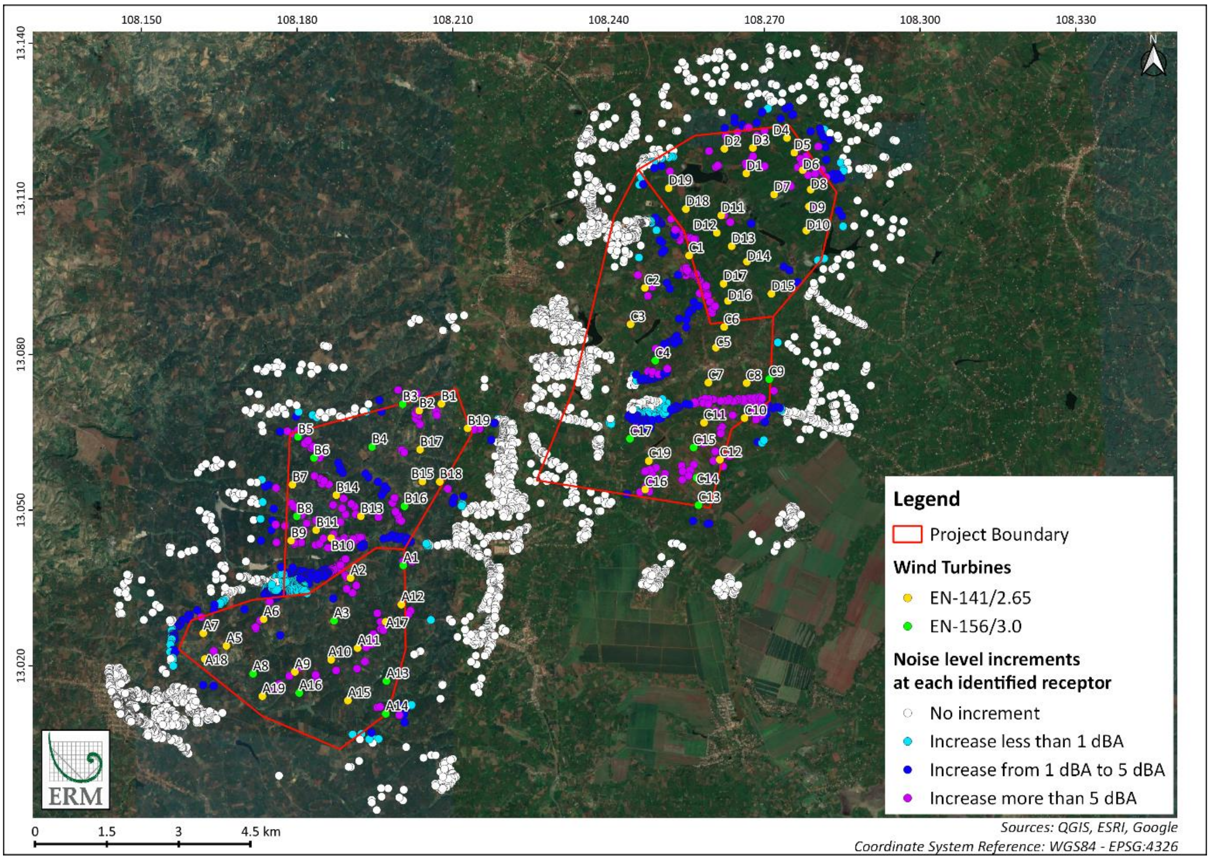



**Figure 10.16 Predicted Wind Farm Noise Levels and Noise Assessment Criteria against (Hub Height) Wind Speed for NSR9 (which refers to Baseline Location NML1)**




Source: QGIS, ESRI, Google, June 2021

**Figure 10.17 Classification of Sensitive Receptors with regards to the Noise Level Increments from the Project's WTGs**

Overall, total eight NSRs namely NSR1, NSR2, NSR3, NSR4, NSR 5, NSR7, NSR8, and NSR9 over nine having noise impacts are predicted to be exceeded the stipulated limit (at 45dBA) in the IFC EHS guideline and ambient noise level of each correspondence NMLs for the night-time. Among eight NSRs, NSR5 and NSR8 are predicted to exceed the night-time criteria at wind speed of over 6m/s. Only one

NSR6 is predicted to have no noise impacts during night-time in comparison to background noise at NML3. Noise levels calculated at NSR1, NSR2, NSR3, NSR4, NSR5, NSR7, NSR8, and NSR9 associated with background noise level at NML1, NML2, NML4, NML5, and NML6 are expected to be over maximum 13dBA when wind speed reaches 7 – 8 m/s. During day time, there are only three NSRs including NSR1, NSR6, and NSR8 receiving noise level lower than the regulated limit (55dBA) according to IFC EHS Guidelines and background noise associated with the background noise level at NML2, NML3, and NML6. The remaining six over nine NSRs exceeded 3 – 4 dBA in comparison to the noise level of standard and baseline at wind speed of 6.5 m/s. Figure 10.17 presents the noise level increments for each identified receptors as mentioned in Figure 10.1 due to the operation of the Project's WTGs. Out of 4,602 identified receptors within the two-kilometre buffer, it is anticipated that:

- 3,524 (76.57%) identified receptors are already under the noise level threshold
- 333 (7.24%) identified receptors will received a noise level at the increment of less than 1dBA. A change in sound level of 1 dB cannot be perceived[13].
- 415 (9.02%) identified receptor will received a noise level at the increment of more than 1dBA but less than 5dBA. A change in sound level within this range is considered a barely discernible difference[wo], and
- 330 (7.17%) identified receptors will received a noise level at the increment of more than 5dBA out of which 147 receptors are located within the WTGs safety zones (300.75 m for the EN-141/2.65 and 312 m for the EN-156/3.0). A change in sound level of 5 dB will typically result in a noticeable community response[13].

#### *10.2.3.2.7 Significant of Impacts*

The assessment has indicated that noise impacts from the Project's WTGs operations are expected to be the most significant at NSR3 and NSR9 during the night-time because predicted noise levels are above criteria at maximum 13dBA at wind speed of 7 – 8 m/s when operating at the acoustically worst-case scenario. In addition, according to provided wind data (See Chapter 7 Environmental Baseline), it is observed that the wind speeds at 120 m are regularly fallen from 7 m/s to 8 m/s which means NSR3 is also expected to mostly receive at maximum +13dBA on top of current noise levels within the Project's area. For the remaining seven NSRs including NSR1, NSR2, NSR4, NSR 5, NSR7, NSR8, and NSR9, the predicted noise levels are also exceeded 4-12dBA in comparison to the background noise criteria at wind speed over 6.5 m/s. Therefore, the impact magnitude is therefore considered **Large**.

During the operation, the wind turbine noise exposure can cause direct and negative effect such as disturbance and potential health impact on local people living in nearby residential areas for long-term period (20 years of operation in this case). There are many publications showing the negative health-related effect on human such as physiological (blood pressure rising, headache, hearing loss and sleep disturbance) and psychological (annoyance or nervousness) symptoms[14 15]. In addition, the closer the distance of exposing to the noise source, the more significant the impact will be. Also mentioned in Section 10.2.3.1.3, due to a dense of sensitive receptors situating around the WTGs, the impact associated with noise accelerates significantly during the operation phase. Hence, the sensitivity of receptors in the area is considered **High**. Therefore, the negative impact is ranked as being of **Major** significance, as shown in Table 10.20.

**Table 10.20 Noise Impact Significance during Operation Phase**

| Impact Description | Noise Disturbance and Potential Health Impact | | |
|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral |

[13] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.525.6394&rep=rep1&type=pdf
[14] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5551191/
[15] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4256253/

| | | | | |
|---|---|---|---|---|
| **Impact Type** | **Direct** | Indirect | Induced | |
| **Impact Duration** | Temporary | Short-term | **Long-term** | Permanent |
| **Impact Extent** | **Local** | Regional | Global | |
| **Frequency** | Operational noise levels may occur intermittently or continuously depending on wind conditions and WTG operations in the operation phase | | | |
| **Impact Magnitude** | Negligible | Small | Medium | **Large** |
| **Receptor Sensitivity** | Low | Medium | **High** | |
| **Impact Significance** | Negligible | Minor | Moderate | **Major** |

### 10.2.3.2.8 *Additional Mitigation Measures*

Below are some mitigation measures in terms of IFC hierarchy recommended for noise impact during the operation phase:

- Routine maintenance of wind turbines should also be conducted during the operation phase, with specific attention to equipment degradation that may cause further noise impacts. Any equipment that is abnormally noisy should be evaluated and repaired as necessary to return emissions to typical operating performance.
- Community grievance mechanism should be applied. It is recommended that if any repeated/validated noise complaints are received then compliance monitoring should be undertaken at the most affected receptors to confirm predicted noise levels. Where noise monitoring occurs, the work should be scoped and then conducted by a suitably experienced person. The purpose of the monitoring is to understand in-situ levels and to provide a comparison to predicted levels such that any additional controls be identified and then implemented if feasible, reasonable and practical to do so. If this is required:
  - All project / site noise levels should be measured in the absence of any influential source not associated with the project
  - If the measured site noise levels are below the predicted values and comply with the applicable thresholds, limits or criteria identified for each noise aspect, no further noise control is required, and
  - If the measured site noise levels are above the predicted noise levels or the applicable thresholds, limits or criteria identified for each noise aspect, further noise control should be considered.
- Closely collaborating with local authorities to ensure local people are well aware of the predicted noise exceedance areas and notify the potential impacts to local residents in case of new houses are proposed within those areas.
- Other receptors (183 receptors) outside of the buffer safety area of WTGs receiving a noise level at the increment of more than 5dBA shall also be closely communicated and monitored the noise impact level from wind turbine operation via different communication channels (village heads, Project's grievance mechanism, and local authorities).
- Operational curtailment: In certain jurisdictions, there may be requirements to shut down wind turbines in some periods during the specific meteorological conditions to meet the regulated noise emission at nearby dwellings.
- Consider to replace these WTGs (WTG A17, WTG B9 and WTG D5 associated with NSR2, NSR3 and NSR9 which generated high noise level exceeding 12-13 dBA more than the standard) with the quieter or even relocate these to the less sensitive areas to take advantage of distance and shielding.

- In the worst case scenario where the replacement or relocation of wind turbines is failed to minimise the generated high noise level, the removal of wind turbines (WTG A17, WTG B9, and WTG D5) shall be carefully considered.
- Relocation of potential sensitive receptors, particularly identified households living within the buffer safety area of 300 m of eight WTGs including WTG A17 (4 sensitive receptors – SRs), WTG A18 (1 SR), WTG B2 (6SRs), WTG B9 (3SRs), WTG B19 (8SRs), WTG C1 (1SR), WTG C16 (5SRs), and WTG D5 (4SRs), who are predicted to be significantly affected by noise impact, is highly recommended, nevertheless a validation survey is recommended which includes additional survey to perform a census of the exact affected households and uses. Activities like agriculture, are not restricted in safety buffer areas according to national and international applicable standards. In this case, the relocation plan shall be developed and managed by the Project's owner. These 32 receptors out of 147 receptors located within the WTGs' safety zones are identified as severely impact by the noise more than others.

#### *10.2.3.2.9 Residual Impacts*

The residual impact is still considered as Major due to the high density of residential within the Project's area. The Project's owner shall be responsible for applying the mitigation measures and re-assessing the implementation to ensure that the noise level at the potential affected receptors is met the permissible threshold of national and international standards.

#### *10.2.3.2.10 Monitoring and Audit*

It is suggested that monitoring of noise will be conducted quarterly at representative areas of Noise sensitive receptors during the operation phase. The monitored parameters include $L_{A90}$ and $L_{Aeq}$ in accordance to *QCVN 26: 2010/BTNMT* – National Technical Regulation on Noise. Additionally, noise-related complaints should be monitored through the Project's grievance mechanism.

## 10.3 Water Resource Impact Assessment

### 10.3.1 Scope of Assessment

According to Feasibility Study Report, water for construction activities will be taken from nearby reservoir or local drilling wells. This section discusses the potential impacts of the Project's construction activities to the surface water and groundwater.

Activities causing the potential impacts to surface water availability and quality as well as receptors of the impacts are described in Table 10.21.

**Table 10.21 Scope of Water Resource Assessment – Construction Phase**

| Potential Activities | Potential Impacts | Potential consequences | Receptors |
|---|---|---|---|
| Land preparation and civil works<br><br>Construction of transmission line, access road, wind turbine foundation, and laydown area<br><br>Operation of temporary facilities such as the concrete batching plant | ▪ Increased turbidity due to suspended solid concentration into nearby lakes, rivers and Streams<br>▪ Increased contaminants such as heavy metals, oil and grease etc. into surface water bodies from construction activities<br>▪ Waste discharged from construction activities and worker's activities | ▪ Decreased quality in surface water bodies (creeks) which is used by the local people for their domestic purposes.<br>▪ Water shortage for nearly receptors | ▪ Water supplies: domestic water users<br>▪ Downstream surface water users in the Project's proximity. |

| Potential Activities | Potential Impacts | Potential consequences | Receptors |
|---|---|---|---|
| Water consumption for worker's activities - groundwater. | ■ Spillage of oil, chemicals, hazardous chemical from use of vehicles and construction machines during the construction phase, and<br>■ Reduction in downstream water availability, conflicts with surface water users. | | |
| Waste and wastewater management from construction activities and worker's activities | | | |
| Hazardous waste storage and handling | | | |

## 10.3.2 Relevant Guidelines and Criteria

### 10.3.2.1 Vietnam Regulations

- *Circular No. 16/2009/TT-BTNMT* dated 7 October 2009 on guiding the implementation of National technical regulations on environmental protection
- *Circular No. 32/2013/TT-BTNMT* dated 25 October 2013 on guiding the promulgation of National technical regulations on environment
- *QCVN 08-MT:2015/BTNMT* – National Technical Regulation on Surface Water Quality
- *QCVN 09-MT:2015/BTNMT* – National Technical Regulation on Groundwater Quality
- *QCVN 14:2008/BTNMT* – National Technical Regulation on Domestic Wastewater
- *Decree No. 149/2004/ND-CP*: Government Decree on Regulation on Insurance of Permits for Water Resource Exploration, Exploitation and Use, or for Discharge of Wastewater into Water Source, and
- *Decree No. 67/2003/ND-CP* regarding Environmental Protection Fees and Charges for Wastewater.

### 10.3.2.2 International Guidelines

- ESS1: Environmental and Social Assessment and Management: To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimise, mitigate, offset or compensate for them
- IFC Performance Standard 3: Resource Efficiency and Pollution Prevention requires the Project to consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and environment
- IFC Performance Standard 6: Biodiversity Conversation and Sustainable Management of Living Natural Resources recognized that protecting and conserving biodiversity, maintaining ecosystem services and sustainably managing living natural resources and fundamental to sustainable development
- IFC General EHS Guidelines (Section 1.3, 2007): Wastewater and Ambient Water Quality contains guidelines for projects that have discharge of process water, wastewater from utility operations or storm water to environment. The guidelines provide suggested approaches for the management of wastewater, including water conservation, wastewater treatment, storm water management and wastewater and water quality monitoring

- IFC General EHS Guidelines (Section 1.4, 2007): Water Conservation contains general recommendations for water conservation programmes, water monitoring and management programmes and process water reuse and recycling, and
- IFC General EHS Guidelines (Section 4.0, 2007): Construction and Decommissioning provides specific guidance on prevention and control of community health and safety impacts that may occur during new project development. It covers various aspects of the environment, including noise and vibration, soil erosion, air quality, solid waste, hazardous materials, wastewater discharges etc. It also covers occupational and community health and safety.

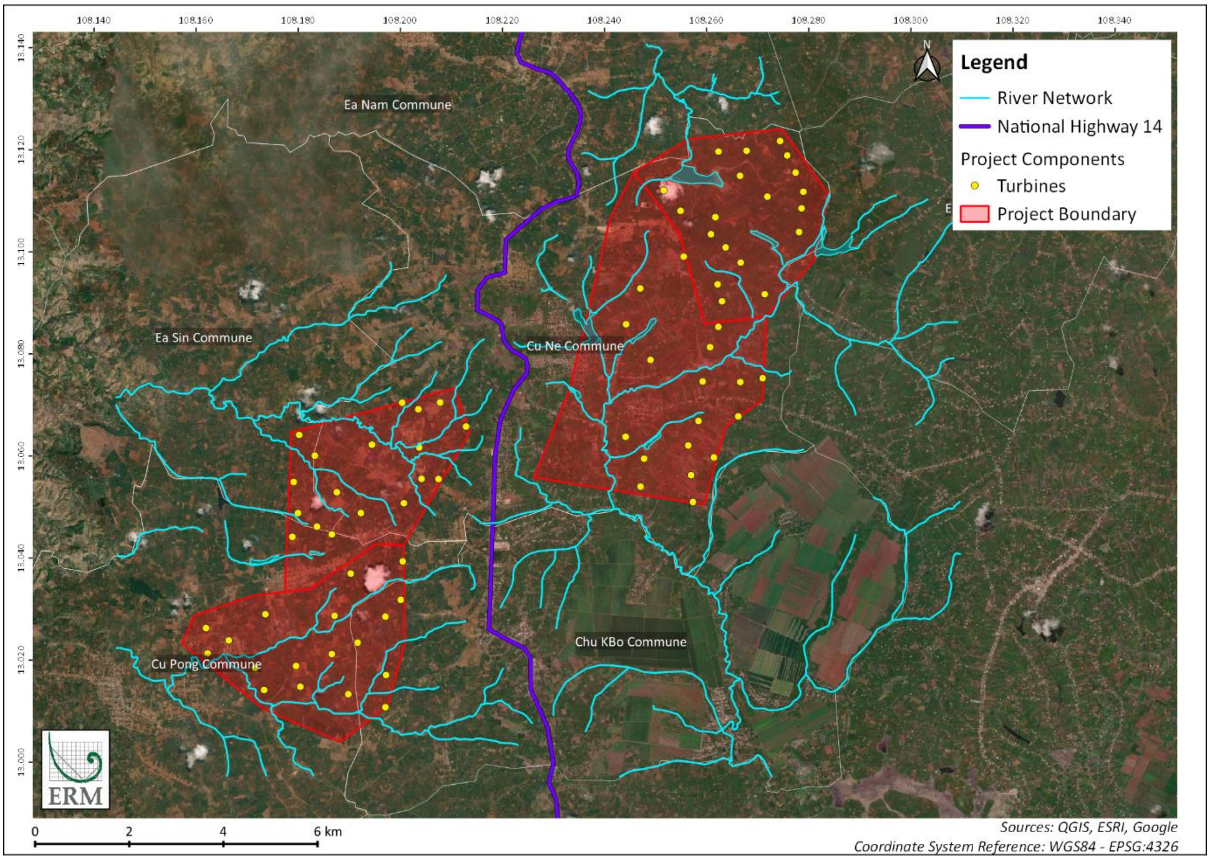
## 10.3.3 Baseline Conditions

### 10.3.3.1 Water Availability

#### *10.3.3.1.1 Surface Water*

As stated in Chapter 7, although there are no major rivers traversing the Project's area, many small lakes and creeks are evenly distributed around Cu Ne and Cu Pong Communes. In Cu Ne Commune, the main water sources serving the agricultural production in the area include Ea Kroa, Ea Drao, Ea Siak, Ea Kmu streams, and large and small ponds/dams covering an area of over 80 hectares. Most of these streams are stretching along the East of National Road 14 and flowing all year round from Northwest to Southeast with a relatively high flow. Additionally, the area to the West of National Highway No.14 has plenty of streams namely Ea Sup, Ea Bro, Ea Kring, Ea Mui, Ea Nang, Ea Gir, Ea Klang, and Ea Ne. All these streams flow under the East to the West direction with different flow rates during rainy and drying seasons. Moreover, there are a number of dams in the area such as Ea Klang dam covering an area of 6 hectares.

In Cu Pong Commune, there is a variety of surface water bodies such as streams (Ea Mok, Ea Sup, Ea Kok, Ea Ban, Ea Knung, Ea Drao, and Ea Tul) and lakes (Ea Bro, Ea Knung, Ea Klok, Krong Ana, and Adrong Diet) supporting to the irrigation of farming activities. However, severe drought happens leading to water shortage to this area every year during dry season.




Source: QGIS, ESRI, Google, August 2021

**Figure 10.18 Water Bodies in the Project's Area**

### *10.3.3.1.2 Groundwater*

Regarding the social baseline, there are abundant sources of groundwater in Cu Ne Commune, Krong Buk District, Dak Lak Province which are exploited by the local people serving their domestic use and irrigation. The average depth of these groundwater wells in Cu Ne Commune is approximately 15 to 25 m.

Groundwater is also the main source for daily life and partly for crop irrigation during drying season of local people residing in Cu Pong Commune. The average depth of groundwater wells in Cu Pong Commune is recorded 18 – 20 m.

In accordance to the Social baseline survey report, 100% surveyed households in the area use groundwater for domestic use (68.8% uses driven wells and 31.2% uses drilling wells). Local people in Cu Ne and Cu Pong Communes can also access to secondary water sources with small percentage including 13.9% of bottled water, 2.8% of rain water, and 2.1% of water from river, spring, and lakes.

## 10.3.3.2 Water Quality

### *10.3.3.2.1 Surface Water*

The surface water's quality at the area surrounding the Project site was in good condition according to the Feasibility Study Report and Dak Lak Province's Environmental Monitoring Report in 2020[16]. Assuming that all surface water parameters were under the threshold regulated in National Technical

[16] Provided by the Department of Natural Resources and Environment (DoNRE) of Dak Lak Province

Regulations on Surface Water Quality (*QCVN 08-MT:2015/BTNMT*) at column B1 of the limits for irrigation, water transportation, or other similar purposes.

#### *10.3.3.2.2 Groundwater*

The Feasibility Study Report and the Dak Lak Province's Environmental Monitoring Report in 2020 also stated that the groundwater quality within and around the Project area has been in good condition. Also assuming that all parameters of ground water were lower than the allowable limits of the National Technical Regulation on ground water quality *QCVN 09-MT: 2015/BTNMT*.

### 10.3.4 Impact Assessment

For the assessment of water resource availability and water quality, the sensitivity and magnitude criteria are outlined in Table 10.22 and Table 10.23.

**Table 10.22 Sensitivity Assessment Criteria for Water Resources**

| Sensitivity Criteria | Contributing Criteria | |
|---|---|---|
| | **Environment[17]** | **Social[18]** |
| Low | The water resource does not support diverse aquatic habitat or populations, or supports aquatic habitat or population that is of low quality. | The water resource has little or no role in terms of provisioning services as agricultural water source, other domestic uses as washing, bathing, industrial use and waterways for the local community. |
| Medium | The water resource supports diverse populations of flora and fauna but available in the surface water bodies in the region. | The water resources have local importance in terms of provisioning services but there is ample capacity and/or adequate opportunity for alternative sources of comparable quality |
| High | The water resource supports economically important or biologically unique aquatic species or provides essential habitat for such species. | The surface water resources are wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or transboundary watershed level for provisioning services. |

**Table 10.23 Criteria for Impact Magnitude for Water Resource Impact Assessment**

| Magnitude Criteria | Negligible | Small | Medium | Large |
|---|---|---|---|---|
| General Criteria | No perceptible or readily measurable change from baseline conditions | Perceptible change from baseline conditions but likely to be within applicable norms and standards for model of use. | Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and/or likely to approach and even occasionally | Major changes in comparison to baseline conditions and/or likely to regularly or continually exceed applicable norms and |

[17] The extent to which the water resource plays an ecosystem or amenity role in terms of supporting biodiversity either directly or indirectly, particularly with respect to dependent ecosystems.
[18] The extent to which the water resource provides or could provide a use (drinking water, agricultural uses, washing and other domestic or industrial, use as waterways) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation.

| Magnitude Criteria | Negligible | Small | Medium | Large |
|---|---|---|---|---|
| | | | exceed applicable norms and standards for mode of use. | standards for mode of use. |
| Water Quantity | There is likely to be negligible or no consumption of surface water by the Project at any time | The Project will consume surface water, but the amounts abstracted are likely to be relatively small in comparison to the resources available at the time of use (i.e. taking into account seasonal fluctuation) | The Project will consume surface water, and the amounts abstracted are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation). | The Project will consume surface water, and the amounts abstracted are likely to be very significant in comparison to the resources available at the time of use ((i.e. taking into account seasonal fluctuation). |
| | There is likely to be negligible or no abstraction, use of or discharge to the groundwater by the Project at any time | The Project will consume groundwater or deliver discharge to groundwater, but the amount abstracted/ discharged are likely to be relative small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation). | The Project will consume groundwater or discharge to groundwater, and the amounts abstracted/discharged are likely to be significant in comparison to the resource available at the time od use (i.e. taking into account seasonal fluctuation) | The Project will consume groundwater or discharge to groundwater, and the amounts abstracted/discharged are likely to be very significant in comparison to the resource available at the time od use (i.e. taking into account seasonal fluctuation) |
| Water Quality | Water quality impacts are likely to be well within ambient levels or allowable criteria<br>Discharges are expected to be well within statutory limits<br>Potential short-term localized effects on water quality but likely to be highly transitory (e.g. lasting a matter of hours) and well within natural fluctuations | Water quality impacts are likely to be well within ambient levels or allowable criteria<br>Discharge are expected to be within statutory limits<br>Potential short-term localized effects on water quality but which are likely to return to equilibrium conditions within a short timeframe (e.g. hours or days at most) | Water quality impacts are likely to result in occasional exceedances of ambient levels or allowable criteria<br>Occasional breaches of statutory discharge limits (limited periods) expected<br>Potential localized effects on water quality which are likely to be fairly long lasting (e.g. weeks or months) and/or give rise to indirect ecological and/or socio-economic impacts | Water quality impacts are likely to routinely exceed ambient criteria levels or allowable criteria over large areas.<br>Repeated breaches of statutory discharge limits (over extended periods) expected<br>Potentially severe effects on water quality which are likely to be long-lasting (e.g. months or more) or permanent and/or give rise to indirect ecological and/or socio – economic impacts. |

### 10.3.4.1 Impact during the Construction Phase

#### *10.3.4.1.1 Potential Impact*

The potential impacts on the quality of water surface from the construction activities of transmission line, other components and worker's activities include:

- Increase turbidity due to the sediment and suspended solid (SS) from excavated soil and construction materials washed into freshwater water bodies consisting of lakes and another natural streams
- Increase contaminants (construction debris, fuel, oil, etc.) washed/seep into water bodies due to run-off during rainy months
- Waste discharged from construction activities and worker's activities
- Spillage of oil, chemicals, hazardous chemical from the use of vehicles and construction machines during the construction phase, and
- Reduction in downstream water availability and groundwater resources which may cause conflicts of water demand of local community.

#### *10.3.4.1.2 Existing Controls*

The Project's owner suggested some existing controls to minimise the impact to the water sources induced by wastewater and solid waste during the construction phase as below:

- Impacts from wastewater and run-off water:
  - Arrange all working staffs at the construction site to stay in the rented local houses and utilise the in-situ toilets at place
  - The contractors working for the Project shall equip 5 – 10 portable toilets enclosed with 3-compartment septic tanks[19] (V=20m$^3$) (See Figure 10.19) and domestic bins serving the worker's demand at the Project's locations including clearing, levelling, and backfilling areas
  - Utilise water efficiently for construction activities to avoid unnecessary loss of containment to the environment
  - Equipment shall be stored in indoor areas to avoid leakage of oil and lubricant to the environment
  - The repairing and maintenance of transportation vehicles shall be conducted at the garage in order to not release the oil and grease and wastewater from car washing to the surrounding environment
  - The drainage systems to be constructed in the construction areas. Run-off water (mainly rain water) will be collected by internal drainage system and then released into the environment by the inclination of the terrain. Regularly check and clean the drainage system to avoid blockage of soil, debris, and spoil, and
  - Main construction activities should be conducted during dry season to avoid contaminated run-off water into the environment in rainy season.

[19] Environmental Protection Plan (EPP) provided by the Project's owner

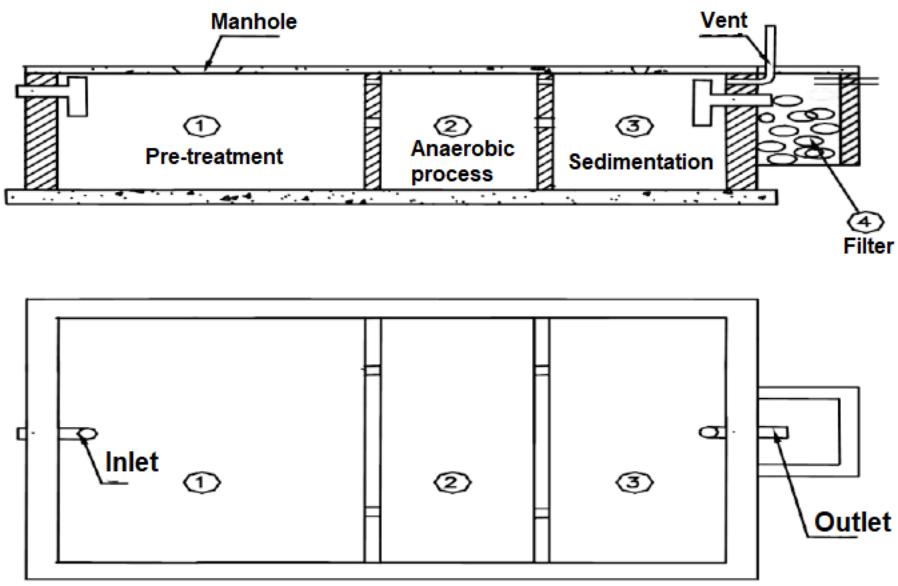



**Figure 10.19 3-compartment Septic Tank**

- Impacts from solid waste:
  - Construction spoil:
    - Construction waste shall be stored at temporarily designated area to avoid being waterlogged and polluted to the surrounding environment
    - Construction waste materials shall be collected, classified and transported for proper treatment by licenced agency in accordance to Article 5, 6, and 7 of *Circular No. 08/2017/TT-BXD* on Construction Solid Waste Management dated 16 May 2017 by the Ministry of Construction.
    - Reuse and recycle construction materials such as plank or timber pillar to compact or strengthen the low terrain, and
    - Spoil materials such as soil, stone, brick, etc. shall be properly managed by the Project's owner and contractor to avoid being invaded to agricultural land of local people; otherwise the Project's owner shall be responsible for compensation and support local people for remediation.
  - Domestic waste:
    - A small amount of domestic waste generated from the location of wind turbine foundation will be collected and buried sanitarily in-situ
    - Domestic waste generated from substation's location shall be collected and stored in 120-litter dustbin with lid, then being transported by licensed agency for proper treatment
    - The waste management plan (inventory, dustbin, and cleaning schedule) shall be prepared by the subcontractor during the pre-construction stage
    - Provide trainings and drills on sanitary, security, and environmental protection regulations for workers and personnel working on site
    - Littering is prohibited while working on site, and
    - Reduce, reuse, and recycle of spoil materials for ground levelling.

- Hazardous waste:
  - Hazardous waste materials such as oily rag, welding rod, and paint shall be collected, stored properly in bins with lid at temporarily designated area before being transported by licenced agency for proper treatment, and
  - Regular inspection and maintenance of material and equipment vehicles travelling to the site to avoid leakage of oil and fuel to the environment.

### *10.3.4.1.3 Significance of Impacts*

#### *10.3.4.1.3.1 Impact on Water Quantity*

In the construction phase, the Project sourced the groundwater from nearby wells for its activities. . The decrease in groundwater resources using for Project's activities is considered as Negative in terms of Impact Nature. It also causes the direct impact to the locals who are dependent on the surface water bodies and groundwater for daily uses. The impact duration is considered as short-term as it has been only within the 18-month of the construction phase and the impact extent is only local scale as happening within the Project's area and the immediate surroundings.

During the construction phase, the water requirement for wind turbine foundation construction and road watering is taken from wells via a pipeline of 1.5 m long. The construction period lasts for 18 months inevitably covering six months of dry season when drought significantly happens in Cu Ne and Cu Pong Communes (referred to environmental and social Baseline). The prolong drought in the areas has depressed the water level of groundwater at low for recent years[20] [21]. According to the Department of Agriculture and Rural Development[22], groundwater sources in Krong Pak, Krong Buk Districts of Dak Lak Province are in deteriorated conditions due to pollution and over-exploitation. For instance, in Krong Buk District, the exploited groundwater reaches to 2,000 to 2,500 $m^3$/day serving the need of irrigation and domestic uses of local people. Although the water requirement for the construction period is relatively small, the water competition with local demand is still high during dry season. Hence, the impact magnitude on water quantity-related impact is considered as **Medium**.

Regarding the receptor sensitivity aspect, the significance of impact has been assessed as **High** for social receptors taking into account the chances of an overexploited source of groundwater, causing scarcity of water in the region. The baseline social findings also indicated that the vast majority of affected households (144 surveyed households) rely mainly on groundwater (both driven and drilling wells) as the main source of drinking water and domestic use (bathing, and washing) beside a small percentage of water use from bottled water, rain water, and water from surface bodies (river, spring, and lake). Generally, the impact significance in terms of water quantity during the construction phase has been assessed as **Moderate**.

**Table 10.24 Impact on Water Quantity from the Construction Activities and Worker's Activities**

| Impact Description | Impact on water quantity from construction activities and worker activities | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent |

20 https://nhandan.vn/tin-tuc-xa-hoi/tay-nguyen-no-luc-chong-han-456053

21 https://baotintuc.vn/tay-bac-tay-nguyen-tay-nam-bo/han-han-keo-dai-hang-nghin-ho-dan-o-dak-lak-thieu-nuoc-sinh-hoat-20200518114003807.htm

22 https://baodaklak.vn/channel/3489/201004/khai-thac-nguon-nuoc-ngam-loi-bat-cap-hai--1939156/

| | | | | | | |
|---|---|---|---|---|---|---|
| **Impact Extent** | **Local** | | Regional | | Global | |
| **Impact Frequency** | Intermittent over the construction period (within 18 months) | | | | | |
| **Impact Magnitude** | Negligible | Small | | **Medium** | | Large |
| **Receptors Sensitivity** | Low | | Medium | | **High** | |
| **Impact Significance** | Negligible | Minor | | **Moderate** | | High |

*10.3.4.1.3.2 Impact on Water Quality*

In terms of water quality, the improper wastewater discharge from worker's activities and washing of machinery and trucks could have negative impact on surface water. During the peak period, the Project construction will require a workforce of approximately maximum 506 persons and staffs working onsite and at the construction office area. Regarding the benchmarks of water, the maximum water supply norm is specified as 180 litres/person/day[23], then the total water supply is estimated at 506 × 180 = 91,080 litres/day.

Moreover, Item a, Clause 1, Article 39 of *Decree No. 80/2014/ND-CP* specifies that domestic wastewater is estimated at approximately 100% of water supply. Hence, the amount of domestic wastewater for workers is about 91.08 $m^3$/day.

The typical composition and concentration of untreated domestic wastewater[24] discharged from worker's activities during the construction phase is presented in Table 10.25 below:

**Table 10.25 Typical Composition of Untreated Domestic Wastewater**

| Contaminants | Concentration (mg/l) | QCVN 14:2008/BTNMT (Column B)[25] | IFC EHS Guideline Value[26] | Applicable standards for the Project |
|---|---|---|---|---|
| $BOD_5$ | 110 – 350 | 50 | 30 | **30** |
| COD | 250 – 800 | - | - 125 | **- 125** |
| Total suspended solid (TSS) | 120 – 400 | 100 | 50 | **50** |
| Total Nitrogen | 20 – 70 | - | 10 | **10** |
| Total Phosphorus | 4 – 12 | - | 2 | **2** |
| Oil and grease | 50 – 100 | 20 | 10 | **10** |
| Total coliform bacteria (MPN/100mL) | $10^7$ - $10^{10}$ | 5000 | 400 | **400** |

The results show that the typical concentration of pollutants from domestic effluents exceeds the limit of *QCVN 14:2008/BTNMT* (Column B) and IFC EHS Guideline. The wastewater discharged from worker's activities, if not properly treated, will negatively cause surface and ground water contamination in short-term period of 18-month construction phase. Pollution in freshwater sources directly affect the locals that are dependent on the fresh water bodies. The impact extent is only local scale as happening within the Project's area and the immediate surrounding. In addition, as reported in the Dak Lak's Environmental Monitoring Report, surface water quality at the monitoring time in 2020 showed that all

23 Source: Worker's accommodation: processes and standards (2009) – Public guidance note by IFC and the EBRD.
24 Source: Wastewater Engineering – Treatment and Reuse (4th Edition) – Metcalf & Eddy, Inc.
25 Source: QCVN 14: 2008/BTNMT – National Technical Regulation on Domestic Wastewater
26 IFC EHS Guidelines for Environmental Wastewater and Ambient Water Quality.

parameters were lower than the thresholds regulated in *QCVN 08-MT:2015/BTNMT on Surface water Quality* at column B1 (for irrigation). Only some parameters including Total Suspended Solid (TSS), Chemical Oxygen Demand (COD), and Biochemical Oxygen Demand (BOD) were a bit higher than the limitation at some monitoring points due to the operation of nearby wastewater treatment plant near Ea Drueh stream, cassava factory near Ea Tam stream, and Buon Kuop hydroelectricity plant. These streams are not located in the Project's area; hence, there is no related and direct impact to the surface water bodies within the Project's boundary. Also reported the above-mentioned report, the groundwater quality at the Project's area was pretty good and lower than limited thresholds specified in *QCVN 09-MT:2015/BTNMT* on Ground Water Quality. The groundwater sources are good enough for local demand such as production and domestic use of people. Given that the Project will implement good practice control measures including wastewater will be collected and treated by the third specialised unit, the impacts magnitude on surface water quality due to wastewater discharge from worker's activities is considered as **Low**.

Fuel leakage from transformers at site during the construction phase becomes a contributing factor to the surface water and groundwater contamination. Given that there will be a reinforced concrete oil conservator tank with capacity of 96 $m^3$ to be constructed, all of the leakage is contained and properly managed in case an accidental spills occur. Hence, the likelihood of spillage to the water bodies and seeping into groundwater is low and the impact magnitude can be considered **Small** this case.

As mentioned in Table 10.4, most of the excavated soil for turbine foundation construction and internal renovation was reused and recycled for ground levelling. The rest of spoil materials was expected to be transported out of the Project's site. It is noted that the nearest water bodies are located around 45 m away from WTG B17, 87 m away from WTG B8, and 95 m away from WTG B3, respectively. Therefore, the excavation and transportation of soil materials may potentially pose an impact to a dense network of streams and lakes situated in the Project's area and the proximity during the construction phase. In addition, a potential impact of soil erosion caused by Project's activities will contribute to increase the concentration of Total Dissolved Solid (TDS) and Total Suspended Solid (TSS) in surface water bodies, particularly in rainy season due to run-off. As a result, there may also be a chance of surface water contamination due to sediments from excavated soil and soil erosion washed out to nearby water bodies during rainy days. The impact may be elevated to an area prone to downpour, flooding, and landslide in Krong Buk District, Dak Lak Province during rainy season. Judging by that, the impact magnitude is assessed as **Medium**.

Regarding the social baseline, groundwater from wells is the main source of water requirement for local people residing in the Project's area and proximity instead of surface water bodies. Hence, the receptor sensitivity is assessed as **Low**.

Overall, the impact significance of water quality from the construction activities and worker's activities is considered as Minor (See Table 10.26).

**Table 10.26 Impact on Water Quality from the Construction Activities and Worker's Activities**

| Impact Description | Impact on water quantity from construction activities and worker activities | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Impact Frequency | Intermittent over the construction period (within 18 months) | | | |
| Impact Magnitude | Negligible | Small | **Medium** | Large |

| Receptors Sensitivity | **Low** | Medium | High |
|---|---|---|---|

| Impact Significance | Negligible | **Minor** | Moderate | High |
|---|---|---|---|---|

### 10.3.4.1.4 Additional Mitigation Measures

The following additional mitigations measures are based on ESIA requirements to minimise impacts associated with freshwater quality:

- Develop Construction E&S Management Program including:
  - Waste and wastewater Management Plan which will cover the management and mitigation measures to minimise the impacts on nearby water bodies and surrounding communities)
  - Soil Compaction, Erosion and Pollution Management Plan. The Plan should include some specific action but not limited to as follows:
    - Any soil stock piles (excavated materials) should be sited on flat ground, at distance from local drainage channels and at a location approved by local authorities, and
    - Stock piles of soil (or other erodible materials) should be securely covered.
  - Solid and hazardous Management Plan.
- Bunds or silt fences instead of canvas shall be constructed on the stockpiling areas to prevent wash away of sediment load to the water bodies
- Oil separation tank and sedimentation tank will be installed to capture and detain construction site runoff and oil and grease from vehicles and equipment. Where applicable, sediment control will be installed along major drainage lines where construction activity is taking place within 100 m of these line
- Vegetation located down-slope of the work site assists in filtering out sediment. Where practicable, maintain downstream vegetation in good condition during the construction process
- Collect and store in accordance with applicable regulations, all solid waste including domestic waste, hazardous waste, oil and grease from the maintenance, reparation and operation activities of equipment during the construction phase. Solid waste then shall be transported out of the Project's site in separated containers and treated properly by functional units in accordance to *Circular No. 36/2015/TT-BTNMT*
- All water and liquid wastes arising from the construction activities will be properly disposed of and will not be discharged into any water bodies/streams course without adequate treatment. Domestic wastewater will be collected and processed by the mobile sanitary facilities.
- Establish internal rules and activities for environmental protection, including littering and disposal of wastes
- Establish rain water / storm water drainage system that connects to oil-water separators to collect and remove oil prior to discharge into receiving bodies (at the operation house and the substation area)
- Domestic solid waste will be collected weekly. The Project's owner will sign an agreement with functional units for transporting and handling respective wastes
- The construction materials, debris and backfill will be stored away from water bodies or water ways and only at the designed sites along the construction zones
- Construction waste should be stored separately and be periodically collected by an authorized treatment and storage facility
- Hazardous waste to be collected and stored by project owners and handled by the official hazardous disposal organisation

- Prohibit discharging of waste and wastewater directly into fresh water bodies, and
- Supervise implementation of proposed mitigation measures by the Contractors.

#### *10.3.4.1.5 Residual Impact*

With the implementation of the existing controls and additional mitigation and management measures and monitoring and auditing outlined for construction above, the residual impacts would be anticipated to be **Minor**.

#### *10.3.4.1.6 Monitoring and Audit*

- Monitoring of water resource will be conducted every six months during the construction phase. The monitored parameters include pH, DO, $BOD_5$, TSS, COD, $NO_3^-$, $PO_4^{3-}$, Oil & grease will be measured and compared to allowable permits according to *QCVN 08 – MT:2015/BTNMT* – National Technical Regulation on Surface Water Quality and WHO Surface Water Quality guidelines specified in the World Bank Group Environmental, Health and Safety General Guidelines.
- Water quality monitoring should be conducted at surface water bodies and groundwater sources within the Project's area. Sampling, preservation, transportation and analysis must be complied with national standards.
- The Project's owner shall supervise the implementation of all proposed mitigation measures and monitoring by the Contractors.

### 10.3.4.2 Impact during the Operation Phase

The water requirement for the operation phase will be considerably less and will only be for domestic use (about 42[27] workers on site × 180 litres/person/day × 100% = 7.56 $m^3$/day). Given the installation of sanitary facility (toilets) which have septic tanks on site and Wastewater Management Plan for Operation Phase will be prepared and implemented, the risk of domestic wastewater discharge to water bodies is limited.

In addition, leaks and spills of oil, lubricants or fuel from the operation equipment due to malfunction of handling system and poor practice of operational workers are likely to occur but localized and in long-term period. In addition, there is an oil conservator tank to be constructed at site for oil transformer loss of containment. This event will be discussed in detail in the Section Unplanned Event.

The significance impact due to waste and wastewater discharge, small oil spillage during operation phase after implementation of mitigation measures is assessed as **Minor** (See Figure 10.40).

**Table 10.27 Impact on Water Quality from the Construction Activities and Worker's Activities**

| Impact Description | Impact on water quantity from construction activities and worker activities | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Impact Frequency | Steady over the operation period | | | |
| Impact Magnitude | Negligible | **Small** | Medium | Large |

[27] The number of workers during the operation phase is provided by the Project's owner

| | | | | |
|---|---|---|---|---|
| **Receptors Sensitivity** | Low | **Medium** | High | |
| **Impact Significance** | Negligible | **Minor** | Moderate | High |

## 10.4 Soil Environment Impact Assessment

### 10.4.1 Scope of Assessment

The key activities that are likely to have negative impacts on land and soils, including:

- Pre – construction and construction phases:
  - Earthworks and construction activities resulting in soil compaction and loss of soil stabilising vegetation, hence increasing surface runoff and localised erosion such as:
    - Land and vegetation clearance in areas designated for WTG foundation, transmission line pylon;
    - Excavation for WTG foundations and electrical poles; and
    - Construction of internal road system.
  - Accidental leaks/spills of fuel, oil, chemical and hazardous materials/waste from machine and equipment during construction phase.
- Operation and management phase:
- Spillage of fuel, oil, chemicals and hazardous materials from Operation and Maintenance activities from O&M machine and turbines that might contaminate the soil.

It is noted that impacts caused by accidental leaks or spillage of fuel, oil, chemicals and hazardous materials from machine during Construction and Operation phases will be considered in detail as unplanned event and be assessed in Section 13.4.1.1 and 13.4.2.1.

- The scope of Soil Environmental Impact Assessment which listed potential impacts and consequences as well as identified receptors is described in Table 10.28.

**Table 10.28 Scope of Soil Environment Assessment**

| Phase | Potential Activities | Potential Impacts | Potential consequences | Receptors |
|---|---|---|---|---|
| Construction phase | ■ Groundworks and construction activities:<br>■ Land and vegetation clearance in areas designated for WTG foundation, transmission line pylon<br>■ Excavation for WTG foundations and electrical poles<br>■ Construction of internal road system | ■ Loss of soil stabilizing vegetation;<br>■ Soil compaction and erosion;<br>■ Soil contamination. | ■ Loss of top soil quality would affect cultivation productivity<br>■ Loss of forest for WTG foundation construction by removal of stabilized top soil might potentially result in increased sediment in surface runoff and localized soil erosion | ■ Soil quality in the Project area |
| | ■ Accidental leaks/spills of fuel, oil and hazardous materials/waste from machine during construction phase | | | |

| Phase | Potential Activities | Potential Impacts | Potential consequences | Receptors |
|---|---|---|---|---|
| Operation Phase | ■ Spillage of fuel, oil, chemicals and hazardous materials from Operation and Maintenance activities | | | |

## 10.4.2 Relevant Guidelines and Criteria

### 10.4.2.1 Vietnam Regulations

- *Circular No. 16/2009/TT-BTNMT* dated 7 October 2009 on guiding the implementation of National technical regulations on environmental protection
- *Circular No. 32/2013/TT-BTNMT* dated 25 October 2013 on guiding the promulgation of National technical regulations on environment, and
- *QCVN 03-MT: 2015 /BTNMT* - National Technical Regulation on the Allowable Limits of Heavy Metals in Soils.

### 10.4.2.2 International Guidelines

- ESS1: Environmental and Social Assessment and Management: To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimise, mitigate, offset or compensate for them
- IFC Performance Standard 3: Resource Efficiency and Pollution Prevention requires the Project to consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and environment, and
- IFC General EHS Guidelines (Section 4.0, 2007): Construction and Decommissioning provides specific guidance on prevention and control of community health and safety impacts that may occur during new project development. It covers various aspects of the environment, including noise and vibration, soil erosion, air quality, solid waste, hazardous materials, wastewater discharges etc. It also covers occupational and community health and safety.

## 10.4.3 Baseline Conditions

According to the Feasibility Study Report, the soil quality within and around the Project area is still in good condition. Therefore, assuming that all soil parameters, even the heavy metals are under the threshold regulated in *QCVN 03-MT: 2015/BTNMT*- National technical regulation on the allowable limits of heavy metals in the soils (column limit for Agricultural land).

## 10.4.4 Impact Assessment

Impact on soil quality in the Project area is predicted and assessed based on the sensitivity and magnitude criteria are outlined in Table 10.29 and Table 10.30, respectively.

**Table 10.29 Sensitivity Assessment Criteria for Soil Quality (Compaction, Erosion and Contamination)**

| Sensitivity Criteria | Contributing Criteria | |
|---|---|---|
| | **Environment[28]** | **Social[29]** |
| Low | ■ The soil quality does not support diverse habitat or populations and/or supports habitat or population of low quality | ■ The soil quality has little or no role in provisioning of services as agricultural uses for the local community |
| Medium | ■ The soil quality supports diverse habitat or population of flora and fauna and supports habitats commonly available in the Project AoI | ■ The soil has local importance in terms of provisioning services as agricultural services but there is ample capacity and/or adequate opportunity for alternative sources of comparable quality i.e. ready availability across the AoI. |
| High | ■ The soil quality supports economically important or biologically unique species or provides essential habitat for such species | ■ The soil is wholly relied upon locally with no suitable technically or economically feasible alternatives, or is important at a regional level for provisioning services. |

**Table 10.30 Criteria for Impact Magnitude for Assessment of Impact to Soil**

| Magnitude Criteria | Negligible | Small | Medium | Large |
|---|---|---|---|---|
| Soil compaction, erosion and contamination | ■ Qualitative- No perceptible or readily measurable change from baseline conditions | ■ Perceptible change from baseline conditions but likely to easily revert back to earlier stage with mitigation | ■ Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and/or likely take time to revert back to earlier stage with mitigation | ■ Major (e.g. order of magnitude) change in comparison to baseline conditions and/or likely difficult or may not to revert back to earlier stage with mitigation |
| | ■ Scale- Localised area as Particular activity areas | ■ Scale- Project site, activity areas and immediate vicinity not impacting any sensitive receptor | ■ Scale – Project site, activity areas and immediate vicinity impacting sensitive receptors | ■ Scale – Regional or International |
| | ■ Time – Short duration (few days) or one | ■ Short term – Only during particular activities or phase of the project | ■ Long term – Spread across several phases of the project | ■ Permanent change |

[28] The extent to which the soil quality plays an ecosystem role in terms of supporting biodiversity. This includes its role as in supporting a lifecycle stage
[29] The extent to which the soil quality provides a use (agricultural use) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation

| Magnitude Criteria | Negligible | Small | Medium | Large |
|---|---|---|---|---|
| | time as temporary | lifecycle as civil works or construction phase (few months) | lifecycle (few years) | |

### 10.4.4.1 Soil Compact and Erosion

#### *10.4.4.1.1 Potential Impact*

The potential impact from construction activities of WTG foundation, transmission line pylon and other project's components include:

- Loss of soil stabilising vegetation
- Soil erosion, and
- Soil compaction would lead to impact on the physical properties of soil such as reduction in pore spaces, water infiltration rate and soil strength.

#### *10.4.4.1.2 Existing Controls*

Regarding the Feasibility Study Report, the Safe and Civilised Construction Plan, and EPP there are some existing controls recommended by the Project's owner as followed:

- Excavation, filling and construction works shall be complied with the current regulations
- Dykes should be constructed along the construction works to avoid soil erosion
- Open ditches and ponds are constructed at the disposal site to prevent soil erosion
- Strengthen the foundations by embankment or plantation
- Plantation can be made in the temporary land area after the construction finishes to increase vegetation and minimise the soil erosion and landslide
- All construction activities including foundation excavation and site levelling are conducted in drying season to avoid erosion, and
- Disposed construction material pieces such as bricks and stones shall be reused. The excavated soil shall be used for backfilling and road construction. Other kinds of construction materials including irons and steels will be collected, transferred back to the manufacturer, reused, or scrap trading.

#### *10.4.4.1.3 Significance of Impact – Construction Phase*

The site clearance, excavation and road widening and upgrading will affect the top layers of the soil. The removal of stabilized top soil would result in slope destabilization and increased soil erosion. As provided by the Project's owner, the remaining amount of excavated soil for wind turbine foundation and internal road upgrading will be reused and recycled for ground levelling. Improper management of temporary soil stockpiling sites may cause soil erosion to nearby local household's cultivation land leading to damage to the local productivity. Areas which are potentially affected by soil compaction and erosion will be the construction site of new internal road, upgrading of access road and a soil stockpiling area. Soil compaction can increase the penetration resistance, a degradation of soil structure and also decrease the water infiltration and percolation in compacted soil which ruins the cultivation and plantation of local people[30]. Hence, soil compaction and erosion also directly and negatively cause influence to local community as cultivation activities remain as their main livelihood. These areas are

[30] https://extension.psu.edu/effects-of-soil-compaction

localised within the Project site and limited during the short-term construction phase (18 months) and would last until the areas are fully rehabilitated during operation phase.

The Project's wind turbines will be located in highland area, loss of agricultural land for WTG foundation construction due to the removal of stabilised top soil might potentially result in increased sediment in surface runoff and localised soil erosion. Soil within the Project site is used for agricultural activities, such as cultivation of perennial trees and fruits planting in the Project AoI and supports a diverse habitat of flora and fauna. Therefore, the impact magnitude is considered as **Medium**.

Most of the area used for the Project's development is mainly agricultural land. Perennial and annual trees including coffee, pepper, cassava, sugarcane and other fruits (avocado, and durian) are the main sources of local community's livelihood, who is considered as a key receptor potentially affected by soil erosion resulted by the improper excavated soil stockpiling nearby farms (See Figure 10.20). Even the Project's owner and EPC contractor has used canvases to cover the soil stockpilings to prevent the soil erosion to the local vicinities, soil erosion-related impact to the plantation area and local households, especially during rainy season may potentially occur. This impact is also accelerated by flooding during rainy season leading to severe soil erosion at the Project's area. Hence, their sensitivity to soil compaction and erosion is considered to be **Medium**. Therefore, the negative impact is considered to be of **Moderate** significance (See Table 10.31).

Source: ERM, 2021

**Figure 10.20 Soil Stockpiling at the Project's site**

**Table 10.31 Impact on Soil Compaction and Erosion in the Construction Phase**

| Impact Description | Impact on Soil compaction and erosion due to construction activities | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Impact Frequency | Intermittent over the construction period (18 months). | | | |
| Impact Magnitude | Negligible | Small | **Medium** | Large |
| Receptors Sensitivity | Low | **Medium** | High | |
| Significance | Negligible | Minor | **Moderate** | High |

##### *10.4.4.1.4 Additional Mitigation Measures*

The following additional mitigation measures are based on ESIA requirements to minimise impacts, including:

- Soil compaction and erosion management plan as part of Construction E&S Management Program shall be implemented during construction to incorporate requirements such as use of dust suppression, soil stabilisation during construction and storm water and sediment management and control
- Construction activities including site clearance, and excavation should be limited in some rainy days or during heavy winds and downpour to minimize erosion and run-off
- Procedures for responding to emergencies/accidental spills of hazardous materials, fuel and waste handling & management are developed and implemented
- Maintenance works are restricted to specially designated platforms with strict control of accidental spills, and
- The Project site should be restored at the end of the Project life-cycle to pre-Project level.

##### *10.4.4.1.5 Residual Impact*

With the implementation of the existing controls and additional mitigation and management measures, the residual impacts would be anticipated to be Minor.

##### *10.4.4.1.6 Monitoring and Auditing*

In addition to daily inspections, internal audits will also be conducted quarterly during the construction phase and bi-annually during operation phase until such time that full rehabilitation is reached, Based on monitoring and audits results, corrective and/or enhancing actions will be implemented. Some monitoring actions that should be implemented are provide in Table 10.32.

**Table 10.32 Monitoring for Soil Compaction and Erosion Management**

| Action | Indicator | Timeline |
|---|---|---|
| Identification of Erosion Control and Sediment Control measures to each construction site. | Erosion Control and Sediment control measures designed specific to each site | Once prior to land preparation |
| Monitoring vegetation clearing | Vegetation clearing remains inside the identified zones (area monitoring) | During land preparation |
| Monitoring Sediment controls and Erosion controls | Current condition of Sediment controls and Erosion controls | A weekly basis; and immediately after rainfall events or flooding period |
| Monitoring of erosion prone areas | Status of erosion prone areas (downstream monitoring including TSS levels) | Daily |
| Visually monitoring stockpiles for signs of wind and rain erosion | Status of stockpiles | Daily |
| Monitoring compliance of mitigation measures implementation | Mitigation measures of soil compaction and erosion are in place | Throughout construction and operation phases (increase frequency during heavy rain months) |

### 10.4.4.2 Soil Contamination due to Improper Waste Disposal and Leaks/Spills

#### *10.4.4.2.1 Potential Impact*

Construction workers working on-site would also generate domestic waste and wastewater, which may be released to the ground if not properly controlled and managed. The domestic waste at the construction site include organic waste, plastic, or glass. In addition, construction activities will also generate various types of hazardous wastes including oil, lubricants and diesel leaked from machine, equipment and vehicles. As provided by the Project's owner, there are maximum 120 staffs working on each site over total 506 personnel during the construction phase with the total generated solid waste of 206.4 kg/day (assuming that there is about 1.72 kg/person/day[31])

Regarding Operation phase, solid waste generated by the O&M team during their daily activities includes oil, waste fuel, grease or disposal of organic waste and domestic waste. Regarding the FS report, it is noted that there will be about 42 staffs working on the site during the operation phase with the maximum generated solid waste of 1.72 kg/person/day[31], so the estimated volume of municipal waste generated about 72.24 kg/day on average.

#### *10.4.4.2.2 Existing Controls*

Regarding the FS Report, EPP, and the Safe and Civilised Construction Plan, there are some existing controls recommended by the Project's owner during the construction phase as followed:

- There are about ten dustbins to be arranged on site, and
- Solid waste generated from the working teams who accommodate in the rented houses shall be collected and transported to the local garbage collection point for further treatment.
- Other existing controls prepared by the Project's owner in terms of solid waste management can be referred to Section 10.3.4.1.2 above.

#### *10.4.4.2.3 Significance of Impact – Construction and Operation phases*

Wastes (both non-hazardous and hazardous), if not properly managed would result in soil contamination within the Project's area and its surroundings. As a result, the cultivation, the local people's livelihoods and the agricultural land habitats nearby the Project area would be negatively and directly affected. The impact frequency is considered as short-term during 18-month construction phase but long-term during 20 years of the operation under the Project's life cycle. In addition, these receptors are in very close distance to the Project site so their sensitivity to soil contamination is considered to be **Medium**.

As defined in Table 10.30, the impact magnitude in terms of soil contamination is considered as **Medium** for construction phase and **Small** for the operation phase during the Project's life cycle.

Soil contamination may occur from leaks and spills of oil, lubricants or fuel from heavy equipment, improper handling of fuel storage during construction phase and operation phase. However, with the effective in place controls to mitigate impacts, the impact significance of soil contamination is considered to be of **Moderate** significance in construction phase and **Minor** significance in operation phase.

**Table 10.33 Impact on Soil Contamination in Construction Phase**

| **Impact Description** | **Impact on Soil environment due to waste generation (hazardous an non-hazardous)** | | |
|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral |

[31] http://documents1.worldbank.org/curated/en/504821559676898971/pdf/Solid-and-industrial-hazardous-waste-management-assessment-options-and-actions-areas.pdf

| | | | | |
|---|---|---|---|---|
| **Impact Type** | **Direct** | Indirect | Induced | |
| **Impact Duration** | Temporary | **Short-term** | Long-term | Permanent |
| **Impact Extent** | **Local** | Regional | Global | |
| **Impact Frequency** | Intermittent over the construction period (18 months). | | | |
| **Impact Magnitude** | Negligible | Small | **Medium** | Large |
| **Receptors Sensitivity** | Low | **Medium** | High | |
| **Impact Significance** | Negligible | Minor | **Moderate** | High |

**Table 10.34 Impact on Soil Contamination in Operation Phase**

| **Impact Description** | **Impact on Soil environment due to waste generation (hazardous an non-hazardous)** | | | |
|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | |
| **Impact Type** | **Direct** | Indirect | Induced | |
| **Impact Duration** | Temporary | Short-term | **Long-term** | Permanent |
| **Impact Extent** | **Local** | Regional | Global | |
| **Impact Frequency** | Intermittent over the operation period (20 years). | | | |
| **Impact Magnitude** | Negligible | **Small** | Medium | Large |
| **Receptors Sensitivity** | Low | **Medium** | High | |
| **Impact Significance** | Negligible | **Minor** | Moderate | High |

### *10.4.4.2.4 Additional Mitigation Measures*

- The following additional mitigation measures are based on the ESIA requirements to minimise these impacts, including:
- Contract a competent/licensed contractor to collect, transport and treat domestic, construction and hazardous wastes from the project site
- Prohibit dumping any solid wastes to the soil or burning waste on the site
- Ensure that hazardous materials are stored in designated areas that are designed with impermeable floor, inflammable walls and accessible to authorized personnel
- Hazardous waste shall be properly managed in accordance with *Decree No. 38/2015/ND-CP*, *Circular No. 36/2015/TT-BTNMT* and *QVCN 07:2009/BTNMT* on Hazardous Waste as follows:
  - Hazardous waste is prohibited to be illegally disposed into the ground
  - All workers and staffs shall be trained on hazardous and non-hazardous waste classification and their handling methods
  - Proper facilities shall be supplied and areas for hazardous waste storage in the construction sites should be clearly determined in accordance with *Circular No. 36/2015/TT-BTNMT*
  - Appropriate organizations with proper license shall be contracted in order to periodically transport and dispose hazardous waste, and
  - A record of hazardous waste should be documented and available at the site (using the form specified in *Circular No. 36/2015/TT-BTNMT*) to allow monitoring volume of generated and

disposed hazardous waste in place by the authorised contractors. The numeric data in the record must be consistent in order to ensure that none of the improper disposal is made in the Project's area or other locations.

- In case of accidental/unintended spillage, the contaminated soil should be immediately collected and stored as hazardous waste.

#### *10.4.4.2.5 Residual Impact*

With the additional mitigation measures, the residual impacts caused by soil contamination in all the phases are expected to be **Negligible** to **Minor**.

#### *10.4.4.2.6 Monitoring and Auditing*

It is recommended that the monitoring program in construction and operation phases should be conducted as follows:

- Parameters: Arsenic, Cadmium, Total Chromium, Copper, Lead and Zinc
- Monitoring locations: Two locations
  - One location at the substation area, and
  - One location at the turbine area.
- Frequency: Every six months.
- Regulation: *QCVN 03-MT: 2015/BTNMT* - National technical regulation on the allowable limits of heavy metals in soil.
- No additional specific monitoring or auditing is recommended.

## 10.5 Electromagnetic Interference Impact Assessment

### 10.5.1 Scope of Assessment

All transformers and transmission lines, especially high voltage lines, emit a type of low frequency non-ionizing radiation caused by the generation of electric fields, due to electric charges (voltage), and magnetic fields, due to the flow of electrical current through transmission lines, which collectively is referred to as Electric and Magnetic Fields (EMF). Exposure to high levels of EMF can result in a health negative impacts to receptors along the transmission line and those residing near the substation. The strength and extent of EMF depends on three things:

- How much current is flowing
- The voltage, and
- Configuration of the wires (e.g. size, wiring phase configuration and separation between the wires).

Key aspects that are likely to negatively impact receptors during the operation phase include electromagnetic interference generated by wind turbines transformers, transmission line and substation transformers when the wind turbines are in operation (i.e. once electrical current flows through the conductors).

**Table 10.35 Scope of Electromagnetic Interference Assessment**

| Phases | Potential Activities | Potential Impacts | Potential Consequences | Receptor |
|---|---|---|---|---|
| Operation | Long-term operational activities of transmission line, substation, and wind | Electromagnetic fields from transmission line | Health risks | Receptors along the transmission line and |

| Phases | Potential Activities | Potential Impacts | Potential Consequences | Receptor |
|---|---|---|---|---|
| | turbines as generating electricity from wind energy. | and transformers in substations | | near the substation and wind turbines |

## 10.5.2 Relevant Guidelines and Criteria

### 10.5.2.1 Vietnam Regulations

- *Electricity Law* dated 03 December 2004 and the Law on amendment and supplement to the Electricity Law dated 20th November 2012
- *Decree No.14/2014/ND-CP*, dated 26 February 2014 stipulating in detail the implementation of electricity law regarding electricity safety, and
- *QCVN 25:2016/BYT* – National Technical Regulation on Industrial Frequency Electromagnetic Fields – Permissible Exposure Level of Industrial Frequency Electromagnetic Fields in the Workplace.

### 10.5.2.2 International Guidelines

IFC Environmental Health and Safety Guidelines for Electric Power Transmission and Distribution (2007) provides guidelines to manage potential environmental and community health and safety impacts from power construction facilities, including electric and magnetic fields.

As mentioned in the above section, electric fields are normally measured in kilovolts per metre (kV/m), while magnetic fields are defined by magnetic flux density, measured in micro-Tesla (μT) or milli-Gauss (mG). The World Bank Group's (WBG) Environmental, Health and Safety (EHS) Guideline[32] for Power Transmission and Distribution (WBG, 2007) refers to the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[33] [34] for health and safety standards relative to exposure to EMF. The World Health Organization (WHO)[35] refers to ICNIRP EMF standards as short-term and high level exposure limits. At present, ICNIRP limits consider the scientific evidence related to possible health effects from long-term, low level exposure to EMF fields insufficient to justify lowering these quantitative exposure limits. The ICNIRP EMF exposure limits are instantaneous and not averaging and it refers to Basic Restrictions and Reference Levels for both magnetic and electric fields under General Public and Occupational exposure conditions (Table 10.36). Basic Restrictions are the fundamental limits on exposure and are based on the internal electric currents or fields that cause established biological effects in humans. They are impractical to measure. Therefore, Reference Levels of exposure to the external fields, which are simpler to measure, are provided as an alternative means of showing compliance with the Basic Restrictions. The Reference Levels have been conservatively formulated to ensure compliance with the Basic Restrictions. In summary, these limits can be considered as chronic exposure standards, no health risks associated with short-term exposure are expected at these levels.

[32] EHS Guidelines for Power Transmission and Distribution, April 30, 2007

[33] The ICNIRP Guidelines (2010) for limiting exposure to time-varying electric, magnetic and electromagnetic field (up to 300GHz) (http://www.icnirp.de/PubEMF.htm)

[34] These values represent the ICNIRP occupational exposure limits.

[35] WHO 2007, Extremely Low Frequency Fields – Environmental Health Criteria, Monograph No. 238 March 2007

**Table 10.36 Basic Restriction and Reference Levels for Exposure to 50Hz EMF at the Edge of Right of Way (ROW)**

| Exposure Characteristics | Electric field (kilo volts per meter, kV/m) | Magnetic flux intensity | | |
|---|---|---|---|---|
| | | Micro-Tesla (μT) | Milli-Gauss (mG) | Ampere/m (A/m) |
| Occupational | 10 kV/m | 1,000 (500 prior to 2010) | 10,000 (5,000 prior to 2010) | 798 (399 prior to 2010) |
| General Public | 5 kV/m | 200 (100 prior to 2010) | 2,000 (1,000 prior to 2010) | 160 (80 prior to 2010) |

## 10.5.3 Assessment Methodology

The calculation of Electro Magnetic Field (EMF) is one of the factors which must be considered during the design process especially for high voltage transmission lines. This is to determine Right of Way (ROW) of the power line such that there will not be danger for the people and surrounding environment.

An excel based software developed by EEP Portal[36] for the calculation of electromagnetic field (EMF) around transmission and distribution overhead lines was used to calculate EMF for the 110 kV transmission line proposed for the Project. The tool can be used to calculate one or two circuit lines in which ground wires can be incorporated for the EMF calculations. In addition, the tool allows combining and creating examples of power lines where two independent power lines can interact with each other. The EMF calculations applied for this tool uses the analytical approach described in EPRI Red Book "Transmission Line Reference Book", third edition, 2005[37]. In addition, accuracy of these EMF calculations could be checked with other commercial software such as MATLAB or CDEGS (Current Distribution, Electromagnetic Fields, Grounding and Soil Structure Analysis).

## 10.5.4 Impact Assessment

### 10.5.4.1 EMF from Overhead 220kV Transmission Line

Input data

As mentioned in Chapter 2, the proposed 220 kV transmission line is a 220 kV double-circuit line with two ground wires that used support tower and angle towers.

The input data used for setting up the transmission tower and circuit lines is given for Tower which connects the existing 220kV transmission line to 22/220kV substation and shown in Table 10.37 and Figure 10.21.

**Table 10.37 Transmission Line Parameters of 220kV Tower**

| | | | X [m] | Y [m] | $U_{max}$ [kV] | I [A] | rA [mm] | d [mm] | n | Ph-seq |
|---|---|---|---|---|---|---|---|---|---|---|
| Line 1 | Circuit 1 | L1 | -3.5 | 27.5 | 230 | 450 | 30.96 | 1.75 | 1 | 1 |
| | | L2 | -3.5 | 23.5 | 230 | 450 | 30.96 | 1.75 | 1 | 2 |
| | | L3 | -3.5 | 19.5 | 230 | 450 | 30.96 | 1.75 | 1 | 3 |
| | | g.w. | -3.5 | 32 | 0 | 0 | 15.48 | 1.75 | 1 | 0 |
| | | g.w. | 3.5 | 32 | 0 | 0 | 15.48 | 1.75 | 1 | 0 |

[36] http://electrical-engineering-portal.com/download-center/electrical-ms-excel-spreadsheets/emf-td-overhead-lines
[37] https://www.academia.edu/36962429/EPRI_AC_Transmission_Line_Reference_Book_200_kV_and_Above_Third_Edition

| | | | X [m] | Y [m] | $U_{max}$ [kV] | I [A] | rA [mm] | d [mm] | n | Ph-seq |
|---|---|---|---|---|---|---|---|---|---|---|
| | Circuit 2 | L3 | 3.5 | 19.5 | 230 | 450 | 30.96 | 1.75 | 1 | 3 |
| | | L2 | 3.5 | 23.5 | 230 | 450 | 30.96 | 1.75 | 1 | 2 |
| | | L1 | 3.5 | 27.5 | 230 | 450 | 30.96 | 1.75 | 1 | 1 |

*X [m] – horizontal length from the middle of the line; Y [m] – height in which wires are suspended; $U_{max}$ [kV] – maximum permissible line voltage; I [A] – maximum permissible line current (in case of bundle it is; determined for all wires); $r_A$ [mm] – wire radius; $d_A$ [mm] – distance between wires in bundle; n – number of wires in bundle; $Ph_{-seq}$ – phase sequence. 1 – L1, 2 – L2, 3 – L3, 0 – Ground Wire*

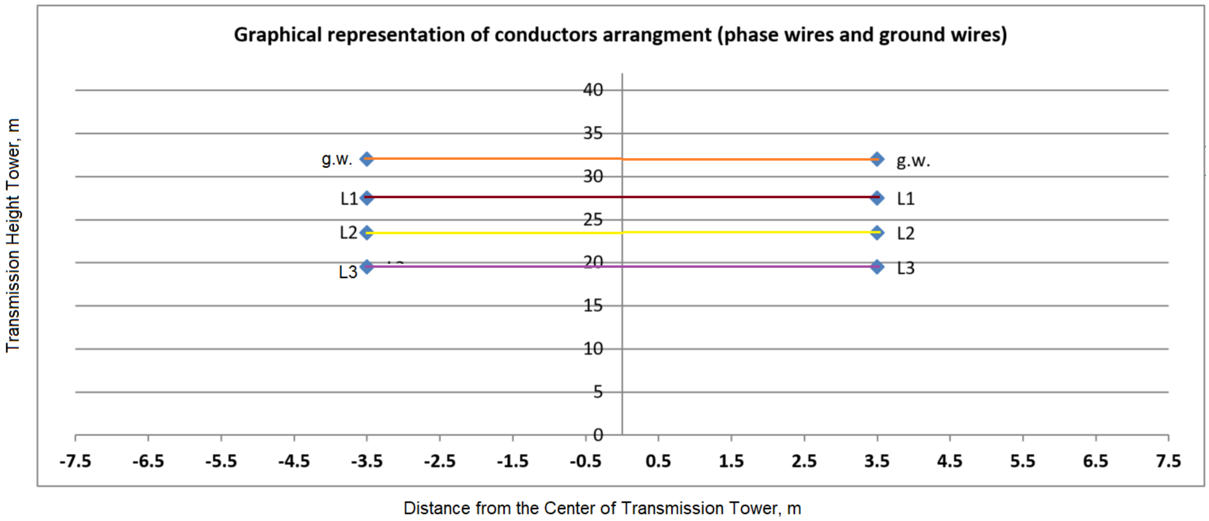



**Figure 10.21 Schematic Representation of Transmission Tower with Power Line Arrangement (for 220 kV Transmission Tower)**

The proposed minimum horizontal free space for the 220 kV double-circuit is 12 m (6 m on either side of the transmission tower). The Right of Way complies with national requirements in *Decree No.14/2014/ND-CP* dated 26 February 2014 stipulating in detail the implementation of electricity law regarding electricity safety. The double circuits wire bare to be positioned between 19 – 32 m.

### *10.5.4.1.1 Potential Impact*

EMF can affect human health directly and indirectly. Direct effects result from direct interactions of fields with the body; indirect effects involve interactions with a conduction object where the electric potential of the object is different from that of the body. Exposure to low-frequency electric fields may cause well-defined biological responses, ranging from perception to annoyance, through surface electric-charge effects due to stimulation of central and peripheral nervous tissues and the induction in the retina of phosphines, a perception of faint flickering light in the periphery of the visual field.

### *10.5.4.1.2 Existing Controls*

In according to the EPP, there are some existing controls proposed by the Project's owner as below:

- Ensure the safety distance abided by *Decree No.14/2014/ND-CP*
- Workers are all provided with PPEs during their work, and
- Arrange the working shifts to limit the working time of workers at site (especially at the substation)

### *10.5.4.1.3 Significance of Impacts*

Operation of the Project will result in the formation of EMF along the transmission line and at the substations. Although high-voltage transmission lines do generate higher EMFs, this effect is offset by the fact that the towers are higher, the ROW is wider, and phase cancellation shielding is applied. These measures result in EMF levels being lowered, at the edge of the ROW.

Based on the EPP model results, the electric field distribution and magnetic field distribution for the proposed transmission tower calculated at the distance from the transmission line at 1 m above the ground are presented in Figure 10.22 and Figure 10.23. The maximum electric and magnetic fields are 1.43 kV/m, 1.88 A/m respectively at 1 m above the ground.

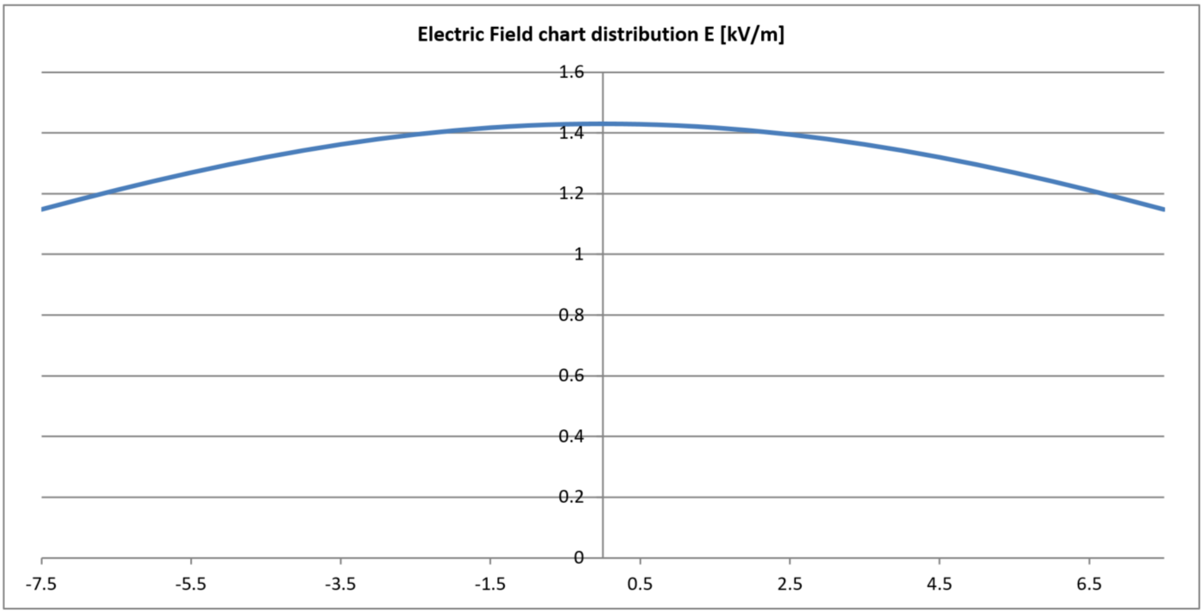



**Figure 10.22 Electric Field Distribution for the Proposed Transmission Tower at 1 m above the Ground**

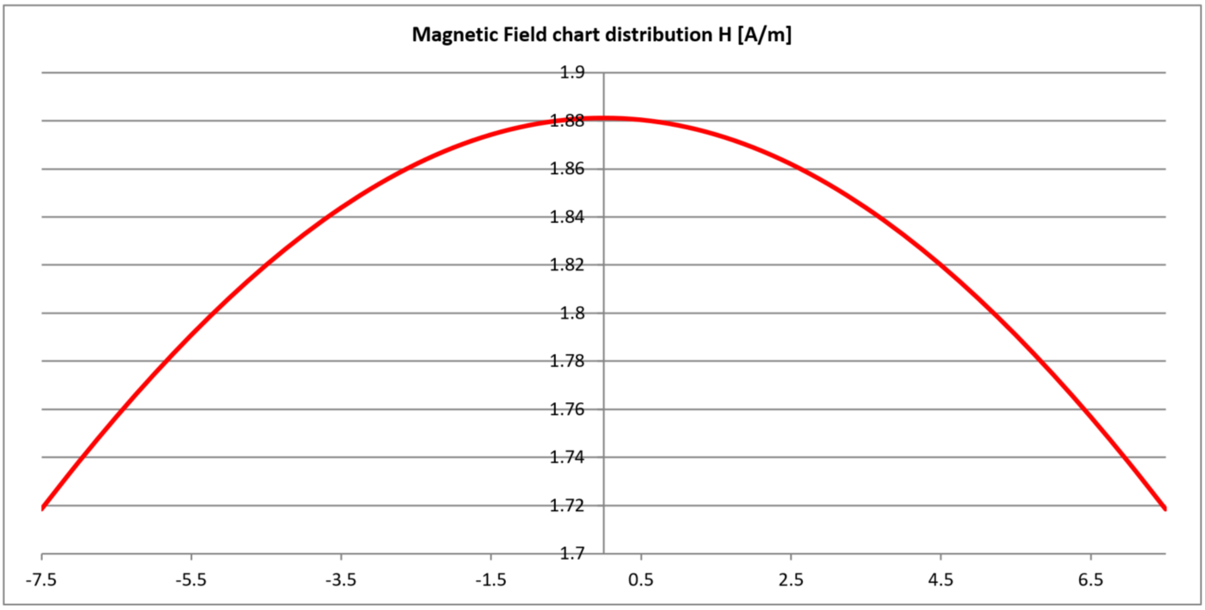



**Figure 10.23 Magnetic Field Distribution for the Proposed Transmission Tower at 1m above the Ground**

The maximum calculated electric field inside the ROW and magnetic field for 220 kV Transmission does not exceed the recommended ICNIRP occupational exposure limits.

The maximum electric and magnetic fields within the ROW for various transmission towers is shown in Table 10.38. The maximum calculated electric field occurs directly under the conductors and decreases out to the edge of the ROW. The phasing of double circuit that will be used in the proposed transmission line configuration results in cancellation effects for the electric fields resulting in rapid decrease with distance. The calculated maximum electric magnetic fields for various transmission towers are below the allowable public and occupational exposure limits in accordance with ICNRP and *Decree No. 14/2014/ND-CP*, dated 26 February 2014 of Government on stipulating in detail the implementation of electricity law regarding electricity safety, which requires the electricity field intensity in the areas where people regularly working must ensure the requirements not exceeding 5 kV/m.

**Table 10.38 Maximum Electric and Magnetic Fields for Various Transmission Tower Types at the Edge of the ROW**

| Tower Type | $E_{max}$ (kV/m) | $H_{max}$ (A/m) |
|---|---|---|
| 220 kV Tower (double circuits) | 1.43 | 1.88 |
| **ICNIRP EMF exposure limits for General public** | **5** | **160** |
| **ICNIRP EMF exposure limits for Occupation** | **10** | **798** |

The EMF calculation results of different tower configuration have shown that at the distance of 6 m from the outmost transmission line, the maximum electric field reached 1.43 kV/m and magnetic field gained 1.88 A/m at the hanging height of wire of >19.5 m while most of human activities occurs at the height below 2 m. In addition, the 220 kV transmission line will be designed not to pass by many households.

The EMF for the proposed 220 kV tower configuration reduce rapidly with distance from the lines. As such, the significance of EMF caused by the Project on Human Health is considered to be **Negligible** (See Table 10.39).

**Table 10.39 EMF Impact Assessment from Overhead Transmission Line for the Operation Phase**

| Impact Description | EMF from Overhead Transmission Line | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Impact Frequency | The impact frequency is closely related to the operation of the wind farm and substation, and is assumed to be continuous during operation as a worst case. | | | |
| Impact Magnitude | Negligible | **Small** | Medium | Large |
| Receptor Sensitivity | Low | **Medium** | High | |
| Impact Significance | Negligible | **Minor** | Moderate | Major |

### *10.5.4.1.4 Additional Mitigation Measures*

Other additional mitigation measures based on ESIA requirements to minimise impacts associated with EMF include:

- Avoid residential buildings, or acquire houses within the ROW.

- Avoid schools, hospitals, health clinics, and other similar buildings – the Electrolytic Tough Pitch (ETP) alignment avoids these sensitive buildings and maintains at least a 32 m buffer to all schools and health clinics
- Tower safety features – place warning signs prohibiting climbing on towers and incorporate design elements that prevent climbing of the towers
- Implement all H&S measures as specified in the regulations including earthling of buildings that are metal clad and directly below the transmission line
- Conduct regular clearance of the clear zone to ensure the area is safe as required by the regulation
- Conduct regular checking/ maintenance to ensure the safe condition of the tower and the cable, and
- Emergency contact information – provide signage at each tower with emergency phone numbers.
- Arrange the shielding around the electromagnetic field source at the safety distance as electric fields can be easily shielded by trees, fences, buildings and most other structures. However magnetic fields are much more difficult to shield than electric fields.

#### *10.5.4.1.5 Residual Impacts*

The residual impact to occupational and public health from the transmission of power through the proposed 220 kV transmission line is considered to be Negligible.

#### *10.5.4.1.6 Monitoring and Auditing*

- The electromagnetic filed should be monitored in the safety corridors of the 220 kV transmission line, at the substation and at the location of turbine.
- The EMF monitoring survey should be conducted yearly during the operation phases.
- The EMF monitoring result must comply with *Decree No. 14/2014/ND-CP*, dated 26 February, 2014 on Stipulating in detail the implementation of electricity law regarding electricity safety and National Technical Regulation *QCVN 25:2016/BYT* on Industrial Frequency Electromagnetic Fields – Permissible Exposure Level of Industrial Frequency Electromagnetic Fields in the Workplace. Should thresholds be exceeded, further mitigation options should be reviewed and considered.

### 10.5.4.2 EMF from 22 kV Underground Transmission Line

#### *10.5.4.2.1 Potential Impacts*

Electromagnetic filed from 22 kV underground transmission line.

#### *10.5.4.2.2 Existing Controls*

Refer to Section 10.5.4.1.2.

#### *10.5.4.2.3 Significance of Impact*

Based on Feasibility Study, the 22 kV underground cables are low-voltage and are buried directly underground which is inside the high-density polyethylene (HDPE). The EMF emission will be highly localised in terms of spatial extent. However, the underground cables is insulated, EMF would be of limited emission to surrounding environment where they pass through cable protection materials. The Feasibility Study design has shown that electric field exists between high-voltage conductive cores and earthling amour. Therefore, there is expected no E-field leaked by the cable as a result of cable shielding. Hence, the EMF levels expected at underground are comparatively small and the predicted magnetic fields are also expected to rapidly decrease both vertically and horizontally. Therefore, the magnitude of potential EMF impact is expected to be **Small**.

However, the nearest residential area is located at approximately 39 m from the Project's wind turbine (within ROW) which will be impacted negatively and directly from the EMF. The livelihood activities of local community have been identified to be within and surround the Projects' areas such as agricultural fields, coffee farms and fruits. So, the sensitivity of receptors is considered **Medium**.

In consideration of the above, the negative impact is assessed to be of Minor significance, as shown in Table 10.40.

**Table 10.40 Impacts of EMF during Operation Phase from the 22 kV Underground Transmission Line**

| Impact | Health Impact due to EMF from 22 kV underground power cables. | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| | Impacts are within the ROW. | | | |
| Impact Frequency | The impact frequency is closely related to the operation of the wind farm and substation, and assumed to be **continuous** during operation as a worst case. | | | |
| Impact Magnitude | Negligible | **Small** | Medium | Large |
| Sensitivity of Receptors | Low | **Medium** | High | |
| Significance | Negligible | **Minor** | Moderate | Major |
| | The significance is **Minor** | | | |

### *10.5.4.2.4 Additional Mitigation Measures*

Some mitigation measures will be proposed in the ESIA, as follows:

- For double circuit lines, it may be possible to arrange the phases to maximise the magnetic field cancellation, and
- Installation of a passive shielding loop can be effective in reducing the magnetic field at a particular point.

### *10.5.4.2.5 Monitoring and Auditing*

- It is proposed that EMF monitoring is carried out by using suitable magnetic and electric filed sensors within the first year of the operation on a quarterly basis. Should thresholds be exceeded, further mitigation options should be review and considered, and
- This monitoring will be included as part of the occupational health and safety monitoring program.

## 10.5.4.3 EMF from 22/220 kV Substation

Substations are part of the electricity supply network that enables the widespread use of electricity for public and industrial use. Inside the substation, there is an existence of switches, connections and a transformer. The transformer steps up voltage coming from wind farms and transforms them to the higher voltage of 220 kV used by transmission lines. Transformer is the main unit where EMF will be of similar magnitude as the transmission lines and hence it has to be located at a height similar to the transmission line and provide sufficient buffer around it to minimize occupational and public hazards. EMF from other elements in a substation will be small and standard mitigation methods are available to reduce both electric and magnetic fields generated by them, as described below. The electric and magnetic field (EMF) levels within the fenced area of a substation depends on the number of transformers used in the substation. However, these EMF levels decrease rapidly with distance from the transformers and other electrical equipment. Most of the time, EMF levels drop to the same as surrounding background levels at a distance of 30 to maximum 60 m from the fenced area.

### 10.5.4.3.1 Potential Impact

Regarding the National Institutes of Environmental Health and Sciences (NIEHS – a federal research institute), most of the EMF comes from a substation is generated by these lines, rather than the equipment at the substation itself[38]. Regardless the minor effect, EMF from substation also induces potential health impact on human health besides the transmission and distribution lines. According to many researched studies (A.P.Asanova et al., 1963, N.V.Revnova et al., 1966, T.E.Sazonova at el., 1969)[39], there is an apparent demonstration of the clinical and physiological aspects of human health influenced by EMF from substation. For instance, clear and visual health-related impacts are induced by 220, 330, 550 kV substation including cardio-vascular and nervous system functional changes. The EMF appearance can also lead to significant impacts on neurologic phenomenon (headache, flaccidity, fatigability, and sleepiness).

### 10.5.4.3.2 Existing / In-place Controls

Refer to Section 10.5.4.1.2.

### 10.5.4.3.3 Significance of Impacts

Predicting magnetic field profiles for substations is a complex exercise given the multitude of time varying sources orientated in multiple directions. As a result, the magnetic field profile is highly dependent on the particular circumstances. In order to understand the magnetic field pattern in the proposed step up substation, similar substation modelling performed elsewhere Tarmizi et al. (2016) was identified for discussion. Tarmizi et al. modelled magnetic field variability in a substation that had the 400 kV side connected to three loads, a shunt reactance and an autotransformer to step down the voltage to 220 kV. The substation considered by Tarmizi et al. was 280 m long, 140 m wide and the conductors are located at the height of 12m above the ground (on the 400 kV side). The normal operating currents at frequency of 50Hz for each load. The magnetic field distribution was calculated at the height of 1.7 m where measurements were available for comparison. The computed results for the normal operating currents are presented in Figure 10.24.

[38] https://www.cga.ct.gov/2004/rpt/2004-R-0826.htm

[39] https://www.who.int/peh-emf/meetings/en/2Rubtsova.pdf

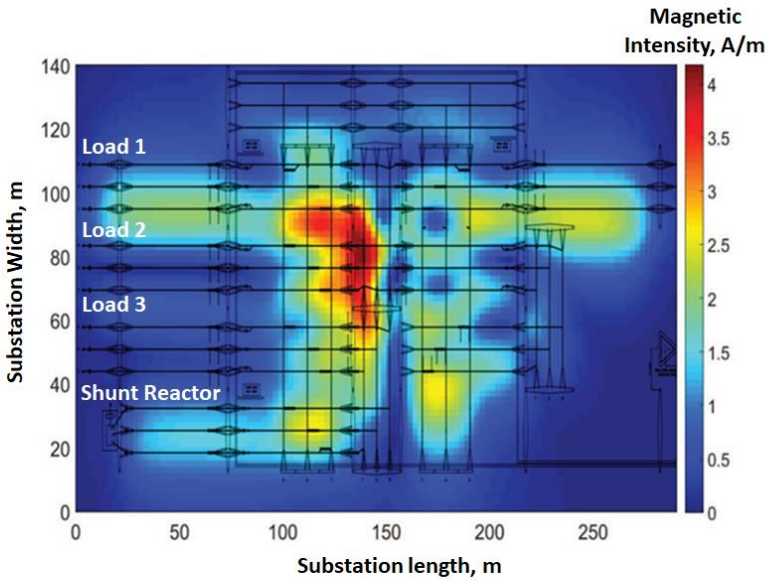



**Figure 10.24 Magnetic Field Distribution in the Substation Studied by Tamrizi et al. (2016) for a 400kV Substation (280m long, 140m wide)**

Figure 10.24 shows that the predicted highest value of the magnetic field is to be 4.164A/m located along busbar 1. For the normal operation conditions of the substation, the maximum values of the magnetic field were found to be below public exposure permissible limits proposed by ICNIRP. In addition, it clearly shows that the magnetic field decreases rapidly within the perimeter of the substation. However, for a lightning strike scenario, the magnetic field in the substation exceeded the public and the occupational exposure limit set by ICNIRP. The voltages and size of the substation used in the study by Tarmizi et al. were much higher than the proposed substation (voltage of 220 kV; and size up to 80m long by 70m wide) and hence the EMF impact is anticipated to be contained within the substation. In addition, according to the satellite image, there are no residential areas within the 300m safety zone of the substation, the sensitivity of receptors is considered **Low**.

Based on the analysis the assessment of impacts of EMF from substation during operation phase is shown in Table 10.41.

**Table 10.41 Impacts of EMF during Operation Phase from the Substation**

| Impact Description | EMF from the Substation during Operation Phase | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | **Temporary** | Short-term | Long-term | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Impact Frequency | The impact frequency is closely related to the operation of the wind farm, and assumed to be continuous during operation as a worst case. | | | |
| Impact Magnitude | Negligible | **Small** | Medium | Large |
| Receptor Sensitivity | **Low** | Medium | High | |
| Impact Significance | **Negligible** | Minor | Moderate | Major |

##### *10.5.4.3.4 Additional Mitigation Measures*

Some additional mitigation measures could be applied to reduce EMF impacts from substation to human health and to be aligned with *Circular No. 25/2016/TT-BYT* – National Technical Regulation on Industrial Frequency Electromagnetic Fields – Permissible Exposure Level of Industrial Frequency Electromagnetic Fields in the Workplace, as follows:

- Equip staffs who can come close to electromagnetic fields (EMF) with PPE and ensure O&M staff can work in different shifts to avoid the exposure time with EMF
- Put up warning signs for high voltage areas
- Organise periodic health check-ups for staff who work in EMF field location
- Provide staff with training on EMF section before performing work
- Consider reallocating sensitive receptors within the ROW (if any) (As observed through the satellite image, there is no sensitive receptors found within the ROW; however, a validation survey should be conducted to identify whether existence of any within the ROW).
- Use ferromagnetic and conductive materials for shielding as a barrier to reduce the field strength at the source, and
- Limit staff who have health problems such as cardiovascular and congenital diseases from working in areas with EMF.
- The Community Grievance Mechanism (GRM) as proposed in Chapter 6 – Stakeholder Engagement (SEP) shall be applied to receive and timely resolve community's grievances related EMF effects caused by the Project activities during operation phase.

##### *10.5.4.3.5 Residual Impacts*

With appropriate mitigation measures, the occupational and human exposure can be minimized to fall under ICNIRP standards, therefore the residual impact to occupational and public from the substation is considered to be Negligible.

##### *10.5.4.3.6 Monitoring and Auditing*

The locally approved regulatory EPP states that the electromagnetic filed should be monitored at the vicinity of the substation. The EMF monitoring survey should be conducted yearly during the operation phase. The EMF result must comply with *Decree No. 14/2014/ND-CP*, dated 26 February 2014 on Stipulating in detail the implementation of electricity law regarding electricity safety and National Technical Regulation *QCVN 25:2016/BYT* on Industrial Frequency Electromagnetic Fields – Permissible Exposure Level of Industrial Frequency Electromagnetic Fields in the Workplace. Should thresholds be exceeded, further mitigation options should be reviewed and considered.

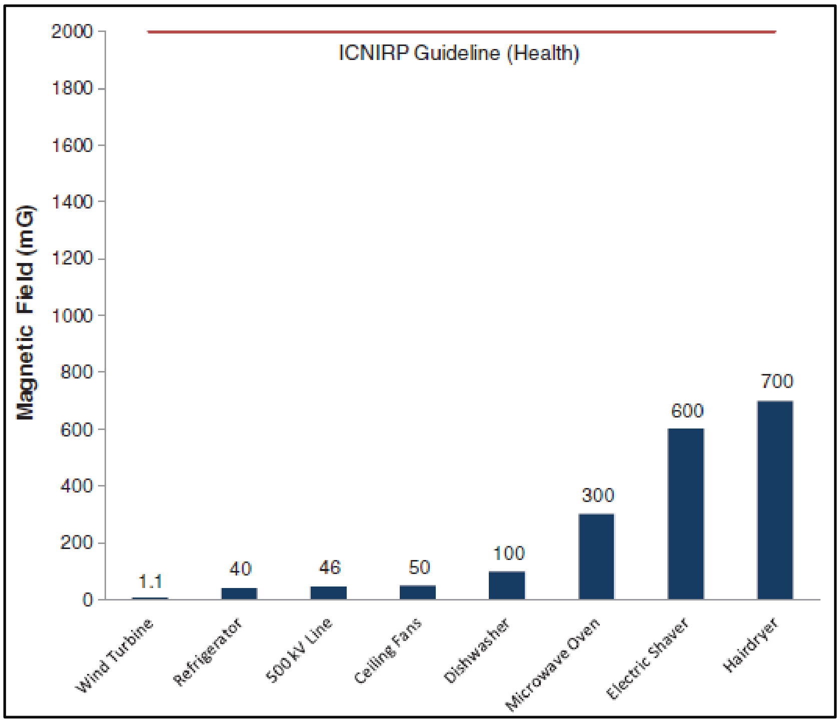
#### 10.5.4.4 EMF from Wind Turbine

##### *10.5.4.4.1 Significance of Impacts*

EMF from the step up transformer either in the nacelle of the turbine rotor unit or at some height below it in wind turbines, which increases the voltage to 22 kV with rated capacity of 3.8 MVA, are expected to be lower than the 220 kV transmission lines. The maximum electric and magnetic fields are unlikely to be assessed quantitatively due to insufficient data of transformer.

The maximum electric and magnetic fields cannot be assessed quantitatively due to insufficient data of transformer. However, referred to EMF results from empirical studies of Canadian 27 MW wind farm by

McCallum et al. (2014)[40], EMF were collected during three operational scenarios to characterize potential EMF exposure: “high wind” (generating power), “low wind” (drawing power from the grid, but not generating power), and “shut off” (neither drawing, nor generating power). Magnetic field levels detected at the base of the turbines under both “high wind” and “low wind” conditions were low (0.9 mG) and rapidly diminished with distance, become indistinguishable from background within 2m of the base. This source appeared to have no influence magnetic field level at nearby sensitive receptors as located over 1km from the closet turbine. Even though there are a number of sensitive receptors within 1km from the closet wind turbines, the influence induced by magnetic field on these are assessed as Low (See Figure 10.25). The study also concluded that magnetic field levels in the vicinity of wind turbines were lower than those produced by many common household electrical devices (Figure 10.25). Furthermore, when compared to ICNIRP guidelines, the levels of EMF measured around wind turbines were all well below levels known to cause harm to public and occupational health.




Source: McCallum et al. 2011

**Figure 10.25 Magnetic Fields Comparison from Wind Turbines and 500 kV Power Lines with Common Household Electrical Devices**

The maximum calculated electric field occurs directly under the base of the turbine and decreases outwards does not exceed the recommended ICNIRP occupational exposure limits. The EMF impact from the wind turbines are considered Negligible**.**

### *10.5.4.4.2 Additional Mitigation Measures*

Whilst no EMF specific additional mitigation and management measures are recommended; to enhance safety, it is recommended to place warning signs prohibiting climbing on wind turbines and incorporating design elements that prevent climbing of the wind turbines. It is also recommended to provide emergency contact information by placing signage at each wind turbine containing emergency phone numbers.

[40] McCallum Lindsay, Aslund M.L.W, Knopper L D, Ferguson G M and Ollson C A. 2014. Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern? Environmental Health 2014, 13:9

##### *10.5.4.4.3 Residual Impact*

The residual impact to occupational and public from the substation is considered to be negligible.

##### *10.5.4.4.4 Monitoring and Auditing*

No specific monitoring and auditing is recommended.

## 10.6 Climate Change Impact Assessment

Climate change is now widely and globally recognised as one of the most significant environmental challenges. In terms of response and adaptation to climate change, a range of international and national policy and legislation has been introduced and implemented to encourage the development of renewable energy, reduce greenhouse gas emissions and combat the impacts of climate change.

Vietnam is particularly vulnerable to the effects of climate change and therefore has a strong commitment to achieve the global mitigation target. Vietnam has set its national targets for emissions mitigation in the Nationally Determined Contribution (NDC): 8-9% GHG emission reduction against the "Business As Usual" (BAU) scenario by 2030 when compared with 2010 and a 25% reduction by 2030 on the condition of substantial international financial and technical support.

### 10.6.1 Scope of Assessment

This section provides a qualitative assessment of the following Project's activities potential impacts on climate change, including:

- Pre-construction activity due to the Project's development such as vegetation clearance can be a contribution factor to the climate change
- Construction activities may increase greenhouse gas emissions such as the operation process of heavy equipment (excavator, heavy trucks, bulldozer, crane) and the transportation of turbine and material from the purchasing point to the Project site, and
- Operation of wind turbines.

In addition, the physical impacts of climate change have implications for performance of wind power production, because the main resources are directly linked to climatic variables such as rainfall, wind, and temperature. This section also provides a qualitative assessment of climate change impacts to the Project development.

### 10.6.2 Relevant Guidelines and Criteria

#### 10.6.2.1 International Context

##### *10.6.2.1.1 Intergovernmental Panel on Climate Change (IPCC)*

In 1998, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) to provide independent scientific advice on climate change. The IPPC was originally tasked with the preparation of a report, based on available scientific information, on all aspects relevant to climate change and its impacts and to formulate realistic response strategies. This first assessment report of the IPCC served as the basis for negotiating the UNFCCC.

The IPCC has produced a variety of guidance documents and recommended methodologies for GHG emissions inventories including:

- 2006 IPCC Guidelines for National GHG Inventories
- 2019 Refinement to 2006 IPCC Guidelines for National GHG Inventories, and
- Good Practice Guidance and Uncertainty Management in National GHG Inventories.

#### *10.6.2.1.2 United Nations Framework Convention on Climate Change (UNFCCC)*

The UNFCCC sets an overall framework for intergovernmental efforts to tackle the challenges posed by climate change. It recognises that the climate system is a shared resource, the stability of which can be affected by industrial and other emissions of $CO_2$ and other GHGs. The convention has near-universal membership, with 192 countries (parties) having ratified the treaty known as the Kyoto Protocol.

Under the UNFCCC, governments:

- Gather and share information on GHG emissions, national policies, and best practices
- Launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries, and
- Cooperate in preparing for adaptation to the impacts of climate change.

#### *10.6.2.1.3 Kyoto Protocol*

The Kyoto Protocol entered into force on 16 February 2005. The Kyoto Protocol built upon the UNFCCC by committing to individual, legally binding targets to limit or reduce GHG emissions. The Kyoto Protocol had two commitment periods, the first was from 2008 to 2012 and the second was from 2013 to 2020. The GHGs included in the Kyoto Protocol were:

- Carbon Dioxide ($CO_2$)
- Methane ($CH_4$)
- Nitrous Oxide ($N_2O$)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs), and
- Sulphur Hexafluoride ($SF_6$).

#### *10.6.2.1.4 Paris Agreement*

In 2015, the Paris Agreement set in place a durable and dynamic framework for all countries to take action on climate change from 2020 onwards (that is, after the Kyoto period), building on existing efforts in the period up to 2020. Key outcomes of the Paris Agreement include:

- A goal to keep the global average temperature increase to well below 2°C and to pursue efforts to keep warming to less than 1.5°C above pre-industrial levels
- All countries to set mitigation targets from 2020 onwards and to review targets every five years to build ambition over time, informed by a global stocktake
- Robust transparency and accountability measures to ensure confidence in countries' actions and track progress towards targets
- Promoting action to adapt and build resilience to climate change, and
- Financial, technological, and capacity building support to help developing countries implement the Paris Agreement.

### 10.6.2.2 Vietnam Context

#### *10.6.2.2.1 Vietnam's Commitments to GHG Emissions Reductions*

Vietnam is a signatory to three significant international conventions on climate change, signing the:

- United Nations Framework Convention on Climate Change (UNFCC) in 1992, ratifying it in 1994

- Kyoto Protocol in 1998, ratifying it in 2002, and
- Paris Agreement in 2016, ratifying it in the same year.

Vietnam has submitted its updated National Determined Contributions to the UNFCCC Secretariat in July 2020. In this report, Vietnam has committed to reduce the GHG emissions by 8-9% (approximately 83.9 Mt $CO_2$-e) below the Business as Usual (BAU) scenario and by 27% (approximately 250.8 Mt $CO_2$-e) with international support by 2030[41], compared to the previously stated reduction of 8% and 25% with unconditional and conditional contribution, respectively.

##### *10.6.2.2.2 Policy Framework Supporting Implementation of GHG Reduction Targets*

- Over the past 10 years, Vietnam has issued and adopted such mitigation-related policies, legal documents, strategies as well as programmes, plans, and schemes to support the implementation of GHG reduction targets. Some of the key documents are listed below:
- Resolution 24/NQ-TW (2013) Active response to climate change, improvement of natural resource management, and environmental protection
- Law on Environmental Protection (No. 55/2014/QH13): promoting clean and renewable energy; environmental protection fee; environmental protection fund; strategic environmental assessment
- Law No. 50/2010/QH12 on Energy Efficiency and Conservation (LEEC): promoting energy efficiency and conservation activities through regulations, standards, and incentives
- The National Climate Change Strategy (2011) approved by Decision No. 2139/QD-TTg
- Vietnam Green Growth Strategy (2011) approved by Decision 1393/1212/QD-TTg, and
- Renewable Energy Development Strategy (2015) approved by Decision No. 2068/2015/QD-TTg.
- The most recent policy related to GHG reduction targets is *Resolution No. 55NQ/TW* dated 11 February 2020 on the orientation of the National Energy Development Strategy of Vietnam to 2030. *Resolution No. 55NQ/TW* sets a number of targets as below:
- The share of RE in the total primary energy supply is expected to account for 15-20% by 2030, and 25-30% by 2045
- The ratio of energy saving over total final energy consumption compared to the BAU scenario will increase about 7% by 2030 and roughly 14% by 2045, and
- The national GHG emission reduction targets from energy activities against the BAU scenario will be 15% and 20% by 2030 and 2045, respectively.

#### 10.6.2.3 International Lenders' Environment and Social Standards

In recognition of the international efforts to mitigate greenhouse gas emissions summarised above, international lenders explicitly require assessment of GHG and climate change risk such as Asian Infrastructure Investment Bank (AIIB) Environmental and Social Framework, International Finance Corporation (IFC), or Equator Principles (EP).

In the absence of national laws relating to the magnitude of GHG emissions from project developments, the guidelines and standards of international lender's environment and social standards are used to place project emissions into perspective as below:

##### *10.6.2.3.1 AIIB Environmental Safeguards*

The AIIB requires the design and implementation of the Project shall minimize the emission in accordance with the aims of the Paris Agreement in December 2015. The Project's Owner shall develop

[41] Ministry of Natural Resources and Environment (MONRE), 2020.

mitigation or adaptation measures to reduce the risk of climate change, as relevant as well as assess the impacts of the Project on climate change. The opportunities for low-carbon use, emission reduction, adaptive capacity enhancement, resilience strengthening, and vulnerability reduction to climate change shall be identified, where applicable. The promotion of renewable energy use and climate-proofing incorporation shall be conducted technically and financially.

#### *10.6.2.3.2 International Finance Corporation Performance Standards (IFC PS)*

In recognition of the international efforts to mitigate greenhouse gas emissions summarised above, the International Finance Corporation (IFC) Performance Standards explicitly require assessment of climate change risk and an understanding of GHG emissions and energy use, and includes:

- IFC Performance Standard 1: The risks and impacts identification process will consider the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities, and potential transboundary effects, such as pollution of air, or use or pollution of international waterways.
- IFC Performance Standard 3, which requires:
  - Consideration of alternatives and implementation of technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.
  - For projects that will generate over 25,000 tonnes of $CO_2$ equivalent (t $CO_2$-e)/ year, quantification of direct GHG emissions within the physical project boundary and indirect emissions associated with off-site production of energy (i.e. purchased electricity), will be conducted by the Client annually in accordance with internationally recognised methodologies and good practices.

#### *10.6.2.3.3 Equator Principles*

The Equator Principles (EP) is a voluntary environmental and social risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects. EP4 was release in November 2019 with an effective date of 1 July 2020.

The EP4 notes that quantification of Scope 1 and Scope 2 emissions GHG emissions will be conducted in accordance with internationally recognised methodologies and good practice, for example, the GHG Protocol.

The EP4 notes that for all Projects, in all locations, when combined Scope 1 (direct) and Scope 2 (indirect) emissions are expected to exceed 100,000 t $CO_2$-e annually, an alternatives analysis will be conducted to evaluate less GHG intensive alternatives.

### 10.6.3 Baseline Conditions

In order to provide climate change projection information, in 2013 the Intergovernmental Panel on Climate Change (IPCC) developed and published a new set of climate change scenarios, called RCPs (Representative Concentration Pathway). The four RCPs (RCP2.6, RCP4.5, RCP6 and RCP8.5), are named after a possible range of radiative forcing values[42] in the year 2100 relative to preindustrial

[42] Radiative forcing or climate forcing is the difference between insolation (sunlight) absorbed by the Earth and energy radiated back to the space. Changes to Earth's radiative equilibrium, that cause temperatures to rise or fall over decadal periods, are called climate forcing. (Source: Shindell, Drew (2013). "Radiative Forcing in the AR5" (PDF). Retrieved 17 December 2019 and Rebecca, Lindsey (14 January 2009). "Climate and Earth's Energy Budget: Feature Articles". earthobservatory.nasa.gov. Retrieved 17 December 2019)

values (+2.6, +4.5, +6.0 and +8.5 $W/m^2$, respectively). Climate change for Vietnam in general and for Dak Lak Province in particular is presented in details below.

### 10.6.3.1 Temperature

In Vietnam, for the RCP 4.5 scenarios stated that surface temperatures would increase by 1.9 - 2.4ºC in the North and 1.7 - 1.9ºC in the South. Regarding the RCP 8.5 scenarios, temperature would increase by 3.3 - 4.0ºC in the North and 3.0 - 3.5ºC in the South (IPCC, 2013). Extreme temperatures would have an upward trend[43]. Another material Climate Risk Country Profile for Vietnam issued by the Asian Development Bank (ADB) and World Bank Group (WBG) also stated the projected anomaly changes for maximum, minimum, and average daily temperatures in Vietnam for 2014 – 2059 and 2080 – 2099 from the reference period of 1986 – 2005 for all RCPs as below:

| | Average Daily Maximum Temperature | | Average Daily Temperature | | Average Daily Minimum Temperature | |
|---|---|---|---|---|---|---|
| Scenario | 2040–2059 | 2080–2099 | 2040–2059 | 2080–2099 | 2040–2059 | 2080–2099 |
| **RCP2.6** | 1.1 (−0.4, 2.7) | 1.2 (−0.1, 2.8) | 1.1 (−0.1, 2.3) | 1.1 (−0.1, 2.4) | 1.1 (−0.1, 2.1) | 1.1 (−0.1, 2.2) |
| **RCP4.5** | 1.3 (−0.1, 3.1) | 1.9 (0.3, 3.8) | 1.4 (0.1, 2.7) | 1.9 (0.7, 3.4) | 1.4 (0.1, 2.5) | 1.9 (0.5, 3.2) |
| **RCP6.0** | 1.1 (−0.3, 2.6) | 2.2 (0.6, 4.2) | 1.2 (−0.1, 2.3) | 2.3 (0.7, 3.8) | 1.1 (0.0, 2.2) | 2.2 (0.7, 3.6) |
| **RCP8.5** | 1.8 (0.2, 3.5) | 3.7 (1.8, 6.1) | 1.8 (0.4, 3.1) | 3.7 (2.1, 5.6) | 1.8 (0.4, 3.0) | 3.7 (2.1, 5.4) |

**Figure 10.26 Projected Anomaly Changes for Maximum, Minimum, and Average Daily Temperatures in Vietnam for 2014 – 2059 and 2080 – 2099**

According to the publication by a group of researchers in Hue University[44], there are two climate change scenarios namely A1B and B1 developed for Krong Bong District representing for Dak Lak Province in three periods of time including Year 2020 (2010 – 2039), Year 2050 (2040 – 2069), and Year 2080 (2070 – 2099). In A1B scenario, the annual average temperature is to increase 1.0ºC, 2.0ºC, and 2.8ºC for 2020, 2050 and 2080, respectively while the annual average temperature increases 0.9ºC, 1.5ºC, and 2.0ºC for 2020, 2050 and 2080, respectively in the second scenario B2. The changes in average annual temperature (ºC) according the RCP 4.5 scenarios and RCP 8.5 scenarios for Dak Lak Province[43] is presented in Table 10.42.

**Table 10.42 Changes in Average Annual Temperature (ºC) in Dak Lak Province**

| No. | Province, City | RCP 4.5 Scenarios | | | RCP 8.5 Scenarios | | |
|---|---|---|---|---|---|---|---|
| | | 2016 – 2035 | 2046 – 2065 | 2080 – 2099 | 2016 – 2035 | 2046 – 2065 | 2080 – 2090 |
| 1 | Dak Lak Province | 0.7 (0.4÷1.2) | 1.4 (0.9÷2.0) | 1.8 (1.2÷2.6) | 0.9 (0.6÷1.2) | 1.9 (1.3÷2.6) | 3.3 (2.7÷4.4) |

Source: Climate Change and Sea Level Rise Scenarios for Vietnam published by the Ministry of Natural Resources and Environment 2016

43 Climate change and sea level rise scenarios for Vietnam published by the Ministry of National Resources and Environment in Ha Noi, 2016.

44 https://www.researchgate.net/publication/341422794_Nghien_cuu_tac_dong_cua_bien_doi_khi_hau_den_hoat_dong_san_xuat_nong_nghiep_o_huyen_Krong_Bong_tinh_Dak_Lak

#### 10.6.3.2 Rainfall

In Vietnam, for the RCP4.5 scenarios, annual rainfall would generally increase over a range of 5÷10% by early 21st century over the most parts of the country, 5÷15% by mid and late 21st century particularly in some coastal provinces in the Red River Delta and 20% in the North Central and a part of the South and Central Highlands. For the RCP8.5 scenarios, the greatest increase would be over 20% in most parts of the North, Mid-central and parts of the South and Central Highlands [43]; and

In Dak Lak Province, the changes in annual rainfall (%) regarding the RCP 4.5 scenarios and RCP 8.5 scenarios are demonstrated in Table 10.43.

**Table 10.43 Changes in Annual Rainfall (%) in Dak Lak Province**

| No. | Province, City | RCP 4.5 Scenarios | | | RCP 8.5 Scenarios | | |
|---|---|---|---|---|---|---|---|
| | | 2016 – 2035 | 2046 – 2065 | 2080 – 2099 | 2016 – 2035 | 2046 – 2065 | 2080 – 2090 |
| 1 | Dak Lak Province | 6.5 (2.2÷10.9) | 7.6 (0.8÷15.7) | 10.1 (-1.0÷20.3) | 5.3 (-1.0÷11.6) | 8.7 (1.8÷16.2) | 11.4 (2.4÷19.5) |

Source: Climate Change and Sea Level Rise Scenarios for Vietnam published by the Ministry of Natural Resources and Environment 2016

#### 10.6.3.3 Tropical Depressions and Typhoons

On average, approximately 12 tropical depressions and typhoons had occurred in Vietnam's East Sea on an annual basis in the period of 1959 to 2015 (MONRE, 2016). Of these, seven depressions and typhoons had impacted Vietnam and five of them had made their ways onto Vietnam's mainland (MONRE, 2016); and

Tropical depressions and typhoons recorded in the same period of time show an increase in their intensity and a tendency to last longer and move southward (MONRE, 2016). The number of tropical depressions and typhoons is predicted under the RCP4.5 and RCP8.5 scenarios by MONRE to reduce slightly throughout the 21st century (MONRE, 2016). By the end of the 21st century, storm intensity is forecasted by the IPCC to increase by between 2 and 11% and rainfall within a 100 km buffer area from the storm eye is also predicted to increase by approximately 20% (IPCC, 2013).

#### 10.6.3.4 Extreme Weather Events

The number of cold fronts had decreased gradually, yet their intensity had increased in the period of 1981 to 1990 (MONRE, 2009). Approximately 10 days of cold fronts per year are recorded for Hanoi City (MONRE, 2009). In addition, the number of droughts experienced in Vietnam, especially extreme droughts, has increased significantly since 2000 (MONRE, 2009); and

Droughts in Vietnam are likely to become more severe in future due to the increasing temperature and decreased rainfall during the dry season (MONRE, 2016). The number of hot days (temperature ≥ 35ºC) is predicted to increase to be 35 - 45 days per year by the middle of the 21st century and exceed 100 days per year by the end of the 21st century.

### 10.6.4 Impact Assessment

The WTGs is to be specifically designed and installed to operate stably under various weather and meteorological conditions including temperature, rainfall, and extreme weather. As such, the impact magnitude of climate change is predicted to be Small and the impact significance is also considered to be Negligible.

There are unavailable studies on impacts of natural disasters such as storms on wind farms, but they may cause damage to turbines and affect the lifespan of wind turbines and the transmission line.

## 10.6.4.1 Impacts of Project's Activities to Climate Change

### *10.6.4.1.1 Impact during Pre-construction Phase*

#### *10.6.4.1.1.1 Significance of Impact*

In accordance to the Feasibility Study Report 2021 provided by the Project's owner, the Project development will cause an impact on 208.64 hectares (119.09 ha of fixed-term and 161.55 ha of temporary land) of agricultural land mainly for perennial trees plantation due to the vegetation clearance activity during the pre-construction phase. Vegetation clearing in this area can induce a change of carbon stocks from the removal of living biomass.

The land use category is assumed to be agricultural and crop land in line with IPCC categories (IPCC, 2006). GHG emission from land clearance is expected using the Equation 10.1 and the parameters summarised in Table 10.44. Total GHG emission from vegetation clearing are presented in Table 10.45.

**Equation 10.1 Change in Biomass Carbon Stocks on Land Converted to another Land Category**

$$\Delta C_{LO_{LB}} = A_{Conversion} \times (B_{After} - B_{Before}) \times CF$$

Where:

| | | | |
|---|---|---|---|
| $\Delta C_{LO_{LB}}$ | = | Annual change in carbon stocks in living biomass in land converted to 'other land' | (t C/year) |
| $A_{Conversion}$ | = | Area of land converted to 'other land' from some initial land uses | (ha/year) |
| $B_{After}$ | = | Amount of living biomass immediately after conversion to 'other land' | (tonnes d.m./ha) |
| $B_{Before}$ | = | Amount of living biomass immediately before conversion to 'other land' | (tonnes d.m./ha) |
| $CF$ | = | Carbon fraction of dry matter (default = 0.5) | (tonnes C/tonnes d.m.) |

**Table 10.44 Amount of Living Biomass before and After Land Conversion**

| Description | Amount of Living Biomass (tonnes d.m./ha) | |
|---|---|---|
| | Forest land | Agricultural land |
| Before | 60[a] | 2.6[b] |
| After | 0[c] | 0[c] |

a- Carbon stock in biomass for forest land for tropical forest, moist climate region from Table 3A.1.3 from Chapter 3.3 of Good Practice Guidance for Land use, Land-use Changes and Forestry (IPCC, 2003).

b- Carbon stock in biomass for perennial cropland for tropical, moist climate region from Table 3.3.8 from Chapter 3.3 of Good Practice Guidance for Land use, Land-use Changes and Forestry (IPCC, 2003)

c- Default assumption of 0 was assumed when converted to other land as per Section 3.7.2.1.1.1 from Good Practice Guidance for Land use, Land-use Changes and Forestry (IPCC, 2003)

**Table 10.45 Annual GHG Emissions from Land Clearing in the Preparation Phase**

| Phase | Description | GHG Emissions (t $CO_2$-e/year) [a] | |
|---|---|---|---|
| | | $CO_2$ | Total |
| Preparation phase | Land clearing | 994 | 994 |

### 10.6.4.1.2 Impact during Construction Phase

#### 10.6.4.1.2.1 Existing Controls

There is no existing measures/controls proposed for this Section.

#### 10.6.4.1.2.2 Significance of Impact

Because climate change affects global receptors, the impact magnitude and resource/receptor sensitivity cannot be determined in the same way it can be for other impact assessment aspects such as soil, air or water resource, etc. For this reason, impact significance is only determined to be Significant or Not Significant using the IFC threshold value of 25,000 tonnes of carbon dioxide equivalent per year ($tCO_{2e}$)[45].

Main construction activities such as construction of turbine foundation with reinforced concrete, installation of overhead and underground transmission line, wind turbines also used heavy equipment that consumes a relatively huge amount of diesel. The use diesel fuel has increased the production of greenhouse gases (GHG), especially carbon dioxide ($CO_2$), that contributing to climate change impacts.

The estimate of the Project GHG footprint was performed based on 2006 IPCC Guidelines for National GHG Inventories (UNFCCC, 2018b). The IPCC Guideline defined three level of methodological complexity, called “tier” for GHG accounting and reporting purposes, as shown in Table 10.46.

**Table 10.46 Tiers Approach for Estimation of GHG**

| Scope | Description |
|---|---|
| Tier 1 Approach | Calculates emissions by multiplying estimated fuel consumed with a default emission factor.<br>For $CO_2$, emission factors mainly depend upon the carbon content of the fuel and therefore emissions can be estimated fairly accurately using this method.<br>Emission factors for $CH_4$ and $N_2O$ depend on the combustion technology and operating conditions and vary significantly. As such, large uncertainties are anticipated from this method. |
| Tier 2 Approach | The approach is the same as Tier 1 but country-specific emission factors are used in place of the Tier 1 defaults. |
| Tier 3 Approach | Technology-specific emission factors. |

In this Project, the emission from construction activities has been accounted in the Tier 1 method. The calculation is based on the amount of fuel consumption data and emission factors for $CO_2$, $CH_4$, and $N_2O$ which will be applied to the corresponding activity data. GHG emission from mobile combustion including bulldozer, excavators, cranes, rollers, graders, trucks are estimated using Equation 2. The value of default emission factors and energy content factors are presented in Table 10.47.

45 IFC Greenhouse Gas Reduction Accounting Guidance for Climate Related Projects. IFC Climate Business Department, May 2017

**Equation 2 Fuel Combustion**

$$E_j = \frac{Q_i \times EC_j \times EF_{ijoxec}}{1000}$$

Where:

| | | | |
|---|---|---|---|
| $E_j$ | = | Estimated emissions of gas type j ($CO_2$, $CH_4$ or $N_2O$) from fuel type (i) | (t $CO_2$-e/year) |
| $Q_i$ | = | Estimated quantity of fuel type (i) | (tonnes or GJ/year) |
| $EC_j$ | = | Energy content factor of fuel (j) | (GJ/t or GJ/kL) |
| $EF_{ijoxec}$ | = | Emission factor for each fuel type (j) | (kg $CO_2$-e/GJ or tonne) |

**Table 10.47 Default Emissions Factors and Energy Content Factor for Diesel Combustion in Mobile Equipment and Vehicles**

| Description | Value | Units |
|---|---|---|
| Energy content factor for diesel | 43 [a] | MJ/kg or GJ/t |
| | 35.9 [b] | GJ/kL |
| Diesel density [c] | 0.840 | kg/L or t/kL |
| Tier 1 $CO_2$ emission factor - diesel [d] | 74.1 | kg $CO_2$-e/ GJ |
| Tier 1 $CH_4$ emission factor - diesel [d] | 4.15 | kg $CH_4$/ TJ |
| | 0.12 | kg $CO_2$-e/ GJ |
| Tier 1 $N_2O$ emission factor - diesel [d] | 28.6 | kg $N_2O$/ TJ |
| | 7.6 | kg $CO_2$-e/ GJ |

*a. (IPCC, 2006) - Table 1.2 (default net calorific values (NCVs) and lower and upper limits of the 95% confidence intervals), page 1.18, Volume 2 (Energy), Chapter 1 (Introduction).*
*b. Estimated by ERM based on the diesel density.*
*c. (STAMEQ, 2018) – TCVN 5689:2018, Table 1 (Diesel fuel oil - Specifications and test methods), Diesel density*
*d. (IPCC, 2006) - Table 3.3.1 (default emission factors for off-road mobile sources and machinery), page 3.36, Volume 2 (Energy), Chapter 3 (Mobile Combustion).*

The estimated $CO_2$ emission from the operation of heavy equipment (See Table 10.48) with the assumption below is presented in Table 10.49. It is noted that these are estimates only, and actual emissions would vary depending on factors such as the actual construction schedule, actual material demand.

**Table 10.48 List of Construction Equipment during the Construction Phase**

| No | Equipment Type – Capacity | Quantity |
|---|---|---|
| 1 | Crane | 2 |
| 2 | Truck | 10 |
| 3 | Bulldozers | 11 |
| 4 | Mobile crane | 14 |
| 5 | Total | 37 |

Source: Refer to data provided by the Project's Owner

**Table 10.49 Estimated $CO_2$ Emission from Operation of Heavy Equipment**

| No | Average number of heavy equipment for construction of each turbine | An average diesel consumption rate | Working hours/day | Construction period (18 months) (excluding public holidays) |
|---|---|---|---|---|
| 1 | 37 equipment | 30 litters/hour[46] | 8 hours/day | 378 working days |
| Diesel quantity to complete the construction of 18 wind turbines: 3,356,640 litres | | | | |
| Diesel density: 0.84 kg/litre | | | | |
| Emission factor ($CO_2$-e) : 81.82 kg $CO_2$-e/ GJ | | | | |
| Energy content factor for diesel: 43 MJ/kg | | | | |
| Total estimated CO2-e emission: 3,356,640 litres x 2.955 kg $CO_2$e/litre = 9,918.9 tons $CO_2$-e | | | | |

Additionally, the estimated $CO_2$ emission from transportation of material and equipment is calculated as follows:

**Table 10.50 Estimated $CO_2$ Emission from Transportation of Materials and Equipment**

| Items | Number of heavy haul vehicle movement (one-way)/ day | Number of transportation days | Diesel use Rate[47] (litre/day) | Diesel Use Demand |
|---|---|---|---|---|
| Wind turbine component (turbine blade, Nacelle, Hub, Tower sections) and Transmission line component were transported by specialized trailers | 3 | 378 | 68 | 77,112 litres |
| Material (sand, stone, cement, steel) | 20 | 378 | 57 | 430,920 litres |
| Diesel quantity to complete the transportation of material and equipment: 508,032 litres | | | | |
| Total estimated $CO_2$e emission: 508,032 litres x 2.955 kg $CO_2$e/litre = 1,501 tons $CO_2$e | | | | |

The estimated $CO_2$ emission over the Project Construction is likely to be less than the IFC threshold value of significance of 25,000 tons of carbon dioxide equivalent (t$CO_2$e). Therefore the impact is considered **Not Significant**.

### *10.6.4.1.3 Impact during Operation Phase*

As mentioned above, once operational, the Project will make a contribution to Vietnam renewable energy sector and climate change targets. During the operation phase of the project's life cycle, Huadian Dak Lak Wind Power Project plans to generate totally 754.607 GWh/year of electricity through wind power, which is considered as zero GHG emission during operation phase. Through generating electricity by harnessing the power of the wind as opposed to burning a mix of fossil fuels, the Project is expected to provide a potential saving of 688,956.191 tonnes of carbon dioxide emission per year over its 20 year lifetime[48].

[46] Referred from Article "Evaluating the Environmental Impacts and Energy Performance of a wind farm system utilizing the Life – Cycle Assessment Method: A Practical Case Study", Mohamed R.Gomaa and et al, 2019

[47] Decision No 1134/QĐ-BXD of Ministry of Construction, dated October 8th 2015 on Rate of fuel consumption of construction equipment.

[48] The grid emission factor of Vietnam for 2018 is 0.913 tCO2/MWh, according to the Announcement No. 263/BĐKH-TTBVOD of Department of Climate Change, Ministry of Natural Resources and Environment

Therefore, the Project has **positive impacts** to Climate Change as it helps to reduce consumption of fossil fuels to generate electricity, and as a result, reducing the emissions of GHG and air pollutant emission.

### 10.6.4.2 Impact of Climate change to the Project

The potential impacts of climate changes affected to wind power generation and wind power infrastructure include:

- Extreme weather events, such as stronger and/or more frequent storms can reduce the output of energy, damage generation and grid infrastructure, affect security of energy supply and cause difficult access to the Project's location for maintenance
- Rapid change in wind speed can reduce power generation because turbines cannot operate in very high or very low winds (refer to cut-in and cut-out wind speeds), and
- Severe natural disaster such as flooding and landslide may affect to substation and other components which results in loss of supply locally.

#### *10.6.4.2.1 Existing Control*

Some existing controls were identified in the local EPP and Project engineering design, as follows:

- Each turbine will be installed stone embankment and foundation pit will be compacted to avoid flooding and landslide
- Some technical specifications in the Envision Design were already considered extreme climate condition such as extreme wind speed (10 min average) of 37.5 m/s; survival wind speed (3s gust) of 52.50 m/s and turbulence intensity. These parameters are adapted with extreme weather of Dak Lak province, Vietnam as several storm, typhoons were recorded in Dak Lak province with the maximum wind speed of 36.6 m/s (level 12). The wind turbine will stop producing power at ambient temperature below -40°C and above 50°C. The turbine is designed for use at altitudes up to 1,000 MASL standard and optional up to 2,000 MASL
- Drainage system will be designed and built around the turbines' foundation and transmission line pylon to ensure to accommodate the increased precipitation because of climate change
- Prepare flood warning and prevention system and develop an Emergency Preparedness and Response Plan, and
- When the flash flood occurs, the Project owner needs to evacuate workers out of dangerous areas, using on-site equipment and manpower to control the incidents.

#### *10.6.4.2.2 Significance of Impact*

The impact significance of Climate change to Wind Production is presented below in Table 10.51.

**Table 10.51 Climate Change Impacts to Wind Power Production and Infrastructure**

| Impact Description | Climate Change Impacts to Wind Power Production and Infrastructure | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| | Climate change impacts (such as changes in wind speed, flooding and inundation, storm surges) affect directly to wind turbine operation and wind power production and physical infrastructure (wind turbines, transmission line and distribution system) | | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent |

| | | | | |
|---|---|---|---|---|
| **Impact Extent** | Local | | **Regional** | Global |
| **Frequency** | The impact frequency is closely related to the operation of the wind farm, and assumed to be likely to occur at some time during operation as a worst case. | | | |
| **Impact Magnitude** | Negligible | **Small** | Medium | Large |
| **Receptors Sensitivity** | **Low** | | Medium | High |
| **Impact Significance** | Negligible | **Minor** | Moderate | Major |

### 10.6.4.2.3 *Adaptation Measures*

The following adaption measures are proposed on this ESIA to adapt impacts regarding to climate change, including:

- Construction design should take into account the increase in wind intensity to ensure stability of the WTG and avoid any community/occupational safety incidents
- In case that wind speeds are likely to increase, the selected turbine design (Envision 2.65 MW and 3.0MW) has been adapted to handle higher wind speeds and gusts, to capture greater wind energy with taller towers
- For transmission and distribution (including substation), specifying redundancy in control systems, multiple transmission and distribution routes, relocation. Where stronger winds are expected, higher design standards for distribution poles shall be adopted
- Where lightning strikes may increase, it must apply enhanced lightning protection and grounding system (earth wires, and spark gaps) in the distribution network
- Ensure the presence of rapid emergency teams to repair any damaged turbines in timely manner
- The planned areas for vegetation clearance linked to the construction works shall be clearly determined and demarcated by landmarks to avoid any accidental violation. Site clearance plan will be prepared to identify areas that will be retained with natural vegetation within the Project's boundaries
- Clearing vegetation outside of designated areas will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with sanctions, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation
- Some mitigation measures regarding to transportation plan should be done to avoid unnecessary trips that would make more vegetation clearance, and
- Some existing controls relating to the impact from natural disasters can be referred to Section 10.6.4.2.1.

### 10.6.4.2.4 *Residual Impact*

After applying all adaptation measures, the residual impact to the climate change can be considered to be Negligible.

### 10.6.4.2.5 *Monitoring and Auditing*

There is no monitoring and auditing program for Climate change aspect.

## 10.7 Shadow Flicker Impact Assessment

### 10.7.1 Scope of Assessment

Within windfarms, shadow flickering can have significant impacts on surrounding communities; this section is included to assess and address this particular impact. The likelihood and duration of the flickering effect usually depends upon a number of factors, including:

- The direction and distance of the property relative to the turbine (the further the observer is from the turbine, the less pronounced the effect will be)
- Turbine height and rotor diameter
- Time of the day and year linked to climatology conditions in the area
- Wind direction (that affect potential wind turbine orientation)
- General weather conditions (presence of cloud cover, fog, humidity reduces the occurrence of shadow flicker as the visibility itself of the turbine is reduced)
- Windows structure (e.g. window direction, window coverings, materials)
- Topography and presence of natural or anthropic barriers (i.e. vegetation, other buildings etc.)

In general, shadow flickering effect occurs during clear sky conditions, when the sun is low on the horizon (sunrise and sunset). As the angle of elevation from the horizon of the sun during midday changes throughout the year plus the topographical relief, each location experiences and is influenced by the shadow flickering effect phenomenally different. Hence, specific shadow receptors can be disturbed in different periods of the day or year.

The theoretical number of hours of experienced shadow flickering effect each year at a given location can be calculated by utilising modelling packages (e.g. Shadow model in windRPO 3.4) incorporating the sun path, topographical relief over the Project site, and rotor diameter and hub height details of wind turbine model.

When assessing shadow flickering impacts, the worst case and/or real case impacts are determined:

- **Worst Case Scenario**: the possibility of astronomical shadow flickering duration is maximum when the sun is lastingly shining during daylight hours (i.e. the sky is always clear), the wind turbine is always operating, the rotor is always is always perpendicular to the line from the WTG to the sun.
- **Real Case Scenario**: the expected shadow flickering duration when average sunshine hour probabilities and wind statistics at a certain region include turning off periods (low winds and high winds) are taking into account.

### 10.7.2 Applicable Standards

In August 2015, the World Bank Group published the Environmental, Health and Safety (EHS) Guidelines for Wind Energy[49]. These are technical reference documents containing examples of good industry practice.

The definition adopted in the EHS guidelines states that shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. Shadow flicker may become a problem when potentially sensitive receptors (e.g. residential properties, workplaces, educational and/or healthcare spaces/facilities) are located nearby, or have a specific orientation to the wind energy facility.

Key points identified in the guidelines include:

[49] EHS Guidelines of World Bank Group:
https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

- Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. Shadow flicker may become a problem when potentially sensitive receptors (e.g., residential properties, workplaces, learning and/or health care spaces/facilities) are located nearby, or have a specific orientation to the wind energy facility.
- Potential shadow flicker issues are likely to be more important in higher latitudes, where the sun is lower in the sky and therefore casts longer shadows that will extend the radius within which potentially significant shadow flicker impact will be experienced.
- In case of the possibilities of modifying the wind turbines' locations where neighbouring receptors experience low shadow flicker effects, it is recommended that the predicted duration of shadow flickering effects experienced at a sensitive receptor **should not exceed 30 hours per year and 30 minutes per day on the worst affected days, based on a worst-case scenario**.
- Recommended preventative and mitigation measures to avoid substantial shadow flicker impacts include **systematising wind turbines' arrangement appropriately, when feasible**, to avoid shadow flicker being experienced or to meet duration limits of shadow casting continuously on the shadow sensitive receptor, as set out in the paragraph above, or scheduling wind turbines to **shut down at intervals where shadow flicker limits are exceeded**.

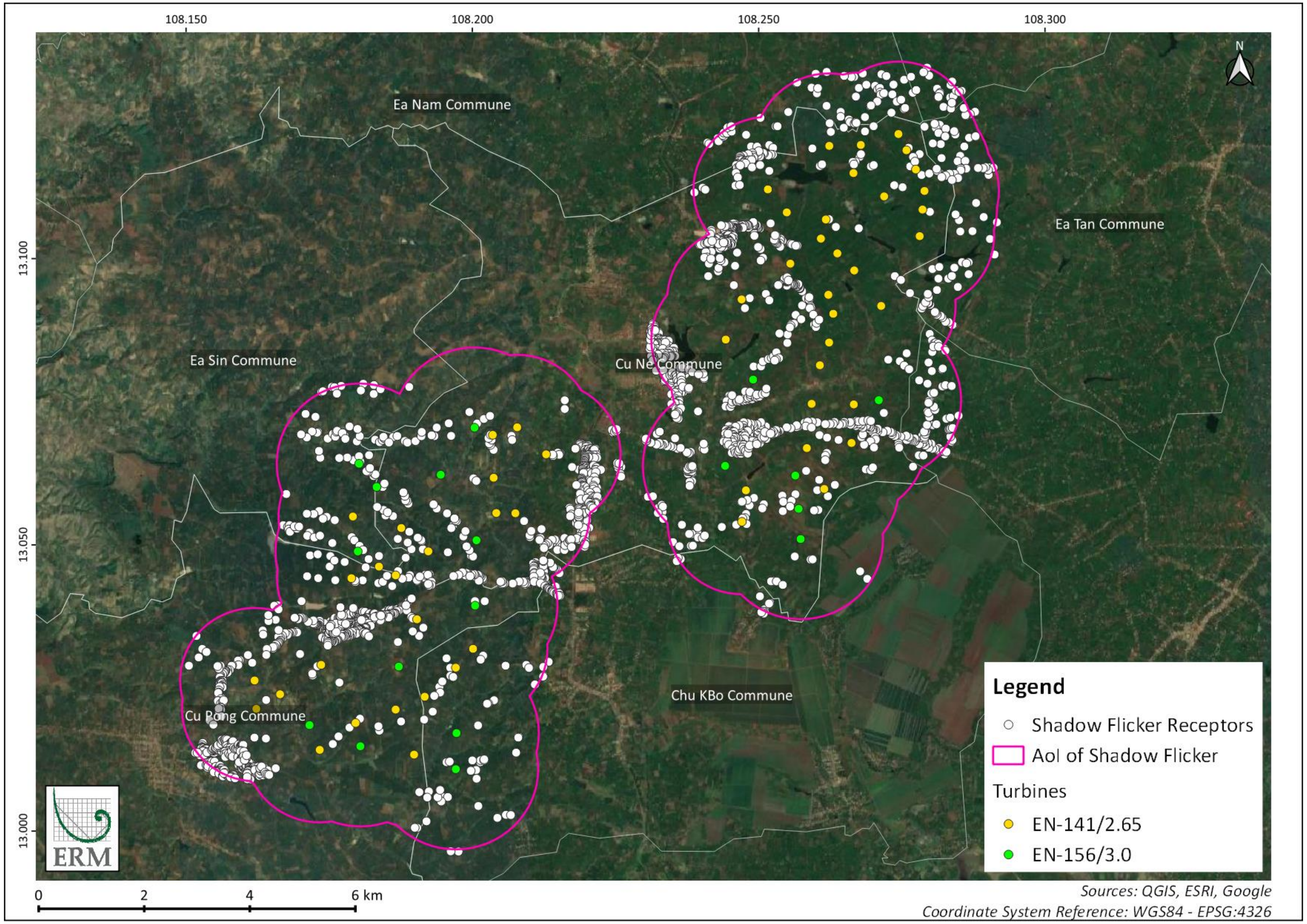
### 10.7.3 Receptors

The Project is divided into four (4) lots and named Krong Buk 1, Krong Buk 2, Cu Ne 1, and Cu Ne 2 which are separated to 2 groups Krong Buk 1&2 and Cu Ne 1&2 (Figure 1.1). Krong Buk 1 is located in Cu Pong commune and the western part of Chu Kbo commune, and Krong Buk 2 is located in Cu Ne commune and the south-eastern part of Ea Sin commune, Krong Buk district, Dak Lak province. Meanwhile, Cu Ne 1 and Cu Ne 2 are both located in Cu Ne commune, Krong Buk district, Dak Lak province.

As aforementioned in Section 5.3.1 - Areas of Influence of Shadow Flicker[50] was identified as 10 times rotor diameter (1,410 m of radius of influence (RoI) for EN141/2.65 and 1,560 m of RoI for EN156/3.0). It is situated in cultivation areas of Krong Buk districts characterised by low-altitude mountainous terrain (in a range of 610 – 830 masl[51]) and agricultural land with a large area of rice fields. There are a total of 2,690 potential receptors that were identified within the AoI and could potentially experience the shadow flickering event and Figure 10.27 presents the location of such receptors.

[50] Area of Influence for Shadow Flicker impact: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48052/1416-update-uk-shadow-flicker-evidence-base.pdf

[51] masl: meter(s) above sea level




Source: QGIS, ESRI, Google, August 2021

**Figure 10.27 Location of Receptors**

### 10.7.4 Assessment Methodology

The project baseline conditions are summarized and represented in this section to describe general characteristics of the project area according to the meteorological baseline which is presented in Section 7.2.5. In addition, there are some assumptions for shadow flicker theory that should be stated prior to modelling. In particular:

- The average monthly sunshine hours is approximately 151 – 280 hours. As recorded, March attains the highest sub hours of 200 – 320 hours.
- The wind turbines have been considered operational with wind speed more than 3 m/s and for the same, based on annual wind rose and wind frequency data (see Table 7.10) it has been assumed that about 90% time of the year, the wind turbines will be operational.
- The blades of the wind turbines are perpendicular with north-east and south-west orientation have been considered based on the predominant wind direction available from the wind mast data (Figure 7.8), which could result in maximum possible size circular/ elliptical.
- It is noted that the assumption of non-vegetation does not take into account trees on the surface which may obscure the line of sight between shadow receptor and turbine in shadow flicker calculation.
- The sun can be represented as a single point.
- Flicker is ignored if sun is less than 3° above horizon due to atmospheric diffusion/ low radiation/ sheltering.

### 10.7.5 Shadow Flickering Analysis

This assessment was performed using windPRO 3.4©; a computer software which is widely used by the wind industry. The software package includes a Shadow Flicker Module (SHADOW) that calculates the frequencies and the intervals in which a specific neighbouring receptor or area will be affected by one or more wind turbines.

Two scenarios have been considered and modelled: Worst Case Scenario (maximum potential risk) and Real Case Scenario.

- **Worst Case Scenario (WC)**: the calculation is based on the following key assumptions:
  - The presence of physical barriers is not considered
  - Natural vegetation screening is not included
  - Cloudiness, humidity are not considered
  - The sun is shining all the day, from sunrise to sunset
  - Local topography has been obtained from NASADEM
  - Rotor is always in operation and refrained from turning off during low winds or high winds
  - Shadow receptors are modelled using the “greenhouse” mode, meaning that shadow flicker effect to each receptor at all directions (visibility 360 degrees)
- **Real Case Scenario (RC)**: is designed by considering planned turbines, the calculations are based on a more realistic situation where publicly available dataset of sun shining probability and average wind direction is applied. However, it should be noted that real case scenario still ignores other relevant conditions (e.g. vegetation cover, window characteristics) of the local settings that will theoretically lead to an overestimation of the shadow flickering occurrence.

All scenarios have been carried out with a chronological resolution of 1 minute (if shadow flicker is predicted to occur in any 1-minute period, the model records this as 1 minute of shadow flicker).

Independent of the selected scenario, the model calculates outputs according to the principles presented in Figure 10.28.

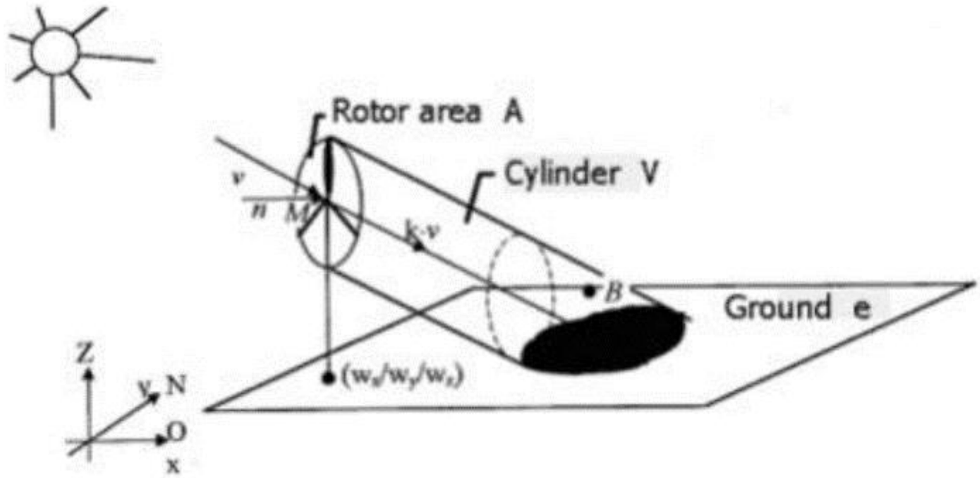



**Figure 10.28 Shadow Flickering Theory**

All receptors in both scenarios, assuming dwellings/groups of dwellings, within Shadow Flickering AoI of Project's WTGs have been modelled taking into account the following characteristics:

- Single storey building. Therefore, shadow flicker has been calculated at a height of 1 m (equivalent to the ground floor windows).
- Slope of the window has been set to 90°.
- The identified receptors are simulated as fixed points with the 360° viewpoint which represented an unrealistic scenario as real windows would only face a particular direction[52].

### 10.7.5.1 Worst Case Scenario

The assumptions have been mentioned in Section 10.7.5 for the modelling setting of the Worst Case Scenario.

[52] Worst Case Scenario in windPRO 3.4 software based on EHS Guidelines for Wind Energy

### 10.7.5.2 Real Case Scenario

The following assumptions have been considered in the modelling setting for Real Case Scenario:

Public data of average daily sunshine hours at Buon Ma Thuot meteorological station (approximately 340 m from the Project):

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.16 | 6.18 | 6.35 | 5.70 | 6.96 | 5.65 | 5.58 | 4.98 | 5.13 | 6.14 | 7.61 | 8.24 |

- Local topography has been obtained from NASADEM
- No cloud cover or any other meteorological conditions that could potentially reduce visibility and the sunlight have been assumed
- Receptors modelled using greenhouse mode
- No existing physical barriers have been considered (e.g. trees, buildings)
- Rotors are always rotating
- The probability distribution of wind direction according to data recorded at the Project's measurement tower at the height of 80 m from 2013 to 2016:

| N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.02% | 3.60% | 18.93% | 13.44% | 10.14% | 6.25% | 2.78% | 1.52% | 1.42% | 2.10% | 8.89% | 16.63% | 8.69% | 2.82% | 0.85% | 0.94% | 100% |
| 89 | 315 | 1,658 | 1,177 | 888 | 548 | 243 | 133 | 124 | 184 | 779 | 1,457 | 761 | 247 | 75 | 82 | 8,760 |

It should be noted that even the assessment performed with such assumptions is leading to an overestimation in terms of real annual number of hours of shadow flicker at a specific location mainly because of the following local conditions have not been included:

- The occurrence of cloud cover has the potential to significantly reduce the number of shadow flickering hours that the observer can be experienced.
- The presence of aerosols in the atmosphere have the ability to influence the flickering duration as the length of the shadow cast by a WTG depends on the angle of direct sunlight hits, which is strictly determined by the amount of fine solid particles/liquid droplets in between the observer and the rotor.
- The analysis has not considered the presence of vegetation or any other physical barriers around a receptor that are able to block the view (at least partially) of the turbine.

### 10.7.5.3 Summary of Scenario Setting

The following table is reporting the modelling settings adopted per each scenario. However, it should be noted that the performed calculations did not consider the actual location and orientation of windows of the possible affected house, or the screening effects associated with existing, site-specific conditions and obstacles like other buildings, leading to potential of over-estimating the duration of occurrences when shadow flicker might be experienced at a specific location.

**Table 10.52 windPRO Shadow Module Inputs (in bold the differences between Worst Case and Real Case Scenario)**

| | Worst Case Scenario | Real Case Scenario |
|---|---|---|
| Wind Turbine location | See Figure 10.27 | See Figure 10.27 |
| Rotor diameter and hub height | 141 m/ 130 m for EN141/2.65<br>156 m/ 130 m for EN156/3.0 | 141 m/ 130 m for EN141/2.65<br>156 m/ 130 m for EN156/3.0 |
| Wind Turbine Operation | Rotors are always rotating | Rotors are always rotating |
| Wind Turbine Visibility | A WTG will be visible if it is visible from any part of the receiver window (greenhouse mode) | A WTG will be visible if it is visible from any part of the receiver window (greenhouse mode) |
| Window stories dimensions | 1m height / 1m large / 1m from the ground floor | 1 m height / 1m large / 1m from the ground floor |
| Cloudiness | Not considered | Not considered |
| Physical barriers (i.e. vegetation) | Not considered | Not considered |
| Minimum sun height over horizon for influence | 3° | 3° |
| Day step for calculation | 1 day | 1 day |
| Time step for calculation | 1-minute | 1-minute |
| Shining period | **The sun is always shining all day, from sunrise to sunset** | **The sun is shining as per available local sunshine data (Buon Ma Thuot meteorological station)** |
| Height contour | NASADEM | NASADEM |
| Eye Height | 1.5 m | 1.5 m |

### 10.7.5.4 Model Results

As presented above, two scenarios have been modelled using SHADOW module of windPRO soft-ware to identify the receptors potentially affected by the shadow flickering. The following sections are reporting the number of potentially affected receptors per each scenario.

#### *10.7.5.4.1 Worst Case Scenario*

As presented above, Worst Case Scenario has been modelled using SHADOW module of windPRO to identify the receptors potentially affected by the flickering. The project area is characterised by the presence of receptors in Krong Buk district.

The modelling package is calculating the predicted shadow flickering durations at receptors with a result of:

- 1,030 receptors which experience greater than 30 hours per year
- 866 receptors which experience greater than 30 minutes per day
- 785 receptors which experience greater than 30 hours per year and 30 minutes per day. These receptors were considered as impacted according to IFC EHS Guidelines for Wind Energy.

Worst Case Scenario has considered unrealistic conditions and its result led to a potential of 785 impacted receptors out of 2,690 mapped ones (around 29.18% and within the impacted zone in Figure 10.30). The key potentially impacted areas are mainly located in dense residential areas:

- Drang village, Cu Pong commune, and Dro village, Cu Ne commune within Krong Buk 1&2
- Ra, Kdeao, Ktang villages, Cu Ne commune within Cu Ne 1&2
- Sparse receptors within Cu Pong and Cu Ne communes

IFC thresholds have been exceeded for both parameters: hours/year and min/day at 785 receivers with the most impacted receptor (No.2307) experiences ~809 hours per year with the maximum of 193 minutes per shadow day.

The following charts and maps present the distribution of areas where flickering is calculated according to the Worst Case Scenario (from Figure 10.29 to Figure 10.34). A table of main result for all receptors is attached in Appendix L.

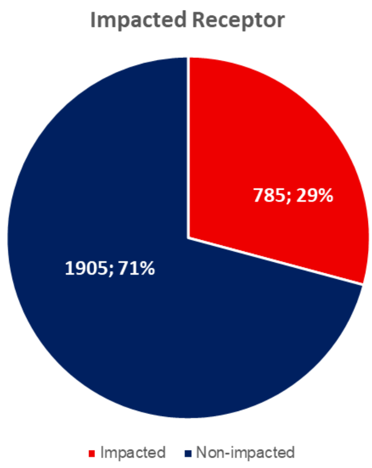



**Figure 10.29 Impacted Receptors**

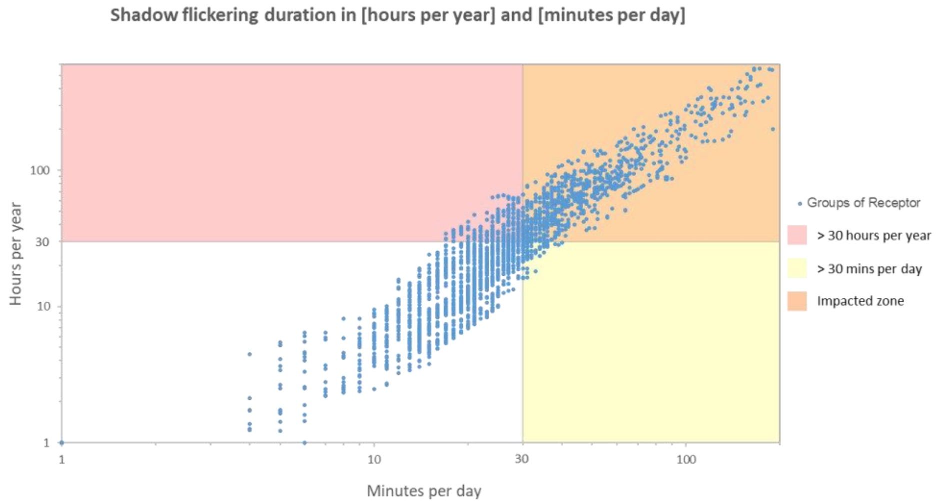
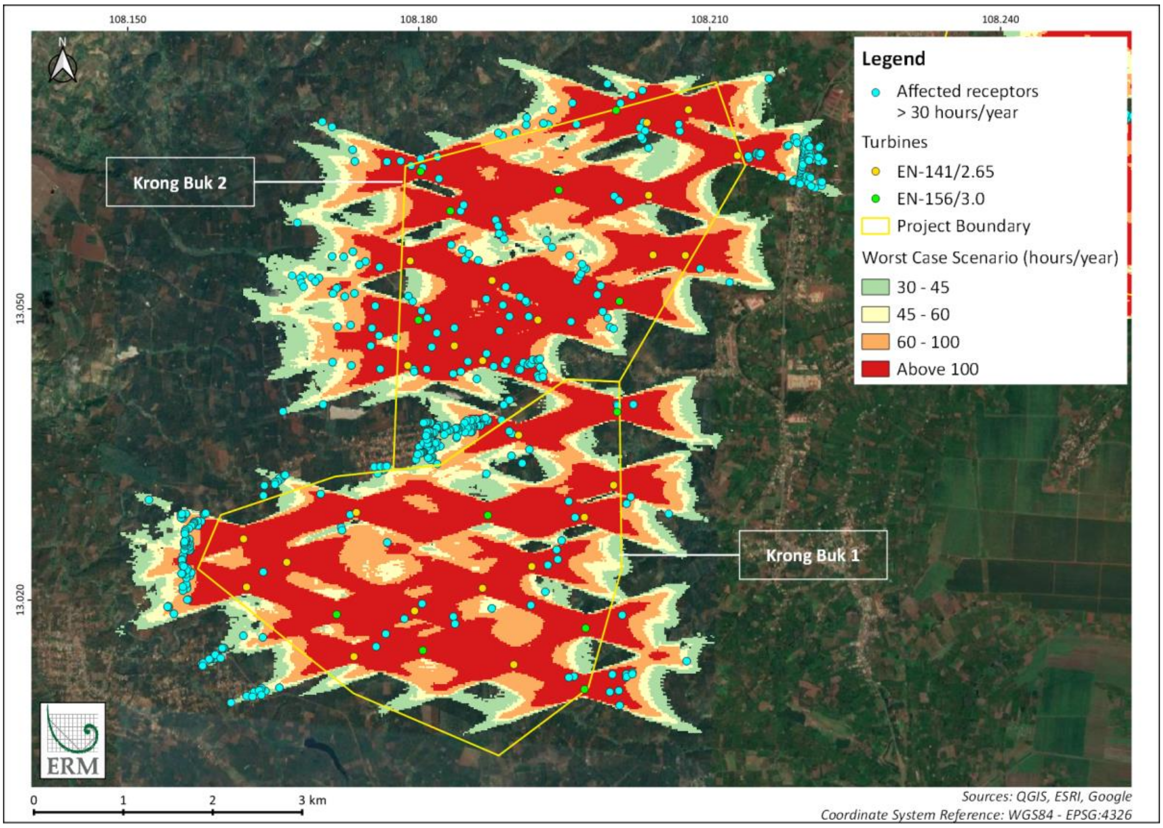
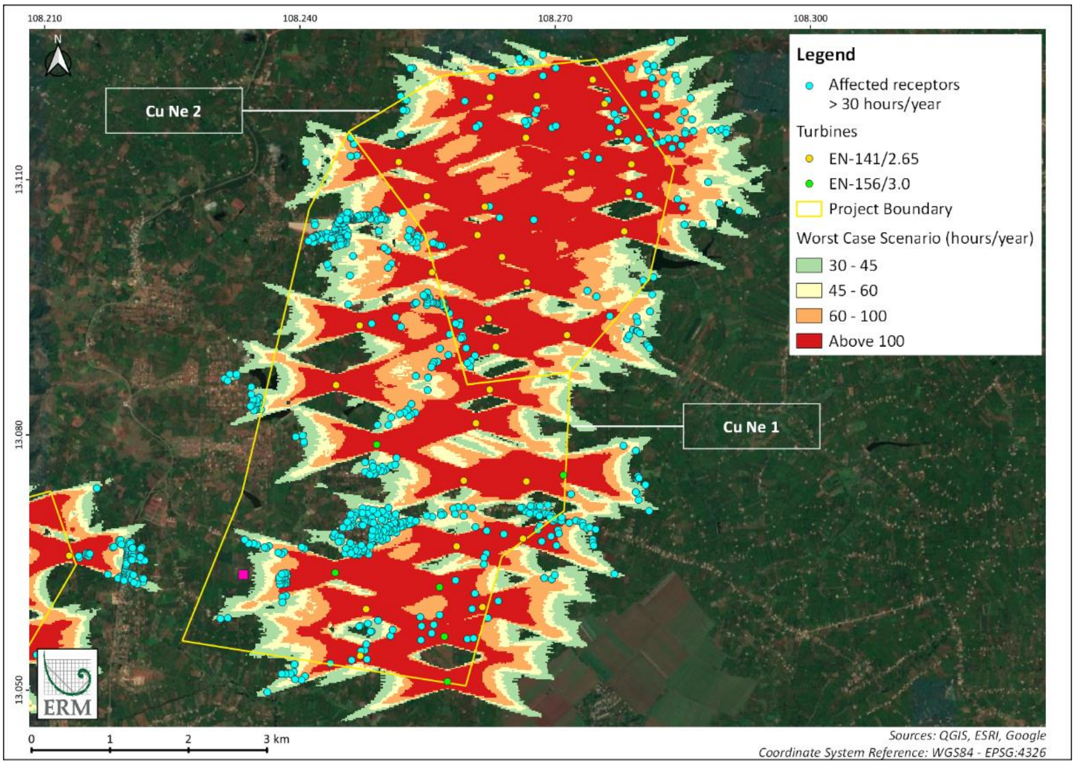



**Figure 10.30 Go Zone Plot Showing the Shadow Flickering of Groups of Receptor in [hours per year] and [minutes per day]**



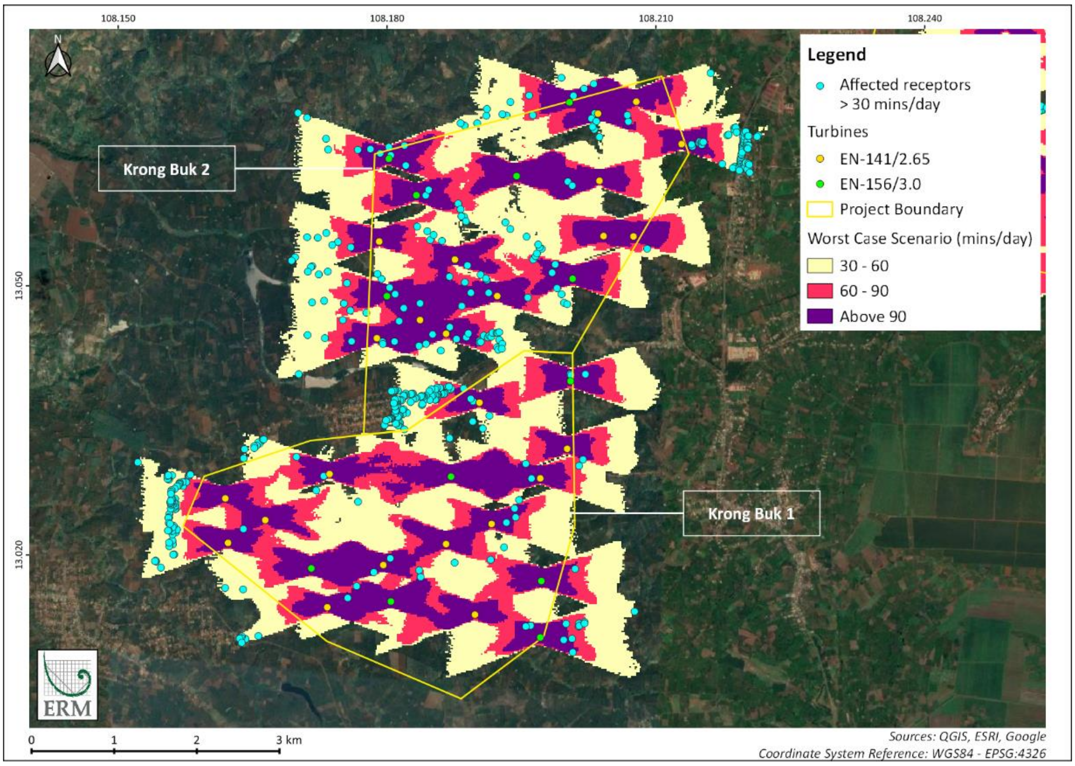

Source: QGIS, ESRI, Google, September 2021

**Figure 10.31 Map of Predicted Shadow Flicker for Krong Buk 1&2 (hours/year) – Worst Case Scenario**



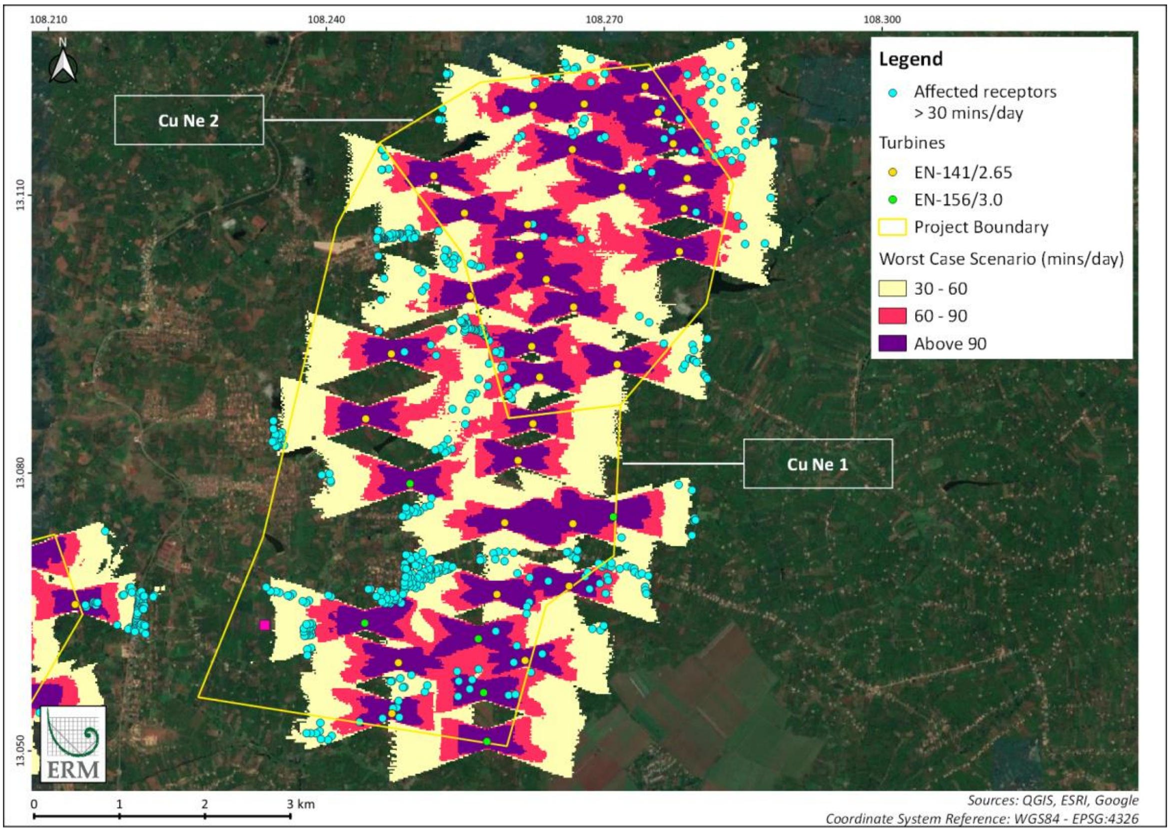

Source: QGIS, ESRI, Google, September 2021

**Figure 10.32 Map of Predicted Shadow Flicker for Cu Ne 1&2 (hours/year) – Worst Case Scenario**




Source: QGIS, ESRI, Google, September 2021

**Figure 10.33 Map of Predicted Shadow Flicker for Krong Buk 1&2 (minutes/day) – Worst Case Scenario**




Source: QGIS, ESRI, Google, September 2021

**Figure 10.34 Map of Predicted Shadow Flicker for Cu Ne 1&2 (minutes/day) – Worst Case Scenario**

### *10.7.5.4.2 Real Case Scenario*

In order to assess the shadow flickering occurrence taking into account local conditions for few parameters, a second scenario has been calculated.

The predicted shadow flicker durations at receptors are presented from Figure 10.35 to Figure 10.37.

Based on these figures, the results confirmed that with the input of local conditions (wind directions and average daily sunshine hours) on the modelling, the number of impacted receptors have been reduced to 312 instead of 1,030 (by approximately 69.7%). In addition, most of the impacted receptors are sparse ones. For further detailed result of the modelling, please refer to Appendix M.

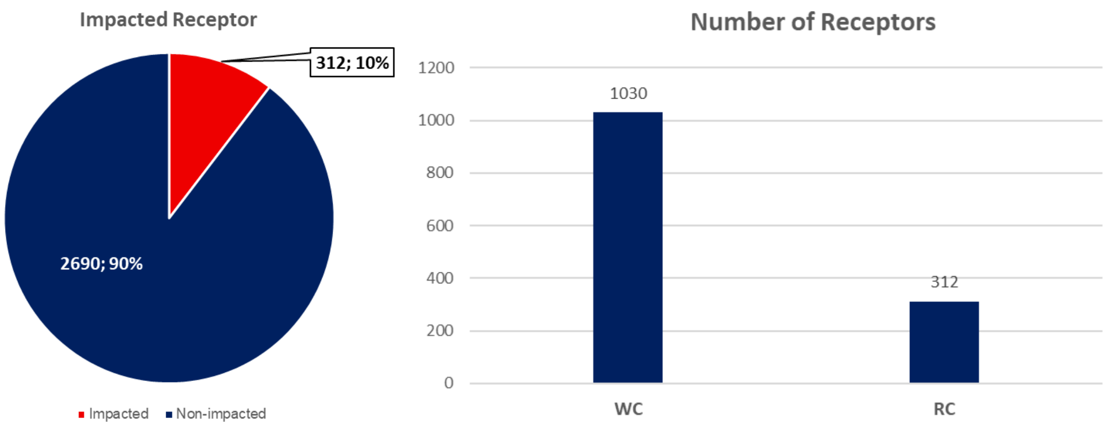
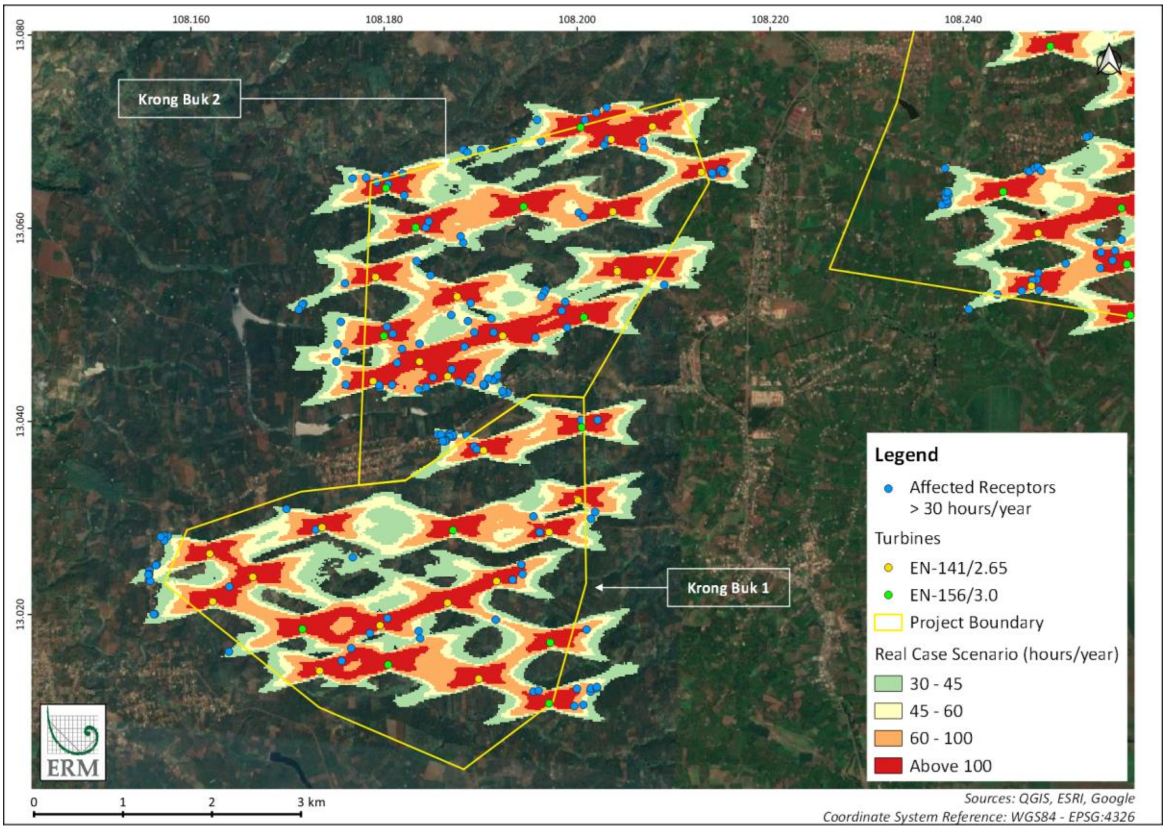
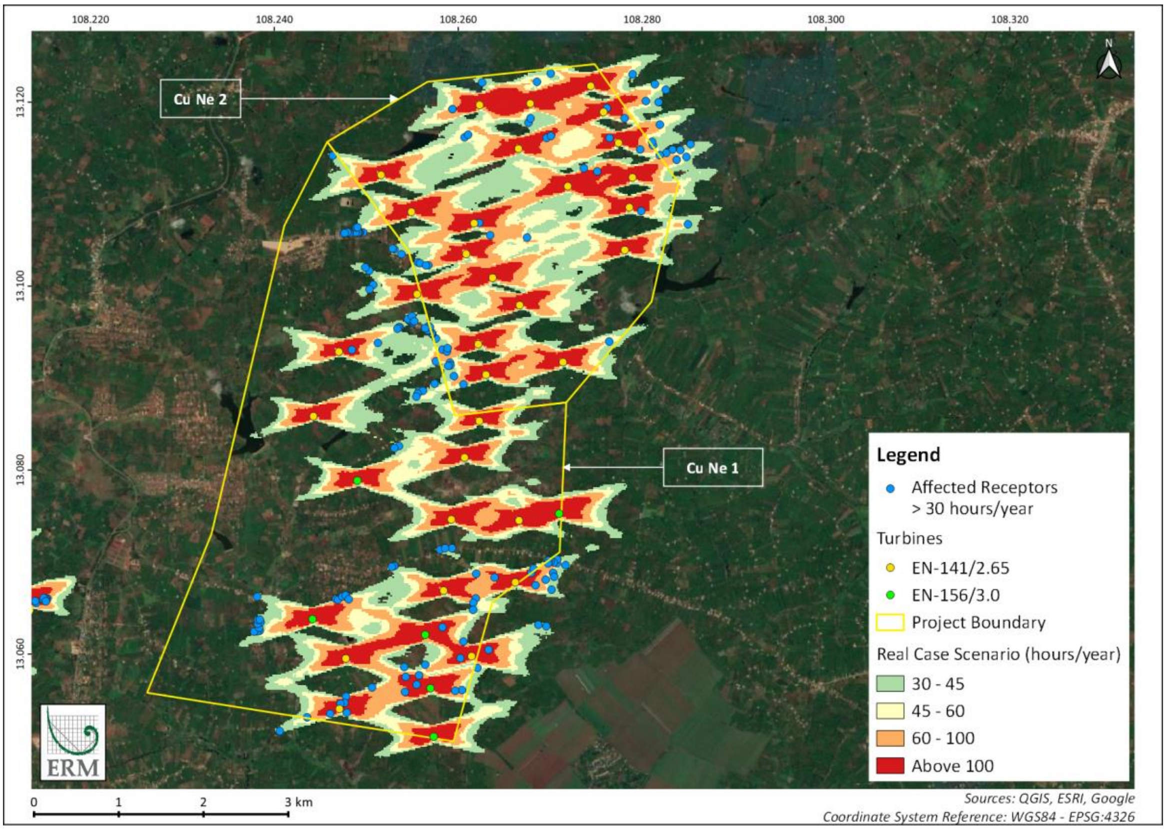



**Figure 10.35 Impacted Groups of Receptors in Real Case Scenario and Comparison of Number of Impacted Groups of Receptors between Worst Case and Real Case Scenarios**




Source: QGIS, ESRI, Google, September 2021

**Figure 10.36 Map of Predicted Shadow Flicker for Krong Buk 1&2 (hours/year) – Real Case Scenario**




Source: QGIS, ESRI, Google, September 2021

**Figure 10.37 Map of Predicted Shadow Flicker for Cu Ne 1&2 (hours/year) – Real Case Scenario**

## 10.7.6 Impact Assessment

### 10.7.6.1 Potential Impacts

The association between shadow flicker caused by wind turbines and the effects on human health is highly debated.

Some studies suggest that flicker from turbines pose a potential risk of inducing photosensitive seizures (Harding et al, 2008; Smedley et al., 2010).

However, in 2011, the UK Department of Energy and Climate Change concluded in their Update Shadow Flicker Evidence Base report that “On health effects and nuisance of the shadow flicker effect, it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health”.

Despite such conclusions, other reports state that although shadow flicker from wind turbines is unlikely to lead to a risk of photo-induced epilepsy, the potential for annoyance and disturbance are still present leading to stress (Cope et al., 2009; Minnesota Department of Health, 2009; National Research Council, 2007).

### 10.7.6.2 Existing/ In Place Control

The existing control measures section is based on local EPP of the Project. However, there are no mitigation measures in this document. Further mitigation measures are suggested in the additional mitigation measures section as below.

### 10.7.6.3 Significance of Impacts

The shadow flickering assessment has considered two scenarios as previously mentioned: a worst-case scenario and a more realistic one embedding local meteorological conditions. In both scenarios, even though the amount of receptors in real case scenario had been significantly reduced comparing to worst case scenario (312 versus 785 shadow receptors), these are still considered to be potentially impacted by shadow flickering exceeding the international maximum permissible limits. It should be noted that:

- Based on available satellite imagery, the potential impacted dwellings located within the areas of influence (1.41 km for EN141/2.65 and 1.56 km for EN156/3.0 from the WTG) are characterised by some dense residential areas and scattered receptors distributed in Cu Pong and Cu Ne communes. These conditions are able to reduce the potential for dense residential areas as the buildings could play a role of man-made barriers which is likely to prevent shadow flicker effect. By contrast, scattered receptors are likely to be affected by the casting unless there is natural barrier surrounding them.
- In addition, it should be considered that receptors have been identified using satellite imagery and not confirmed through a dedicated site visit. Potentially some of these are not representing dwellings where people permanently resided; therefore it would be good if the affected households could be verified through additional fieldwork and validation survey, to understand uses of the dwellings, if these are permanently habited by humans, if the windows are facing the rotors, if there are any blinds or not, etc. Therefore, we cannot state clearly the exact number of affected households nor if these will have to be relocated.
- The performed calculations in the modelling did not take into account the actual location and orientation of windows or the screening effects associated with existing, site-specific conditions and obstacles like other buildings which potentially leading to overestimate the duration of occurrences when shadow flicker might be experienced at a specific location.

Shadow flicker impacts are negative, direct and long-term during the Operation Phase of the Project. The impact scale is within Shadow Flicker AoI on the receptors which are surrounding the WTGs. Impact magnitude varies based on distance of receptors from the WTGs and their orientations.

**Table 10.53 Impacts of Shadow Flickering**

| Impact | Shadow flickering impacts during Operation Phase | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent | |
| Impact Extent | **Local** | Regional | Global | | |
| Impact Frequency | The shadow flickering impact could potentially occur up to 12 hours/day | | | | |
| Impact Magnitude | Positive | Negligible | Small | Medium | **Large** |
| Receptors Sensitivity | Low | **Medium** | High | | |
| Significance | Negligible | Minor | Moderate | **Major** | |
| | The significance is **Major** | | | | |

### 10.7.6.4 Additional Mitigation Measures

It should be understood that shadow flicker is considered an environmental “nuisance”, rather than medical risk, as there is insufficient evidence to indicate that shadow flicker causes health problem.

Thus, the hierarchy of mitigation measures are identified to address issues regarding cause and effect of shadow flicker from wind turbine.

- **Grievance Monitoring and Reporting** – Implementing a process to assess the real occurrence of the shadow flickering at local identified receptors (312) in order to eliminate the phenomena. In case of dwellings experienced flickering shadow, a detailed grievance mechanism should be available and the local community must be aware of the availability of grievance mechanism to submit their complaints regarding nuisances related to shadow flicker from turbines. Ensuring close monitoring through engagement with local stakeholders including informing to affected communities during the operational phase where there are predicted impacts from shadow flickers
- **Visual Screening (Natural)** – Assess potential sensitive receptors, for which shadow flicker modelling indicates could exceed 30 hours per year and 30 minutes per day, after a validation survey at site to verify receptors which are not dwellings, and in order to ascertain the extent of existing natural visual screening in place. If not existing, the occurrence of shadow flickering during operation could be furtherly investigated, and if confirmed, increasing natural screening could be considered to minimise the effect.
- **Visual Screening (Architectural/ Structural)** – If grievances are received linked to this impact or if natural visual screening at potential sensitive receptors are found to be insufficient to mitigate the shadow effect, further assessments will have to be performed and apply certain mitigation actions as installation of blinds, window shades, window tinting, awnings or fences at affected receptors, which will help to minimize the effect of shadow flicker.
- **Operational Curtailment** – In case of shadow flicker related grievances are logged and/or after visual screening has been done, wind turbines operations will be investigated to determine specific wind turbine that result to shadow flicker exceedance of 30 hours/year and 30 minutes/day on affected structure. Based on such information, operational curtailment can be applied to reduce the affect to the impacted receptors which are identified based on the results of monitoring.
- **Relocation –** once concluding the additional suggested assessment, if visual screening (both natural and architectural/ structural) and stopping operation of wind turbines fail to mitigate shadow flicker impact at impacted receptors, then relocation of affected dwellings would have to be considered and had to be openly presented to local community by the Client for prior consent. Any relocation process will have to be performed in accordance with AIIB ESS2 related to resettlement. A community disclosure will be highly recommended to clarify the significant of impact and ensure the community would be affected in case of changes of likelihood. However, it is important to understand that:
  - The Project Owner shall conduct a detailed census or inventory of loss of all impacted receptors by the worst case scenario and set out a “cut-off’ date to avoid any new residential settlements within the impact zone after the date. In case the Project does not have enough resources, a communication channel via local authorities especially villages’ heads should be established as long as all impacted receptors are well-informed about the impacts, cut-off date and grievance process
  - The Project Owner shall also strengthen the cooperation with local authorities to continuously implement local awareness raising of the Project impacts, especially flickering shadow affect, to local people, and
  - For any new settlements after the cut-off date and within the impacted zone, if their settlement lands are legally classified as residential lands, the Project Owner, with the support from local authorities, shall notify them about the shadow flickering issue and provide support to such households whether building structure or surrounding environment designs including natural and artificial barriers

#### 10.7.6.5 Residual Impacts

Residual impact following the implementation of these mitigation measures is still considered to be Major given the high density of potentially impacted population within and near the Project's boundary. However, given the assessment is performed against WCS according to IFC standard, the Project can still be able to achieve and reduce the impact significance to Moderate depending on the efficiency of the mitigation measures and when local meteorological conditions are taken into account.

#### 10.7.6.6 Monitoring and Audit

Grievance related to shadow flickering issue monitoring measures are identified and recommended.

## 10.8 Visual Impact Assessment

A visual impact assessment is an assessment of the potential impacts of the Project on specific views and on the general visual amenity experienced by people. Landscapes are not static but are dynamic, not least due to the range of natural and human factors that define their characteristics, but also due to the many different pressures that have altered landscapes in the past and will continue to do so in the future. Therefore, determining the significance of visual effects identified can be particularly challenging.

This section provides methodology, an assessment of baseline conditions within Project site and surroundings in relation to landscape and visual amenity and then assesses the anticipated impacts throughout the Project construction and operational phases. Then, a set of management measures (including mitigation measures, additional requirements, etc.) and monitoring measures have been identified to avoid impacts or reduce them to acceptable levels.

### 10.8.1 Scope of Assessment

The scope of this assessment is limited to the proposed Project wind turbine design and observers in Section 10.7, including a qualitative visual aesthetics assessment and associated reporting to document the methodology, findings and any agreed mitigation measures for the proposed wind farm site or design. The assessment scope included:

- Reviewing existing project information and operational activities to understand site conditions pertaining to visual impacts;
- Identify the closest and/or potentially most affected receptors situated within the potential area of influence of the wind farm and discuss the existing conditions near these receptors.

### 10.8.2 Consideration and Assumptions

Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's response to any changes, and the overall impacts with respect to visual amenity.

Based on the SRTM (Shuttle Radar Topography Mission) data, it is noted that the Project wind turbines will be located in a raised area where the elevation can be up to 600 masl[53]. It is also noted that the areas where the receptors and the wind turbines are located is distinguished by spread roughness of the terrain.

### 10.8.3 Assessment Methodology

Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's response to any changes, and the overall impacts with respect to visual amenity. The methodology followed to identify and assess the significance of, and the effect of, changes resulting from the Project on both the landscape as an environmental resource in its own right, and on people's views and visual amenity is presented in the subsequent section. People have different

53 masl: meters above sea level

responses to views and visual amenity depending on their context and purpose, with certain activities specifically associated with the enjoyment of the landscape (e.g., the use of footpaths and tourist routes and attractions) generally more susceptible to change. Residents are also considered to be particularly susceptible to change and the combined effects on a number of residents within an area may also be considered.

### 10.8.4 Visual Baseline

The assessment has been developed according to the following tasks:

- Study area definition
- Viewshed analysis
- Viewpoints and sensitive receptors identification

#### 10.8.4.1 Study Area Definition and Viewshed

The landscape study area is defined as the area within which the Project could be discernible by the human eye and could interfere with the main sensitives identified in the local context.

To identify the landscape study area, the Zone of Theoretical Visibility (ZTV) has been determined through computer analysis of topographical mapping to establish the theoretical distance from which the wind turbines could be visible in each direction.

This ZTV was determined through a viewshed analysis using the software QGIS 3.20. The viewshed analysis is based only on topography (i.e. digital elevation model), and represents the areas from which the wind farm could be potentially visible. For this specific assessment SRTM (Shuttle Radar Topography Mission) 30 m Digital Elevation has been utilised.

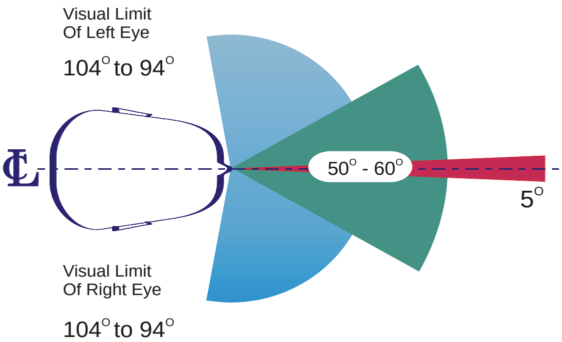
Defining an appropriate viewshed is the starting point to understand the visual impacts of the Project. The area of the viewshed will vary depending on the nature and scale of the proposed facility. The larger (and higher) the facility is, the bigger the viewshed will be, as it may be visible for a greater distance. The viewshed is therefore the area that is most likely to be visually impacted.

The following information[54] explains how a viewshed is defined and identified depending on the horizontal and vertical field of views.

**A. Horizontal Field of View**

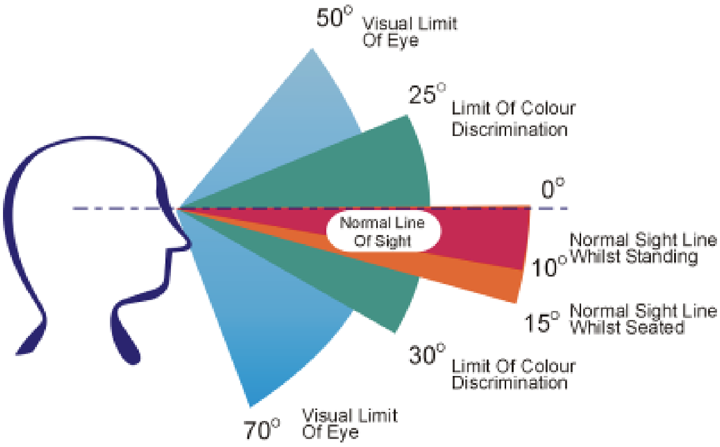
For most people, the horizontal central field of vision covers an angle of between 50° to 60°. Within this angle, both eyes observe an object simultaneously but from a slightly different angle. This creates a central field of greater magnitude than that possible by each eye separately. This central horizontal field of vision is termed the 'binocular field' (see green zone). Within this field images are sharp, depth perception occurs and colour discrimination is possible. Research suggests that the visual impact of a project component will vary according to the proportion the binocular field it occupies. Project components which occupy 5% or 2.5° or less of the horizontal central binocular field of vision are usually perceived as insignificant objects, whereas components which occupy 30° are considered to be visually dominating.

[54] Source: Human Dimension & Interior Space – A Source Book of Design Reference Standards, Julius Panero and Martin Zelnik, The Architectural Press Ltd. London, 1979




**B. Vertical Field of View**

The vertical central field of vision has a similar set of parameters. The vertical binocular field is normally 25° above the vertical and 30° below the vertical. When project components exceed the 50° upper visual limit of the eye, they are considered to dominate the vertical central field of vision. When project components occupy 0.5° they are not considered dominant, nor are they usually perceived as a significant change to the existing baseline condition when they are located within an anthropogenically modified landscape.




**C. Horizontal versus Vertical Visibility over Distance**

As a person moves further away from a project component, the visibility of the vertical dimension tends to reduce more significantly than the visibility of the horizontal dimension. This effect is illustrated below.

## 10.8.4.2 Visual Baseline

Visual interferences may occur when new elements are introduced into a landscape or existing elements are altered or removed leading to a change in the way that stakeholder's access, perceive or experience landscape resources.

Based on the Project characteristics the main interferences could occur from:

- Installation and operation of turbines
- Movement of large construction vehicles

The proposed wind turbines are the major visual element of the proposed development and may visually impact on the surrounding. As the viewer moves further away from these structures the visual impact decreases until it is no longer visible. However, before the point of non-visibility is reached, the wind turbines have reduced in scale such that they no longer have a significant visual impact.

The wind farm is comprised of a number of individual turbines of 2 types of Wind Turbine Generator (WTG) with following dimensions:

- EN-141/2.65: 141 m rotor diameter and 130 m hub height

- EN-156/3.00: 156 m rotor diameter and 130 m hub height

Those WTGs are located with a relatively small separation distances between each individual turbine, less than 700 m. In assessing the visual impact of the wind turbine, it is therefore assumed that the largest horizontal component is the entire rotor diameter, which would be a maximum of 141 m width for EN-141 and 156 m for EN-156. It has been also evaluated the combined effect of multiple rotors throughout the landscape.

As shown in Table 10.54, calculations suggest that the impact of rotors of WTGs would reduce to insignificance at about 3.2 km for EN-141 and 3.6 km for EN-156, as it would form less than 5% or 2.5° of the horizontal field of view.

**Table 10.54 Horizontal Field of View**

| Horizontal Field of View | Impact | Distance from Observer to rotors |
|---|---|---|
| <2.5° of view | The development will take up less than 5% of the central field of view. The development, unless particularly conspicuous against the background, will not intrude significantly into the view. The extent of the vertical angle will also affect the visual impact. | EN-141: >3.2 km<br>EN-156: >3.6 km |
| 2.5° – 30° of view | The development may will have usually a moderate impact that may be not noticeable at the greatest distance of this range. | EN-141: 3.3 km to 263 m<br>EN-156: 3.6 km to 291 m |
| >30° of view | Developments that fill more than 50% of the central field of vision will always be noticed and only sympathetic treatments will mitigate visual effects. | EN-141: <271 m<br>EN-156: <291 m |

A similar analysis can be undertaken based upon the vertical field of view for human vision (Table 10.55), shows the relationship between impact and the proportion that the development occupies within the vertical line of sight.

**Table 10.55 Vertical Field of View**

| Vertical Line of Sight | Impact | Distance from Observer to the Wind Turbine's tip height |
|---|---|---|
| < 0.5° of vertical angle | A thin line in the landscape | EN-141: >23 km<br>EN-156: >24 km |
| 0.5° – 2.5° of vertical angle | The degree of visual intrusion will depend on the development's ability to blend in with the surroundings | EN-141: 23 km to 4.6 km<br>EN-156: 24 km to 4.8 km |
| > 2.5° of vertical angle | Usually visible, however the degree of visual intrusion will depend of the width of the object and its placement within the landscape | EN-141: <4.6 km<br>EN-156: <4.8 km |

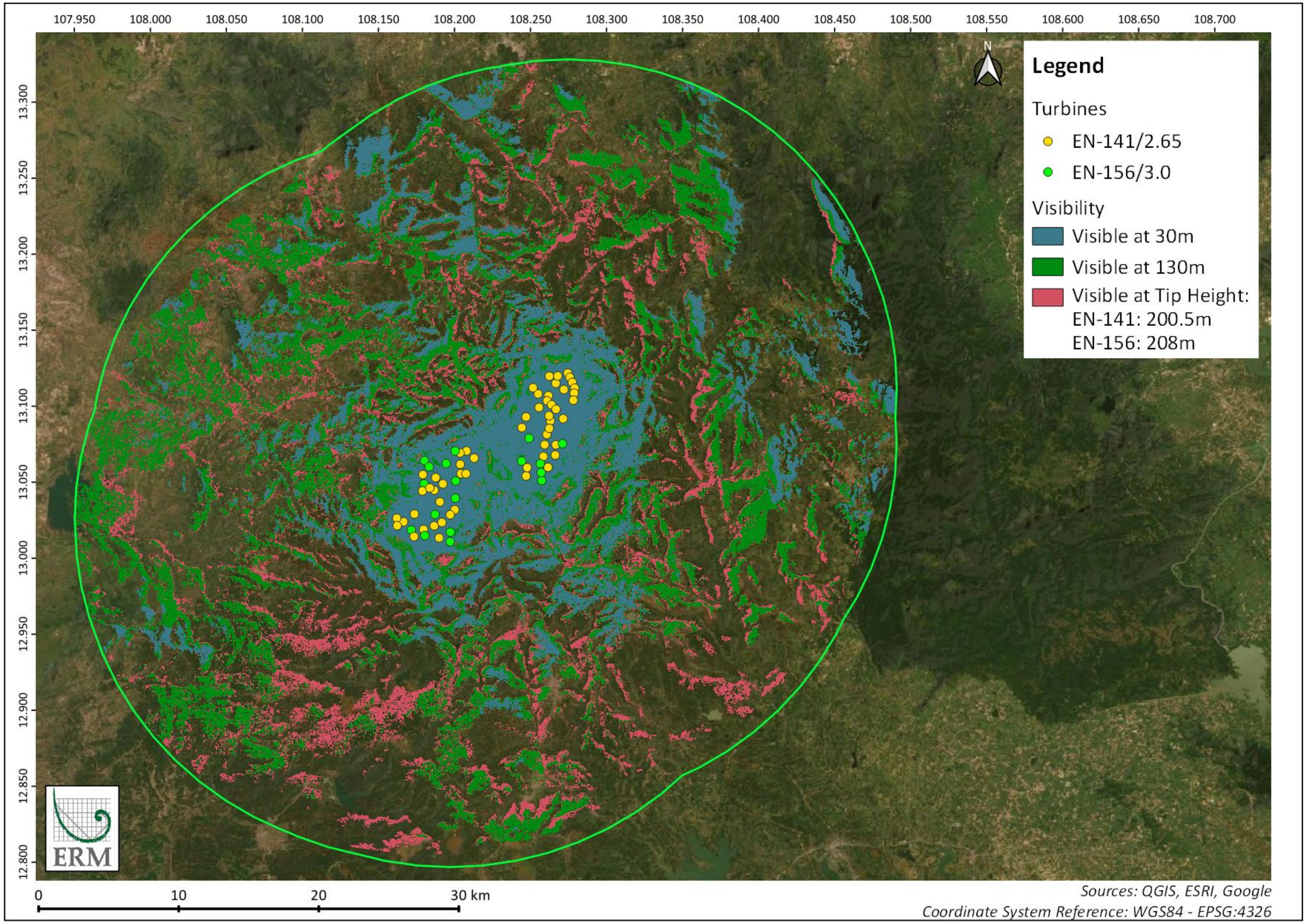
Based on the above, it is reasonable that distances, at which the magnitude of visual impact of the wind turbine will be not significant, can be the ones greater than 23 km for EN-141 and 24 km for EN-156, where a fully visible wind turbine would be an insignificant element within the landscape. However, according to Figure 10.27, there are a large number of residential areas within the Project area in which some of communities situated very close to WTGs (closer than 271 m deriving from 30° of horizontal view of EN-141), it is likely to increase the impact magnitude for those communities.

Generally, the more conservative or worse case distances form the basis for the assessment of visual impacts. Therefore, this development the greater impacts would be associated with the vertical field of view and so it is therefore proposed to use the vertical field of view of EN-156 as the farthest distance of visibility and extend the view shed to 24 km for the wind farm.

QGIS 3.20 was used to determine the ZTV for the Project. The current visibility within the ZTV will vary depending on the presence of intervening local topography, and features such as vegetation and buildings. The present view shed analysis has been based solely on topography and did not take into account the potential screening granted by the local vegetation patches, which would further reduce the actual view shed. Moreover, it should be highlighted that a typical view shed assessment does not take typical meteorological conditions into account that can result in changes to real visibility. For example, rainfall and other atmospheric conditions will alter the visibility of the wind farm. The diminution of visual clarity bought about by atmospheric conditions also increases with distance and cloudy days can result in a natural attenuation of the visibility of the Project.

Similar to cloud coverage, rainy days are able to reduce the visibility as the water droplets obscure vision. This varies greatly depending on the heaviness of the precipitation, but even light rain obscures distant objects greatly.

Figure 10.38 shows the ZTV mapping from any points inside the buffer area.




Source: QGIS, ESRI, Google, September 2021

**Figure 10.38 Viewshed (24 km Buffer)**

The results of the viewshed assessment as presented in Figure 10.39 show that the visibility is a part of whole area which is concentrated at the center of the Project because of the morphology of the area and distance to WTGs. Specifically, the terrain is a low-mountainous (600 – 850 masl) area which some blockable terrains are likely to reduce or block the visibility of WTGs at some locations of observer. The viewshed assessment is shown by 30 m viewshed zone overlapping most of tip height viewshed zone.

It should be emphasized that intervening vegetation is not included in this mapping and is likely to significantly reduce the visibility of wind turbines, in whole or in part, and therefore reduce the impact identified. However, the Project area is analysed and classified as agricultural and bare land, where the vegetation cover is very low. Therefore, the deviation of the assessment from reality is lowered.

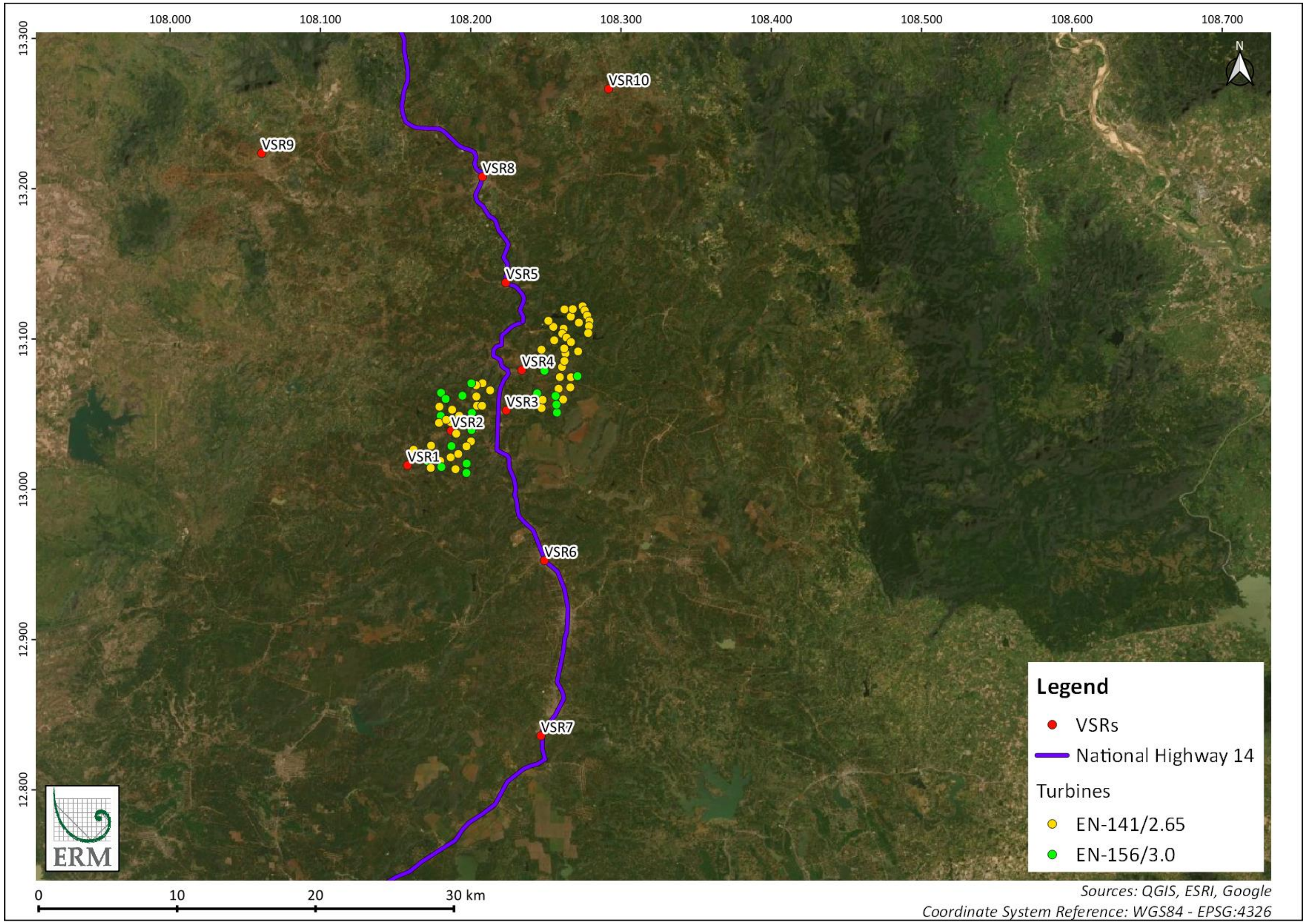
Considering the potential visibility from local communities, the Project components, especially the wind turbines will either wholly or partly be visible from the residential areas in vicinity. Additionally, the National Road 1A goes through the Project area, this is likely to pose a significant temporary visual impact on mobile receptors.

Various locations within the Project area have been selected as visual sensitive receptors (VSRs), in order to evaluate the significance of impact at different directions. The selection boundary is within the vertical viewshed of the wind turbine's tip (radius 24 km) because this is the highest part to be seen. This will cover all the visual perception of people that could be affected by the presence of the Project. After choosing the receptors, a viewshed analysis could be carried out to reflect the view of receptors toward the turbines within field of view.

In order to screen the potential sensitive receptors, the following criteria were used to assess the sensitivity of the VSRs:

- Value and quality of existing views
- Type and estimated number of receiver population
- Duration of frequency of view
- Degree of visibility

Figure 10.39 shows the locations of the VSRs which are houses selected for analysis.




Source: QGIS, ESRI, Google, September 2021

**Figure 10.39 Visual Sensitive Receptors Location**

## 10.8.5 Impact Assessment

The assessment of impacts on visual amenity was performed in accordance with accepted methodologies derived from best practice guidelines. Impact significance for visual amenity is generally derived on the basis of the following main factors:

- The quality/importance of the visual amenity as a resource/function that is potentially affected
- The sensitivity of the visual amenity towards Project activities
- The magnitude of change to the receiving visual amenity as a result of the Project

The visual impact assessment describes changes in the character of the available views to people resulting from a given Project and their visual amenity. To determine the significance of visual effects it is necessary to consider the sensitivity of the visual receptors against the magnitude of visual effects.

### 10.8.5.1 Methodology

#### *10.8.5.1.1 Sensitivity of Receptors*

Visual receptors are people and must be assessed in terms of their sensitivity, combining judgements on their susceptibility to the specific change proposed and the value attached to a view or their visual amenity. Susceptibility refers to the degree to which a particular visual receptor can accommodate change arising from the Project, without detrimental effects on the visual amenity, and will vary with the:

- Occupation or activity of people experiencing the view
- Location and context of the view
- Extent to which their attention or interest may be focused on the view and their visual amenity

Judgements about the sensitivity of visual receptors should be recorded on a scale (e.g., low, medium and high) with clearly stated criteria. Table 10.56 indicates the relative sensitivities of a number of visual receptors.

**Table 10.56 Sensitivity of Visual Receptors**

| Visual Receptors | Sensitivity |
|---|---|
| Small number of visitors with interest in their surroundings. Viewers with a passing interest not specifically focussed on the landscape e.g. workers, commuters. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being low | Low |
| Small numbers of residents and moderate numbers of visitors with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being medium | Medium |
| Larger numbers of viewers and/or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and well-used recreational facilities. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being high | High |

#### *10.8.5.1.2 Magnitude of Visual Effects*

There is no standard methodology for the scale or magnitude of effects on views and visual amenity. However, it is generally based on the:

- Scale of change relating to the loss or additions of features in the view, including the proportion of the view occupied by the proposed development
- Degree of contrast or integration of any new feature or changes in the composition of the view
- Duration of the effect, whether temporary or permanent, intermittent or continuous

- Angle of view in relation to the main activity of the receptor
- Distance of the viewpoint from the Project
- Extent of the area over which the changes would be visible
- Variation in the degree of visibility of the Project (it is helpful to categorize those variations)
- The extent of the view that would be occupied by the Project: full, partial, glimpse etc.
- The distance of the viewpoint from the Project and whether the viewer would focus on the Project due to proximity or the Project would form one element in a particular view
- The proportion of the Project or particular features that would be visible: full, most, small amount, none
- Whether the view is transient or one of a sequence of views as from a moving vehicle or footpath

Consideration may also be given to the time of day and seasonal differences in effects. The worst case may need to be demonstrated (i.e., during dry season, when lower moisture levels increases visibility). The typical criteria and thresholds in determining the magnitude of effect on visual receptors are set out in Table 10.57.

**Table 10.57 Magnitude of Visual Effect**

| Typical criteria and thresholds | Visual Magnitude of effect |
|---|---|
| A change which is barely or rarely perceptible, at very long distance, or visible for a short duration, perhaps at an oblique angle, or which blends in with the existing view. The change may be short term. | Negligible |
| A subtle change in the view, at long distances, or visible for a short distance, perhaps at an oblique angle, or which blends in with the existing view. The change may be short term. | Small |
| A noticeable change in the view at an intermediate distance, affecting a substantial part of the view, part a more wide-ranging, less concentrated change across an expansive area. The change may be medium to long term and may not be reversible. | Medium |
| A clearly evident change in the view at a close distance, affecting a substantial part of the view, continuously visible for a long duration, or obstructing important elements of the view. The change may be medium to long term and would not be reversible. | Large |

### *10.8.5.1.3 Significance of Visual Effect*

When determining the significance of visual effects, the following is taken into account:

- Large scale changes which introduce new discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present in the view
- Changes in views from recognized and important viewpoints or amenity routes are likely to be more significant than changes affecting less important paths and roads
- Changes affecting large numbers of people are generally more significant than those affecting a relatively small group of users

The significance matrix below illustrates the relationship between the sensitivity of a visual receptor and the magnitude of the visual effect. The significance of a visual effect may be adverse or beneficial dependent upon the nature of the change. Each case is assessed on its own merits using professional judgement and experience, and there is no defined boundary between levels of effects. What level of effect constitutes a significant effect will vary on a project by project basis.

**Table 10.58 Significance of Visual Effect**

| | | Sensitivity of Visual Receptor | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| **Magnitude of Visual Effect** | **Negligible** | Negligible | Negligible | Negligible |
| | **Small** | Negligible | Minor | Moderate |
| | **Medium** | Minor | Moderate | Major |
| | **Large** | Moderate | Major | Major |

### *10.8.5.1.4 Selection of VSRs*

Villages and major arterial transport routes are considered to be the most sensitive receptors near the Project Area. In this regard, there are four (4) villages (Drung Lon, Drang, Dro, and Drao villages) and one (1) major highway (national highway No.14). VSRs were selected for assessment based on the extent to which they represent the sensitivity across the Project area. Table 10.59 lists the VSRs selected.

**Table 10.59 VSRs Selected for the Visual Impact Assessment**

| VSR No. | Description | Rationale for Selection |
|---|---|---|
| VSR1 | A house located in Drung Lon village, Cu Pong commune, Krong Buk district, Dak Lak province | Drung Lon is a small village located in vicinity of the south-west of Krong Buk 1. VSR1 is a representative of Drung Lon, Kbuon, Kdo, Drak Hue, and Yum villages, small residential areas that could be affected. |
| VSR2 | A house located in Drang village, Cu Pong commune, Krong Buk district, Dak Lak province | Drang is a small village located in vicinity of the south of Krong Buk 2. VSR2 is a representative of Drang village, a small residential area that could be affected. |
| VSR3 | A house located in Dro village, Cu Ne commune, Krong Buk district, Dak Lak province | Dro is a small village located in vicinity of the south-west of Cu Ne 1. VSR3 is a representative of Dro village, a small residential area that could be affected. |
| VSR4 | A house located in Drao village, Cu Ne commune, Krong Buk district, Dak Lak province | Drao is a small village located in vicinity of the west of Cu Ne 1. VSR4 is a representative of Drao, Thea, and E Cung villages, small residential areas that could be affected. |
| VSR5 | A house located in Kdruh village, Ea Nam commune, Ea H'Leo district, Dak Lak province | Kdruh is a small village located in vicinity of the north-west of Cu Ne 2 and next to National Highway 14. VSR5 is a representative of Kdruh village and village 2, small residential areas that could be affected. |
| VSR6 | A house located in Chu Blang village, Pong Drang commune, Krong Buk district, Dak Lak province | Chu Blang is a village located 8.5 km to the south-east of Krong Buk 1 and next to National Highway 14. VSR6 is a representative of Chu |

| VSR No. | Description | Rationale for Selection |
|---|---|---|
| | | Blang and Tan Lap villages, dense residential areas that could be affected. |
| VSR7 | A house located in Binh Tan ward, Buon Ho town, Dak Lak province | Binh Tan is a ward located 19.8 km to the south-east of Kong Buk 1. VSR7 is a representative of Binh Tan ward, an important and dense residential area that could be affected. |
| VSR8 | A house located in village 8, Ea Drang township, Ea H'Leo district, Dak Lak province | Village 8 is located 11 km to the north-west of Cu Ne 2 and next to National Highway 14. VSR8 is a representative of village 2, 3, 7, 8, and 9, dense residential areas that could be affected. |
| VSR9 | A house located in village 2, Ea Wy commune, Ea H'Leo district, Dak Lak province | Village 2 is located 23 km to the north-east of Cu Ne 2. VSR9 is a representative of village 2, a small residential area that could be affected. |

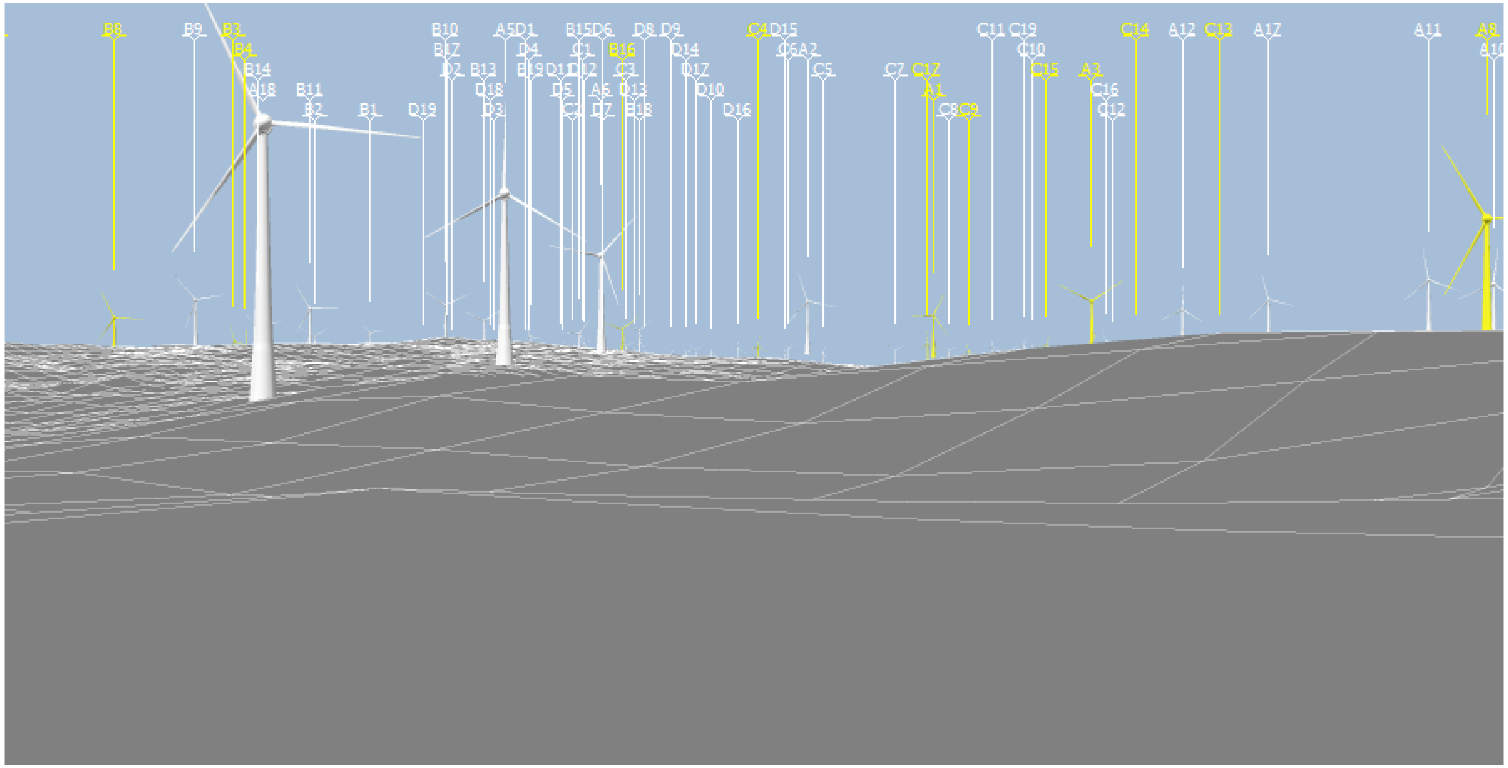
#### *10.8.5.1.5 Identification of Visual Impact*

The visual impact is a product of the magnitude of change to the existing baseline conditions, the landscape context and the sensitivities of VSRs.

Figure 10.39 shows the location of the VSRs which have been selected for the analysis and Table 10.60 shows the summary of the visual impacts of the Project at the selected VSRs.

The following pages present the Impact Assessment for each VSR previously identified.

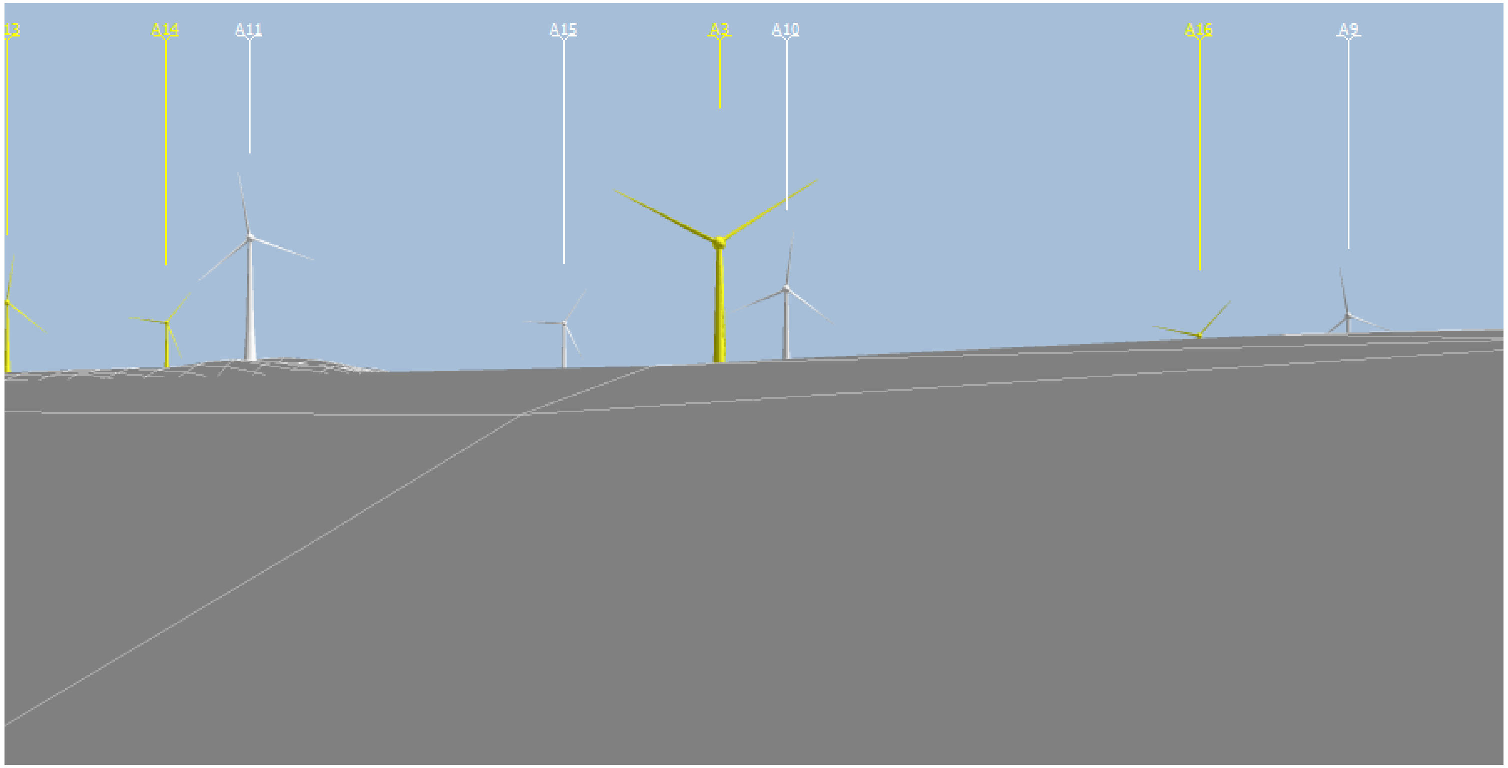
## VIEWPOINT VSR1



| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.015921 | 108.157880 | 1.5 | NE | 50 | 67 | 55 | 31 | 765 | 17,276 |

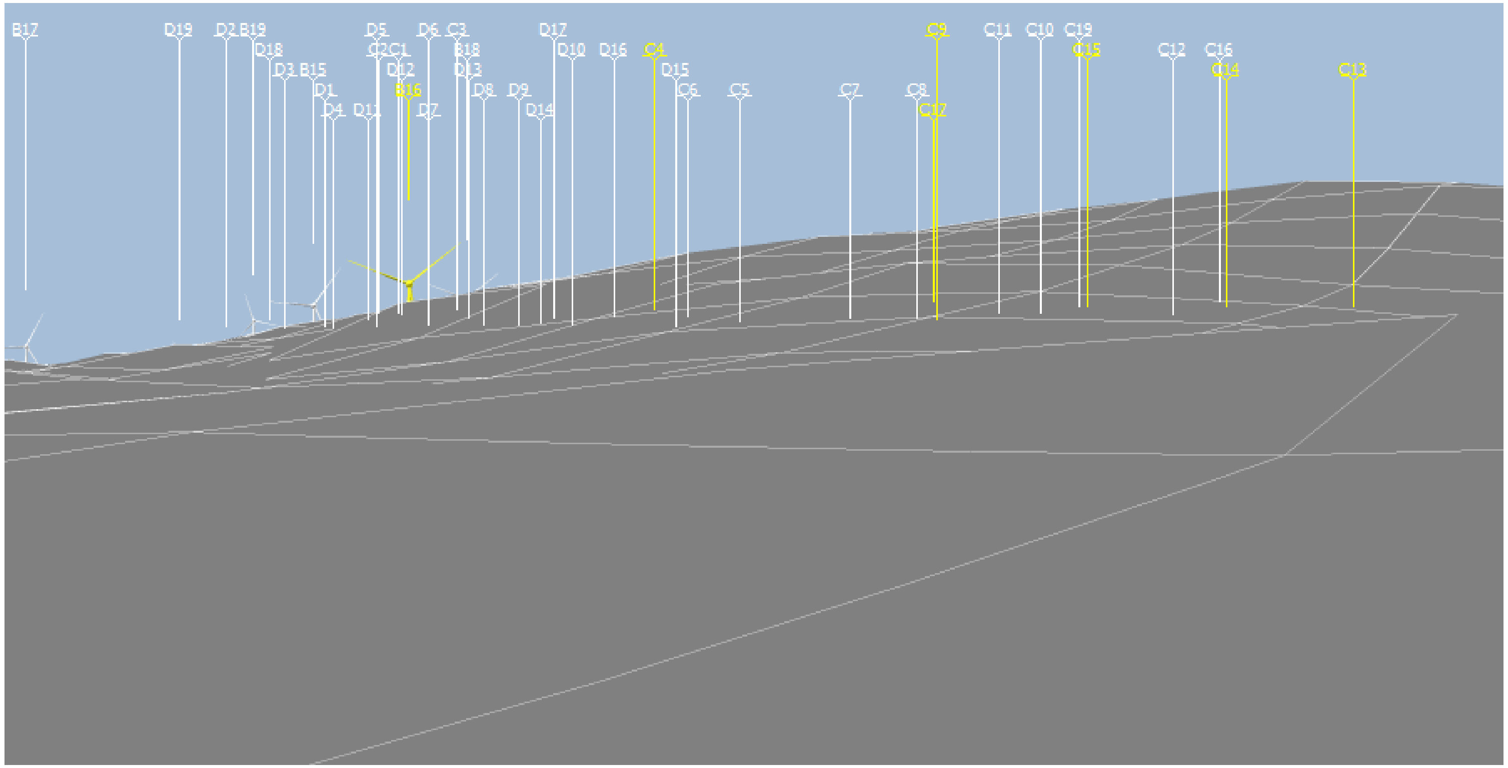
| Visual Sensitivity | Magnitude of Change |
|---|---|
| The present view was taken from a small residential area of Drung Lon village in Cu Pong commune. Due to the average number of residents, the visual sensitivity is considered to be MEDIUM. | Due to the topography of the land and the distance, from this point of view, not all wind turbines are visible. In particular, the local residents could observe three (3) nearest wind turbines with nearly full of tower and rotor and the others exposed full of rotor. Thus, it is considered that the magnitude of change is LARGE. |

## VIEWPOINT VSR2.1




| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.038823 | 108.186914 | 1.5 | N | 50 | 9 | 9 | 8 | 1,126 | 3,310 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The present view was taken from a small residential area of Drang village in Cu Pong commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from this point of view, all wind turbines within field of view are visible. In particular, it is highlighted that for most of the noticeable turbines, they are exposed from the tip clearance height. Thus, it is considered that the magnitude of change is LARGE. | | | | |

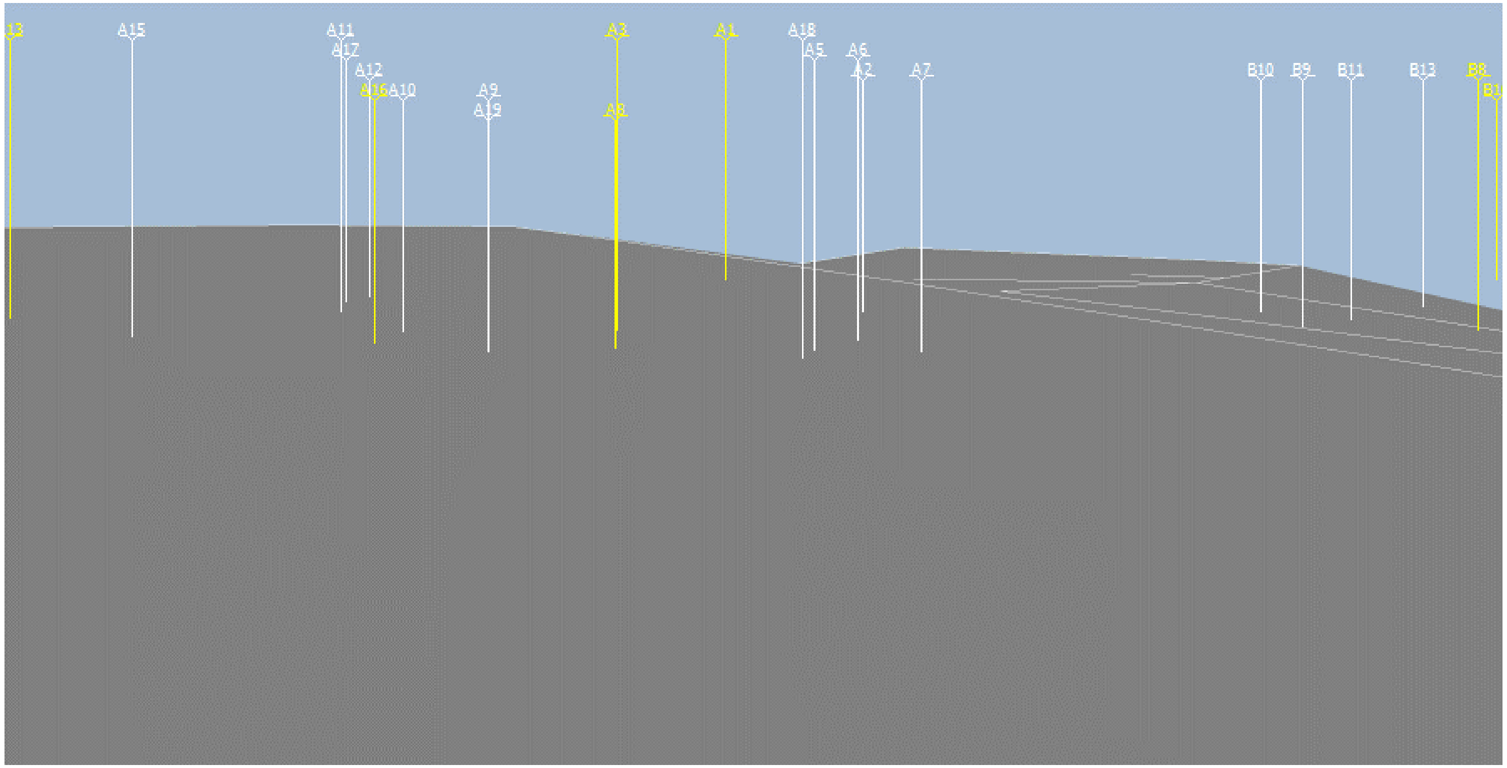
## VIEWPOINT VSR2.2




| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.038823 | 108.186914 | 1.5 | NE | 50 | 54 | 9 | 6 | 1,259 | 13,237 |

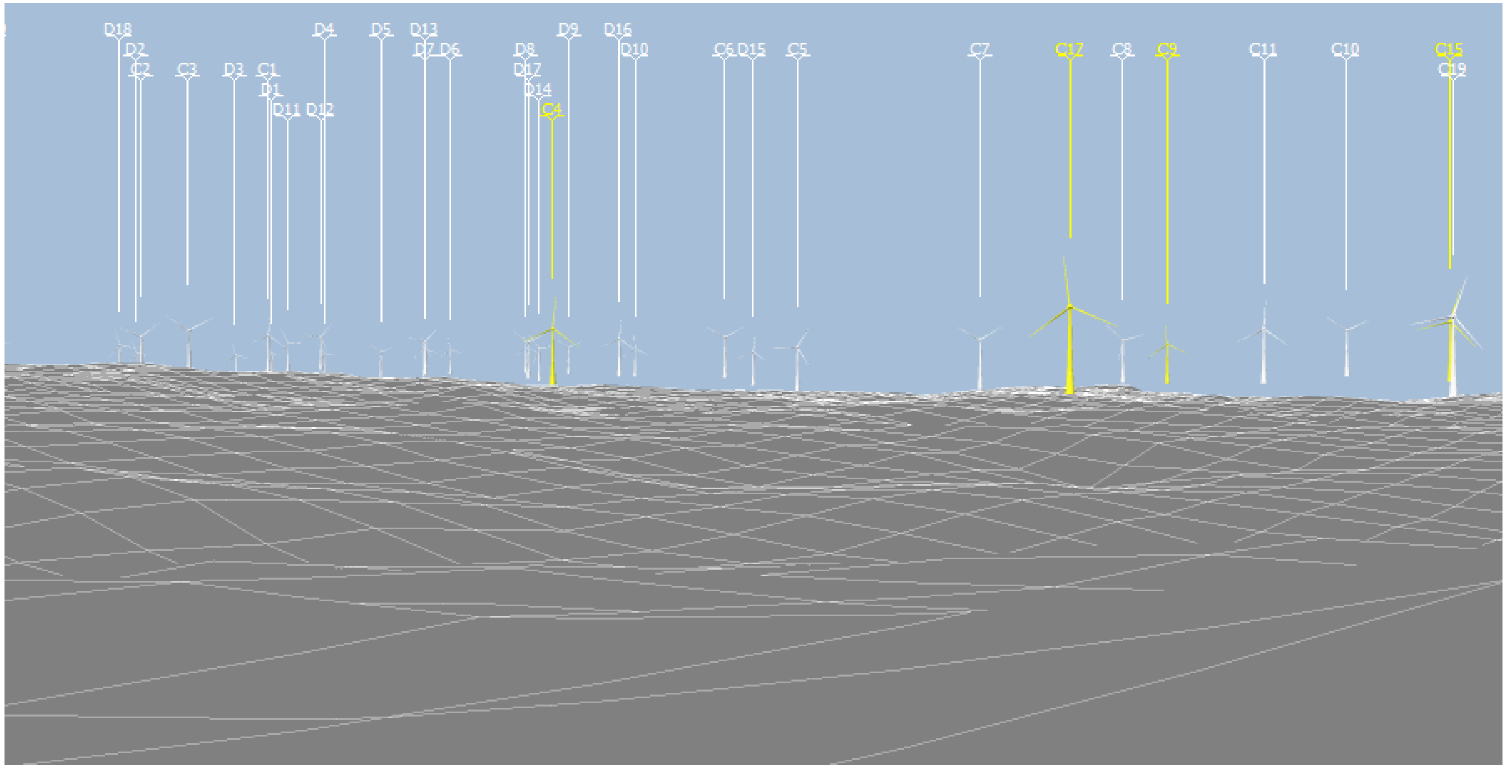
| Visual Sensitivity | Magnitude of Change |
|---|---|
| The present view was taken from a small residential area of Drang village in Cu Pong commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | Due to the topography of the land and the distance, from this point of view, not all wind turbines within field of view are visible. In particular, it is highlighted that for several (9) noticeable turbines, they are exposed from the upper portion of rotor. Thus, it is considered that the magnitude of change is SMALL. |

## VIEWPOINT VSR3.1



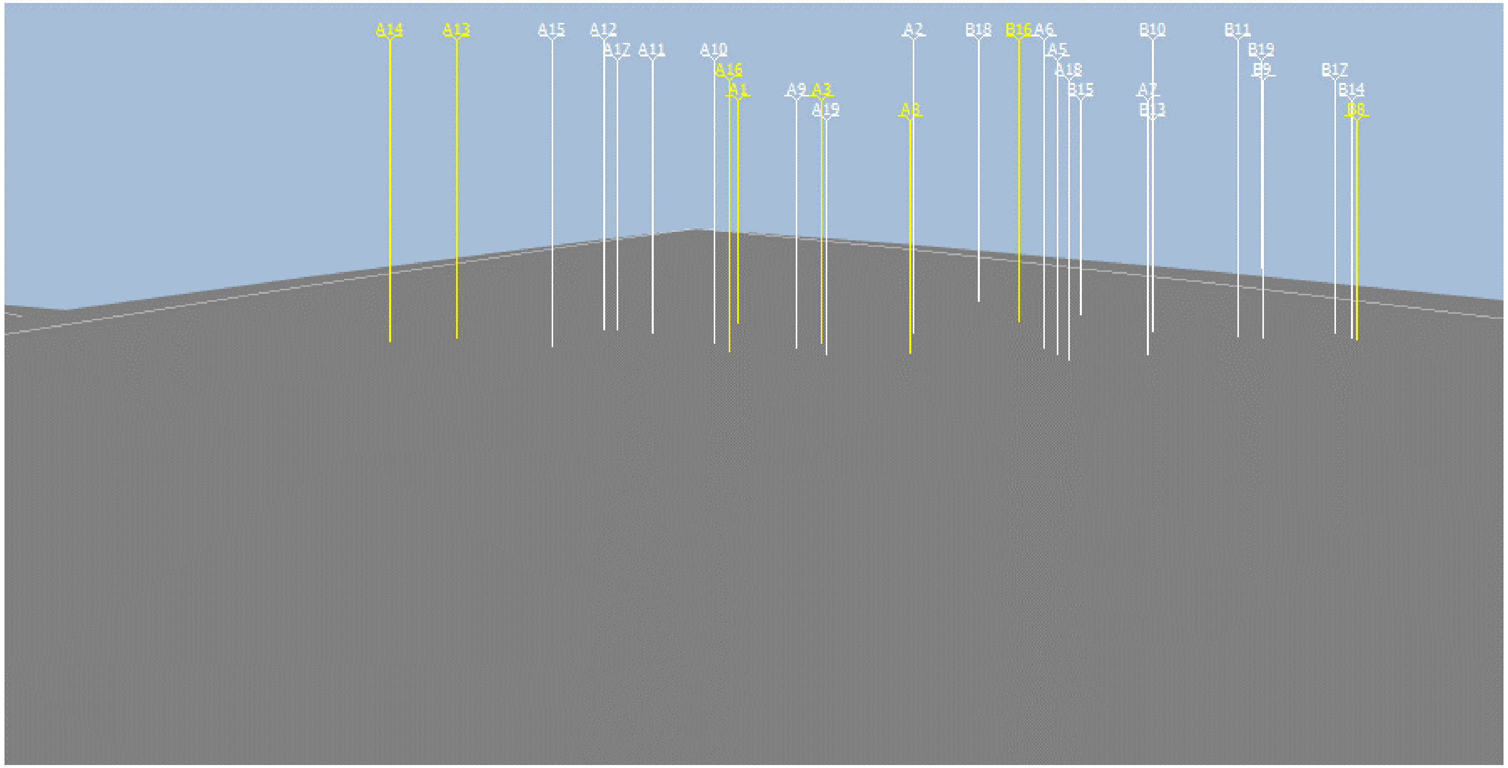

| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.052429 | 108.223614 | 1.5 | WSW | 50 | 23 | 1 | 0 | 2,492 | 7,503 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The present view was taken from a small residential area of Dro village in Cu Ne commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | From this present view, there is only one wind turbine visible which is exposed from the upper part of rotor due to its topography and distance. Therefore, the magnitude of change is considered to be SMALL. | | | | |

## VIEWPOINT VSR3.2



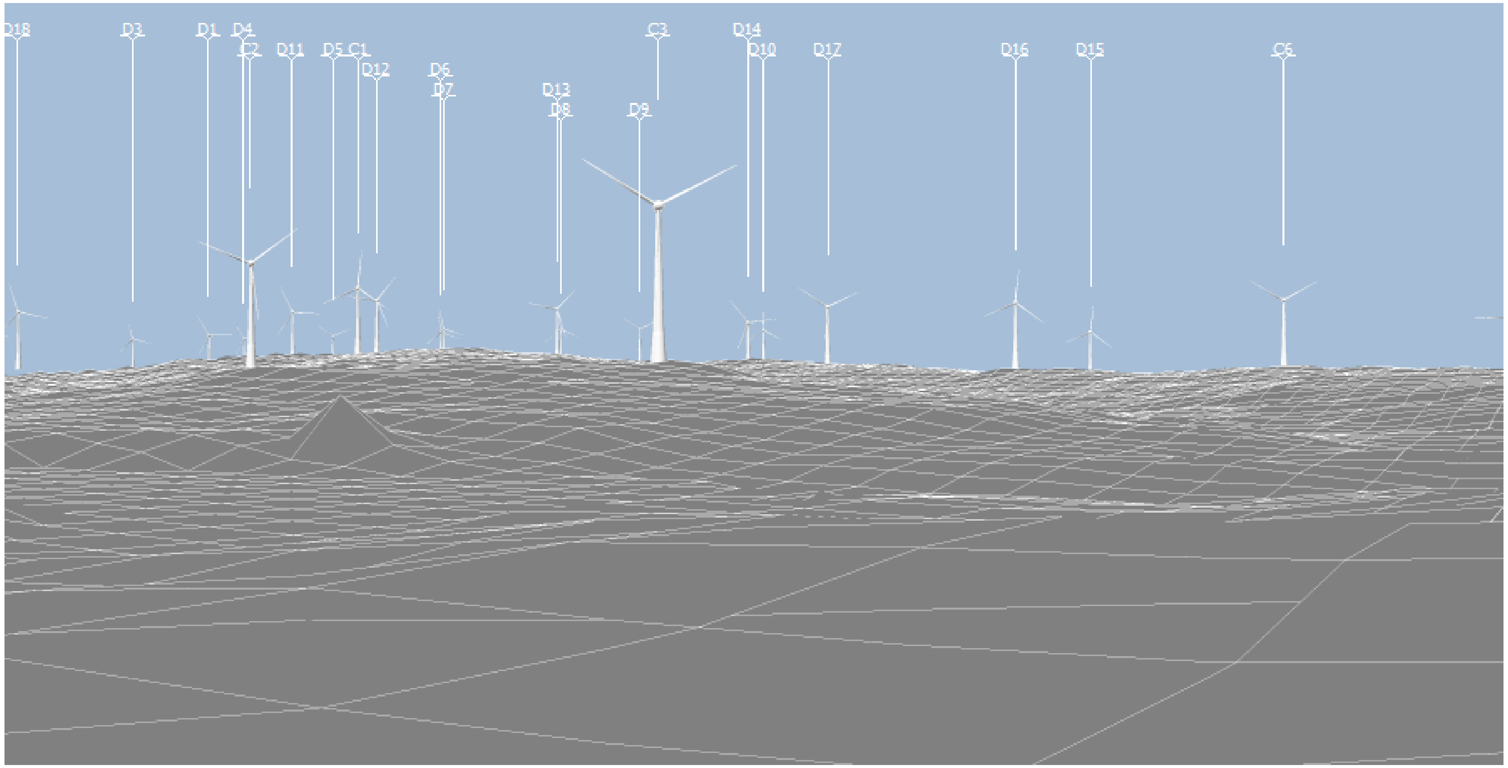

| **Viewpoint Location Information** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.052429 | 108.223614 | 1.5 | NE | 50 | 33 | 33 | 33 | 2,559 | 9,481 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The present view was taken from a small residential area of Dro village in Cu Ne commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from this point of view, all wind turbines are visible from the middle of tower. Thus, it is considered that the magnitude of change is LARGE. | | | | |

# VIEWPOINT VSR4.1



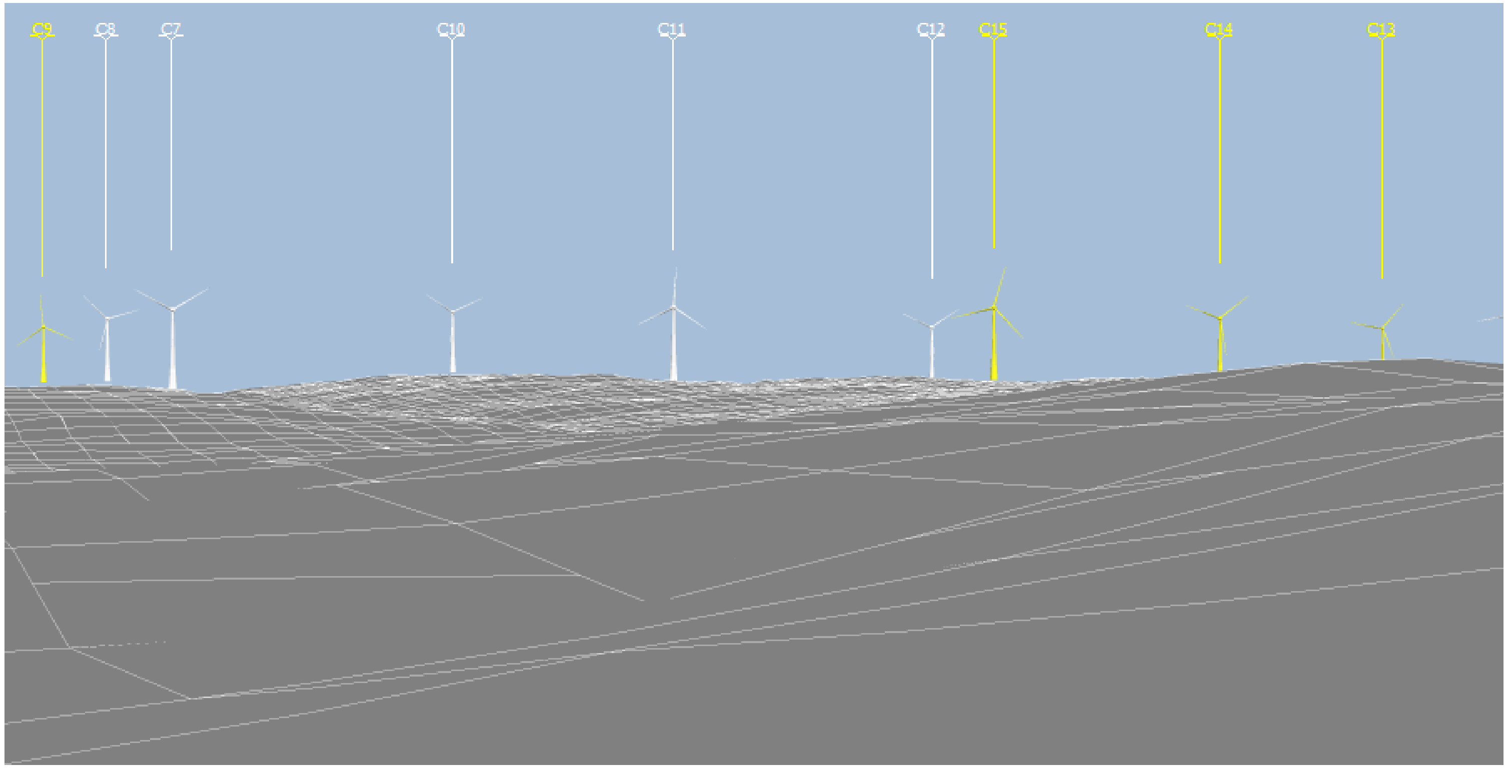

| **Viewpoint Location Information** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.079260 | 108.233963 | 1.5 | SW | 50 | 31 | 0 | 0 | 2,735 | 10,104 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The present view was taken from a small residential area of Drao village in Cu Ne commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from this point of view, no wind turbines are visible. Thus, it is considered that the magnitude of change is NEGLIGIBLE. | | | | |

## VIEWPOINT VSR4.2




| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.079260 | 108.233963 | 1.5 | NE | 50 | 23 | 23 | 23 | 1,334 | 6,450 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The present view was taken from a small residential area of Drao village in Cu Ne commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from this point of view, all wind turbines are visible from the middle of tower. Thus, it is considered that the magnitude of change is LARGE. | | | | |

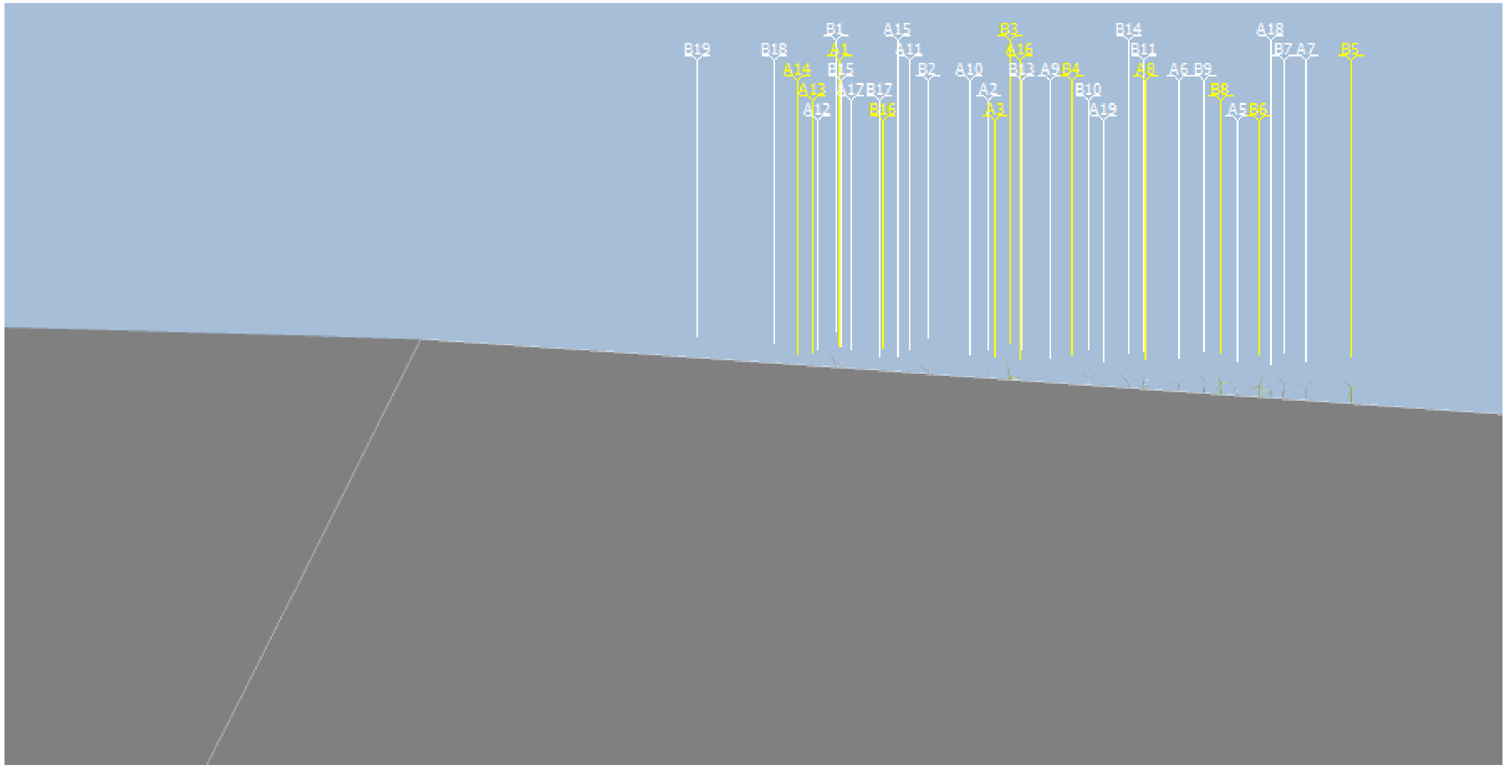
## VIEWPOINT VSR4.3




| **Viewpoint Location Information** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.079260 | 108.233963 | 1.5 | WSW | 50 | 12 | 12 | 12 | 1,633 | 4,039 |

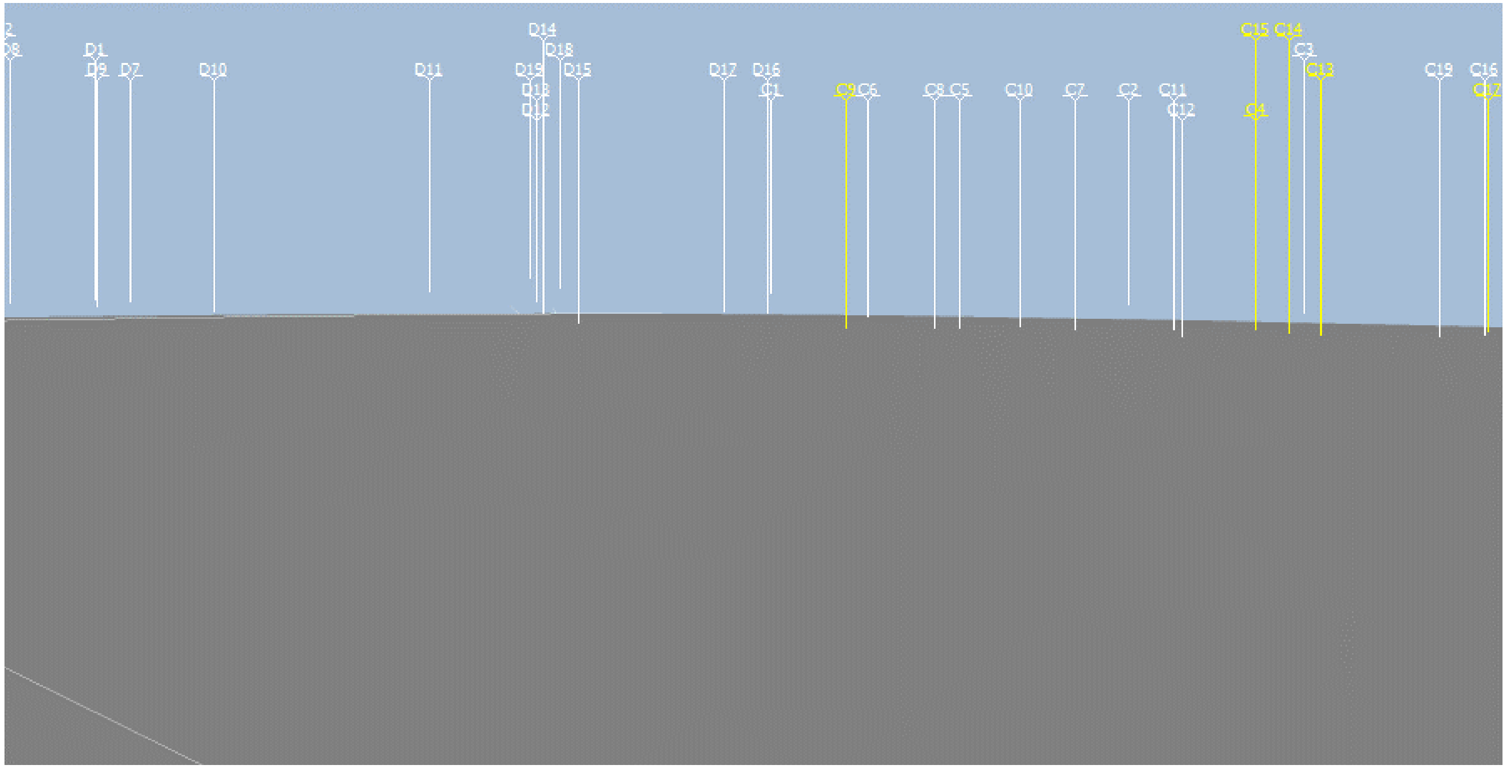
| Visual Sensitivity | Magnitude of Change |
|---|---|
| The present view was taken from a small residential area of Drao village in Cu Ne commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | Due to the topography of the land and the distance, from this point of view, all wind turbines are visible from the middle of tower. Thus, it is considered that the magnitude of change is LARGE. |

## VIEWPOINT VSR5.1



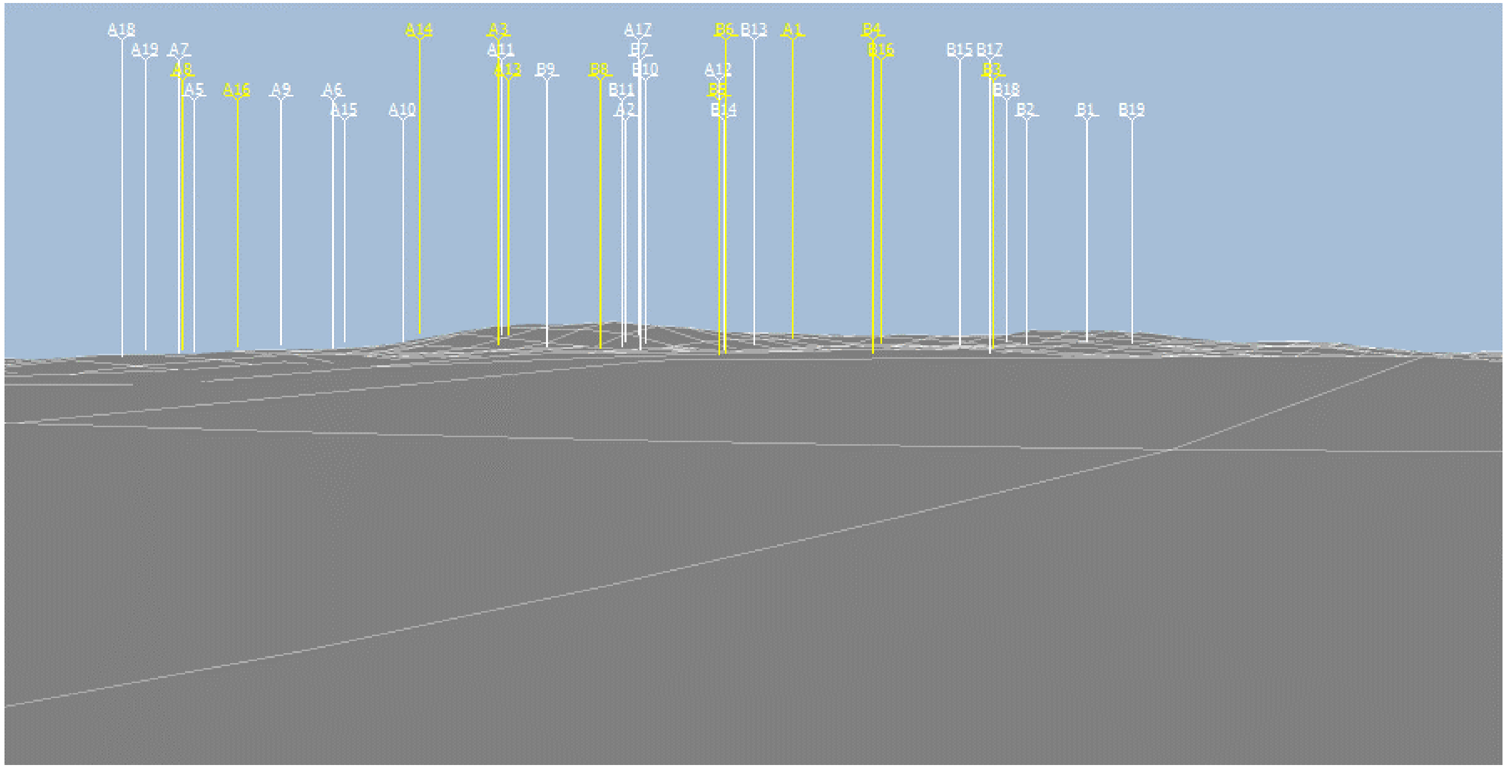

| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.137520 | 108.223327 | 1.5 | SSW | 50 | 38 | 23 | 8 | 7,646 | 14,765 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in Kdruh village, Ea Nam commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from the present view, most of WTGs are visible but a large number of them only exposed from the upper portion of the rotor. Thus, it is considered that the magnitude of change is SMALL. | | | | |

## VIEWPOINT VSR5.2



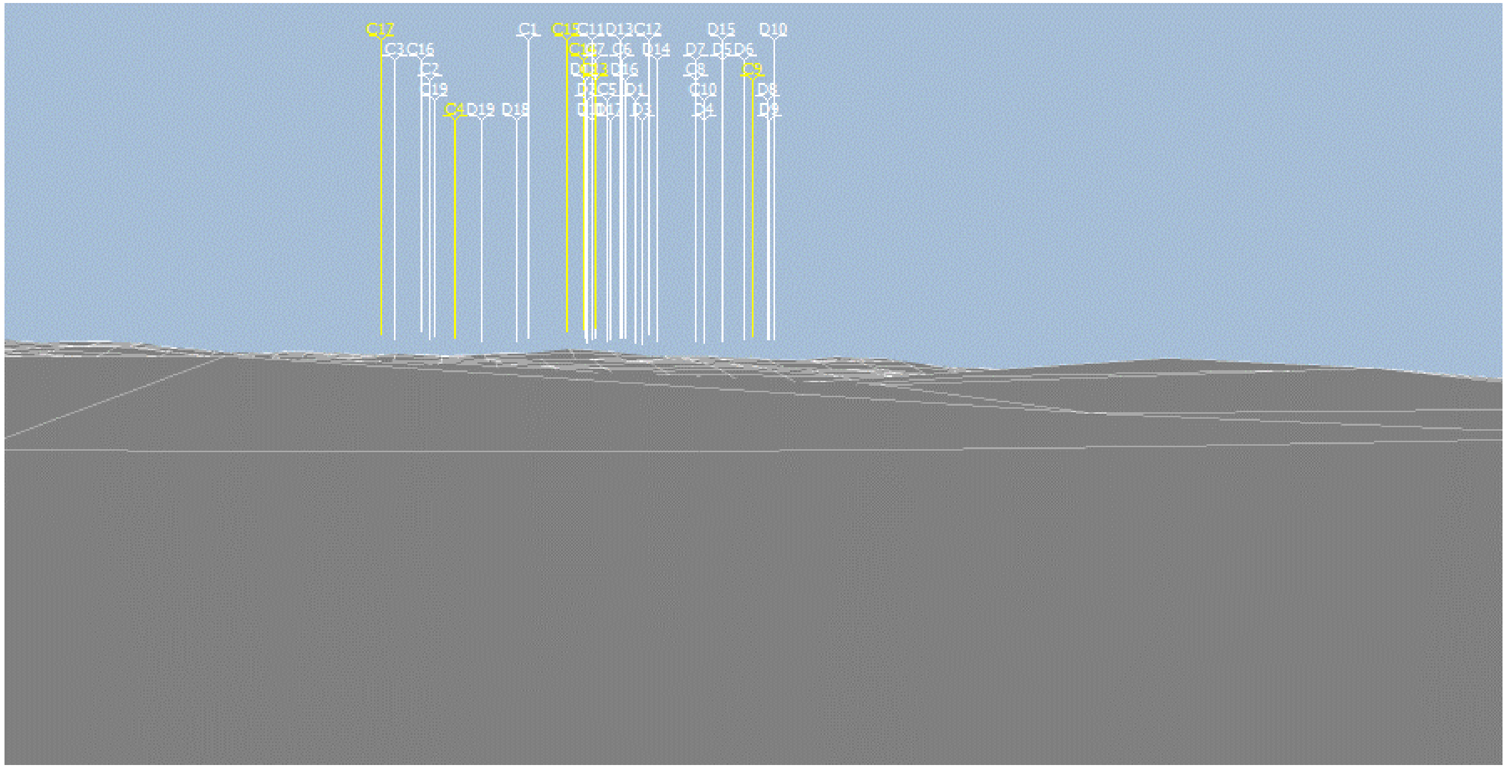

| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.137520 | 108.223327 | 1.5 | SSE | 50 | 33 | 9 | 0 | 4,172 | 10,313 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in Kdruh village, Ea Nam commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from the present view, a few WTGs are visible and all of them only exposed from the upper portion of the rotor. Hence, it is considered that the magnitude of change is SMALL. | | | | |

## VIEWPOINT VSR6.1



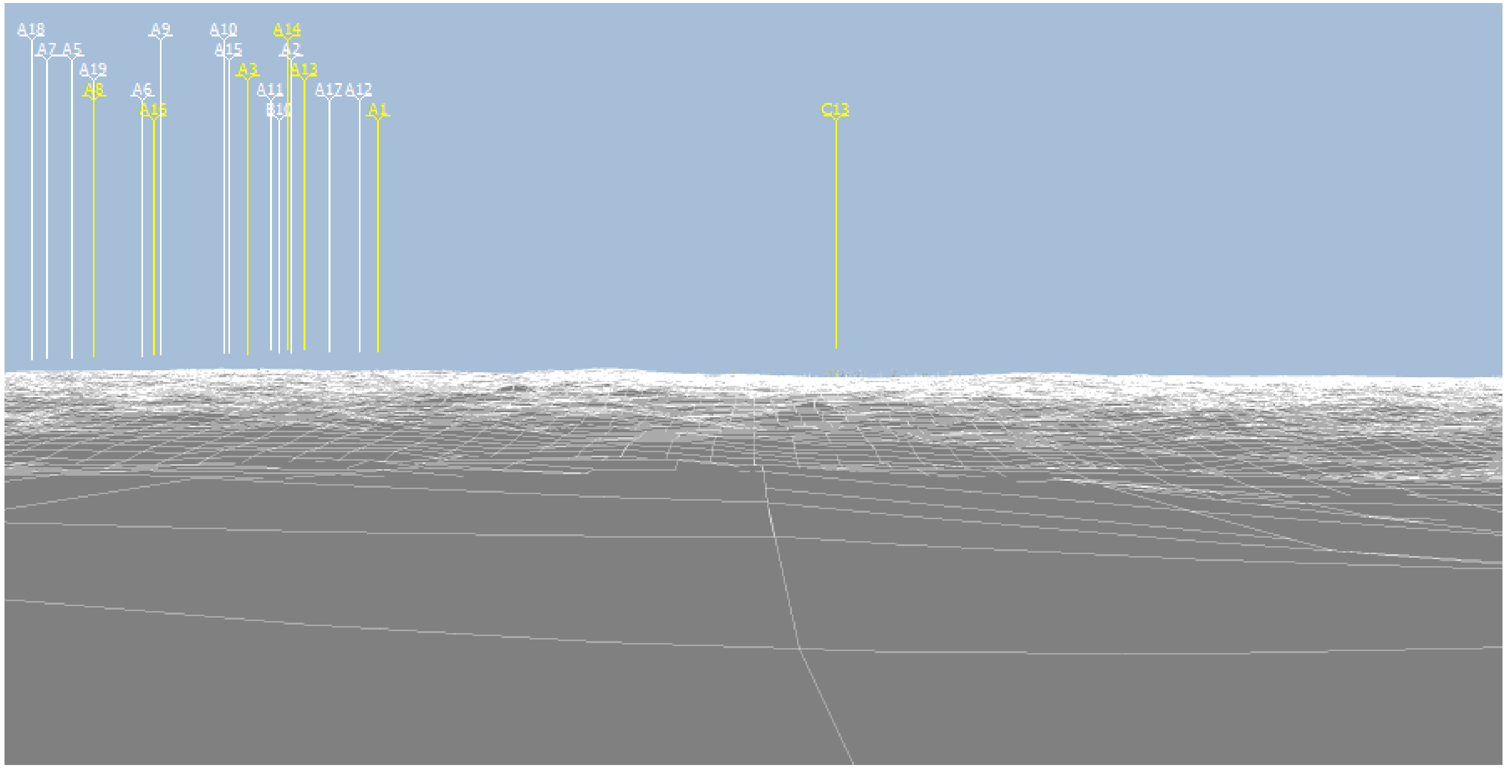

| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 12.952535 | 108.248959 | 1.5 | NNW | 50 | 36 | 0 | 0 | 8,586 | 14,493 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in Chu Plang village, Pong Drang commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the distance, from this point of view, no wind turbines are visible. Thus, it is considered that the magnitude of change is NEGLIGIBLE. | | | | |

## VIEWPOINT VSR6.2



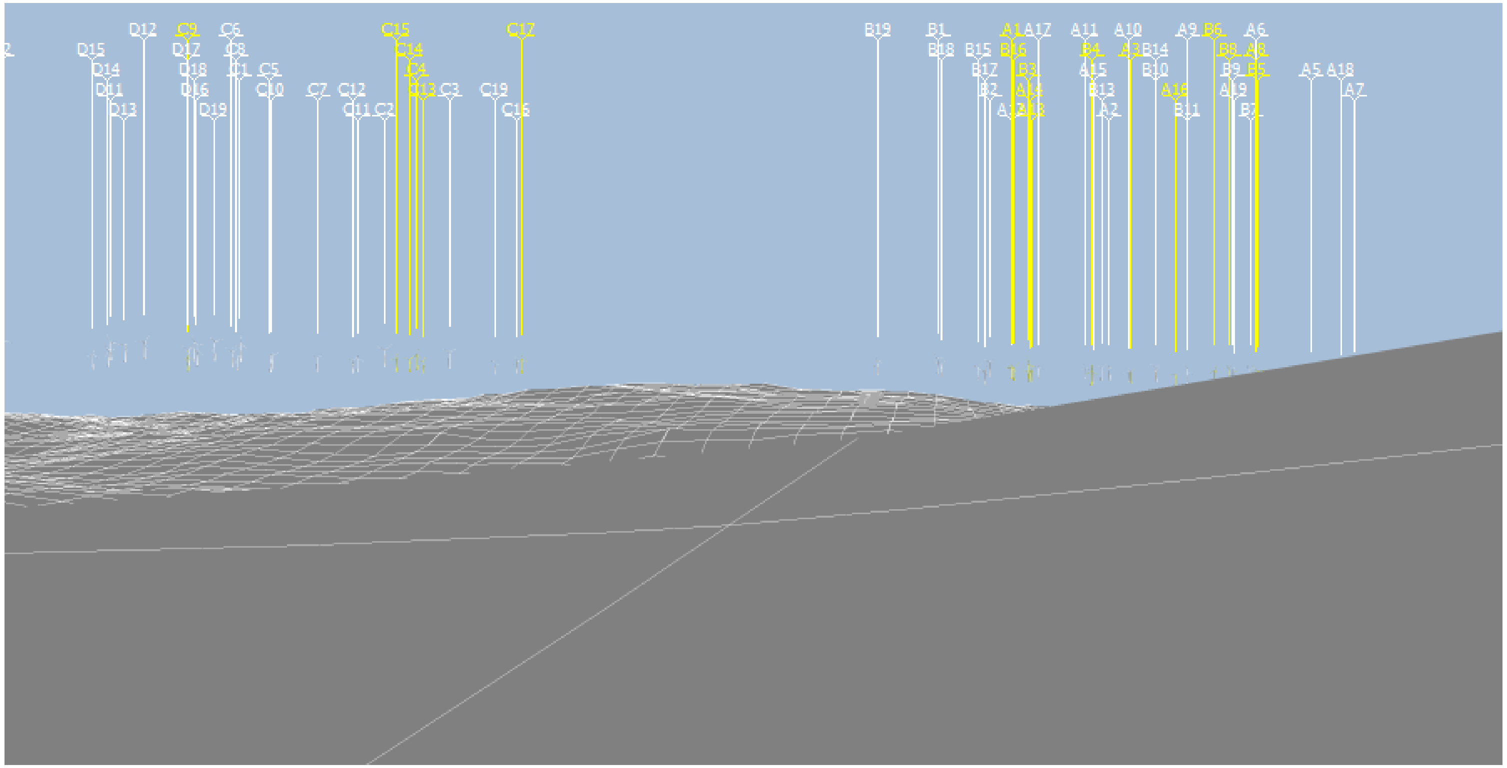
| **Viewpoint Location Information** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 12.952535 | 108.248959 | 1.5 | NNE | 50 | 37 | 18 | 0 | 10,999 | 19,039 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in Chu Plang village, Pong Drang commune. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the very long distance, from the present view, half of WTGs are visible and all of them only exposed from the upper portion of the rotor. Hence, it is considered that the magnitude of change is SMALL. | | | | |

## VIEWPOINT VSR7



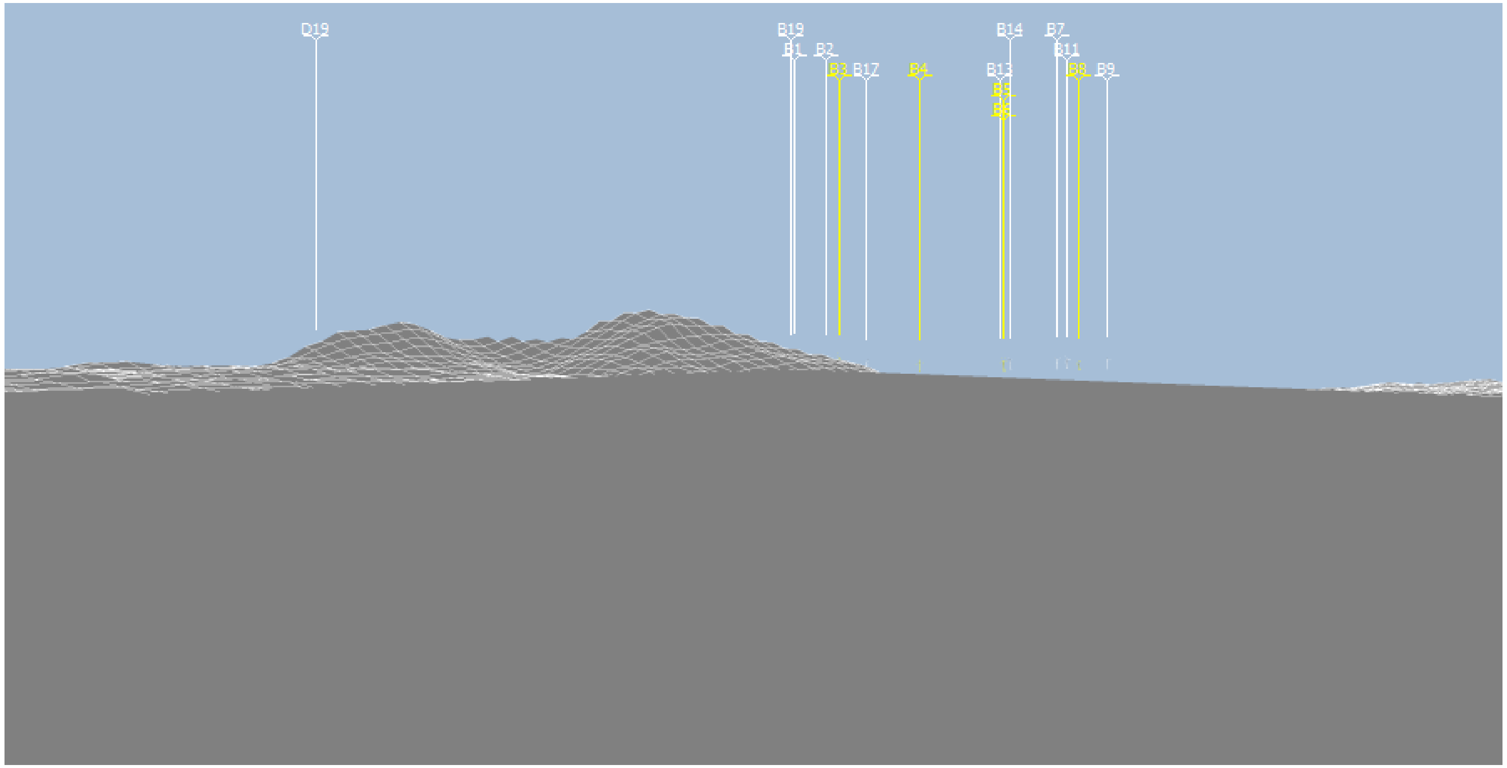

| Viewpoint Location Information | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 12.835871 | 108.246660 | 1.5 | N | 50 | 20 | 12 | 1 | 20,202 | 24,139 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in Binh Tan ward, Buon Ho district. Due to the important and relatively large residential area, the visual sensitivity is considered to be MEDIUM. | | | | | Due to the topography of the land and the very long distance, from the present view, greater than half of WTGs are visible and most of them exposed from the upper portion of the rotor. Hence, it is considered that the magnitude of change is SMALL. | | | | |

## VIEWPOINT VSR8




| **Viewpoint Location Information** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latitude | Longitude | Height above ground level (m) | Centre of Panorama – View Direction | Field of View (FoV) (°) | WTG within FoV | Visible WTG at tip height | Visible WTG at hub height | Nearest WTG (m) | Furthest WTG (m) |
| 13.207949 | 108.207756 | 1.5 | S | 50 | 65 | 53 | 18 | 11,469 | 21,979 |
| Visual Sensitivity | | | | | Magnitude of Change | | | | |
| The view is taken from local community resides in village 8, Ea Drang township. Due to the small number of residents, the visual sensitivity is considered to be LOW. | | | | | Due to the topography of the land and the very long distance, from the present view, most of WTGs are visible and exposed from the upper portion of the rotor. Thus, it is considered that the magnitude of change is SMALL. | | | | |

## VIEWPOINT VSR9




<table>
<tr><td colspan="10">Viewpoint Location Information</td></tr>
<tr><td>Latitude</td><td>Longitude</td><td>Height above ground level (m)</td><td>Centre of Panorama – View Direction</td><td>Field of View (FoV) (°)</td><td>WTG within FoV</td><td>Visible WTG at tip height</td><td>Visible WTG at hub height</td><td>Nearest WTG (m)</td><td>Furthest WTG (m)</td></tr>
<tr><td>13.223592</td><td>108.060860</td><td>1.5</td><td>SW</td><td>50</td><td>15</td><td>11</td><td>10</td><td>21,963</td><td>24,115</td></tr>
<tr><td colspan="5">Visual Sensitivity</td><td colspan="5">Magnitude of Change</td></tr>
<tr><td colspan="5">The view is taken from local community resides in village 2, Ea Wy commune. Due to the small number of residents, the visual sensitivity is considered to be LOW.</td><td colspan="5">Due to the topography of the land and the very long distance, from the present view, most of WTGs are visible and exposed from the upper portion of the rotor. Thus, it is considered that the magnitude of change is NEGLIGIBLE.</td></tr>
</table>

**Table 10.60 Summary of Visual Impacts**

| VSR | Distance to nearest wind turbine | Project visibility | Sensitivity of Receptor | Magnitude of Visual Effect | Significance of Visual Effect – Combined Impact |
|---|---|---|---|---|---|
| VSR1 | 0.8 km | Visible | Medium | Large | Major |
| VSR2.1 | 1.1 km | Visible | Low | Large | Moderate |
| VSR2.2 | 1.3 km | Visible | Low | Small | Negligible |
| VSR3.1 | 2.5 km | Visible | Low | Small | Negligible |
| VSR3.2 | 2.6 km | Visible | Low | Large | Moderate |
| VSR4.1 | 2.7 km | Invisible | Low | Negligible | Negligible |
| VSR4.2 | 1.3 km | Visible | Low | Large | Moderate |
| VSR4.3 | 1.6 km | Visible | Low | Large | Moderate |
| VSR5.1 | 7.6 km | Visible | Low | Small | Negligible |
| VSR5.2 | 4.1 km | Visible | Low | Small | Negligible |
| VSR6.1 | 8.6 km | Invisible | Low | Negligible | Negligible |
| VSR6.2 | 11.0 km | Visible | Low | Small | Negligible |
| VSR7 | 20.2 km | Visible | Medium | Small | Minor |
| VSR8 | 11.5 km | Visible | Low | Small | Negligible |
| VSR9 | 22.0 km | Visible | Low | Negligible | Negligible |

Nine VSRs were selected as representative of 23 villages, in which four (4) villages are major sensitive receptors as presented above, around the Project area and within the viewshed. VSR7 was only selected as representative of Binh Tan ward which is a dense and important residential area to verify the visibility from the area which is 20 km from Binh Tan ward to the Project.

It should be noted that views of the Project could be filtered through vegetation not included in the present analysis. As shown in Table 10.60, receptors located in vicinity of the Project are likely to be affected by the turbines, whilst the area located far away from the Project is not likely to be affected due to the distance and obstacles (e.g. terrain, vegetation, buildings).

The Project will be visible across an area of 200,000 ha. Within this, there are 23 villages, two wards and one major highway. The nine VSRs selected are broadly representative of the landscapes and sensitivities of the Project area. As noted in Table 10.60, only one out of nine selected VSRs were assessed as being impacted to a Major extent, as a result, the VSR1 was chosen as a representative of Drung Lon village which is situated within the Project area and very close to WTGs. Three VSRs will be affected to a Moderate extent, one VSR affected to a Minor extent whilst the rest were considered as Negligible extent. However, as the turbines are not erected, local communities do not see and/or foresee any issues/ problems related to visual impacts. Therefore, overall, the significance of visual impact that will result from the installation and operation of the wind turbines has been assessed as Moderate to Minor.

### 10.8.5.2 Additional Mitigation Measures

The following identifies mitigation measures to be applied by the Project Owner and EPC contractor:

- Siting and design of roads and other infrastructure to minimize off-site visibility from visually sensitive areas should be an important consideration

- Obvious logos and/or patterns with colours at long wavelength of the visible spectrum should be avoided to be painted for the WTGs
- Use of materials (e.g. coating components of wind turbines using white colour and preferably non-reflective paints in compliance with local regulatory) that will minimise light reflection should be used for all Project components (e.g. wind turbine with its tower and blades); The replacement of wind turbines with visually different wind turbines can result in visual clutter, so replacing wind turbines with the same or a visually similar model over the lifetime of the project may be an important requirement
- Existing vegetation should be retained to the greatest extent possible. Vegetation should be retained along roads, substations, and other Project infrastructure

#### 10.8.5.3 Residual Impact

Following the implementation of these mitigation measures, the significance of residual impact is considered as Minor to Negligible.

#### 10.8.5.4 Monitoring Audit

No specific monitoring measures are identified at this stage.

## 10.9 Traffic and Transport Impact Assessment

### 10.9.1 Scope of Assessment

The traffic assessment considers the potential effects of construction traffic on the road network within the vicinity of Huadian Dak Lak Wind Power Project on the following aspects of traffic and transportation:

- The capacity of the existing road network to accommodate the traffic volumes generated by the Project
- Transportation safety on public roads due to Project-related traffic, and
- The key activities that are likely to have negative impacts, including:
  - Transport of equipment (wind turbines and transmission line components) from Cam Ranh Port in Khanh Hoa Province to the Project site
  - Transportation materials from local vendors in Buon Ma Thuot City, Dak Lak Province to the Project’s site, and
  - Daily movement of local construction workers[55].

### 10.9.2 Relevant Guidelines and Criteria

- *Law No. 23/2008/QH12* issued by The National Assembly regulating on road traffic
- Guidelines for Environmental Impact Assessment issued by the Institute of Environmental Management and Assessment (IEMA, 2004), and
- Guidelines for Environmental Impact Assessment of Road Traffic issued by the Institute of Environmental Assessment, 1993.

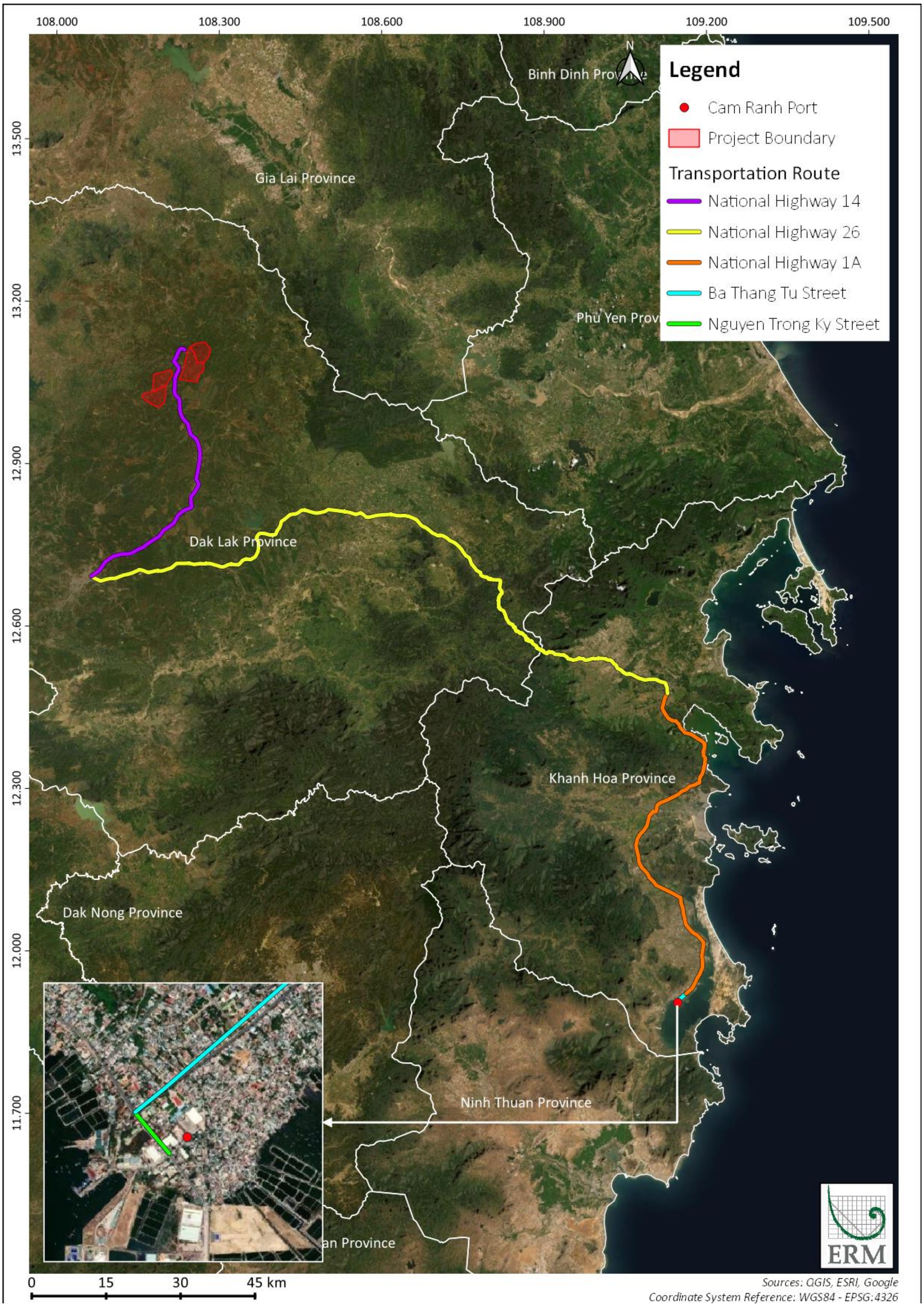
[55] Assume that the construction activities only happen during weekdays and no construction on Sundays or public holidays.

### 10.9.3 Baseline Conditions

Huadian Dak Lak Wind Power Project identified the potential turbine and material delivery routes describes as follows:

- Transportation of major equipment including wind turbines, propeller, transformer, and other components will be imported at Cam Ranh Port in Khanh Hoa Province and transported to the Project site using the super-heavy and super-long vehicles via the route: Cam Ranh Port → Nguyen Trong Ky Street → Marine Transportation Route → Ba Thang Tu Street → National Highway No.1 → National Highway No.26 (Ninh Hoa Town) → National Highway No.14 → Turn left to the Unnamed road (about 5 km) → Krong Buk District → Project's Site. The total length of transportation route is nearly 222 km.
- Transportation of construction material: Materials including levelling sand, brick, stone, iron and steel materials can be purchased directly from local suppliers in Buon Ma Thuot City, Dak Lak Province and its vicinity. The average length of the material transportation route is approximately 56 km.

- The proposed transportation routes and its condition to access to the site development of Huadian Dak Lak Wind Power Project are demonstrated in Figure 10.40, and Figure 10.41.




Source: QGIS, ESRI, Google, June 2021

**Figure 10.40 Transportation Route of the Equipment**


Turn right from Nguyen Trong Ky Street to Ba Thang Tu St.


Turn right from National Road No.1 to National Road No.26


Turn right from National Road No.26 to national Road No.14 (Turning curve: 50 m)


Turn left from National Road No.14 to Unnamed Road (in Krong Buk District, Dak Lak Province)

Existing Access road to Huadian Dak Lak Wind Power Project's area

Internal road connecting Wind Turbine locations at the Project's site in Ea Sin Commune, Dak Lak Province

**Figure 10.41 The Proposed Transportation Routes of Wind Turbine Components and Materials to the Project's Sites[56]**

[56] Photos are taken by ERM team during the site visit and referred from "Transport Survey and Public Road Requirements" Document provided by the Project's Owner.

## 10.9.4 Impact Assessment

### 10.9.4.1 Impact during Construction Phase

#### *10.9.4.1.1 Potential Impact*

Some potential impacts on traffic identified during the construction activities is presented below:

- Degradation of the public road infrastructure and network due to heavy load vehicle movement
- Disturbance to local transportation used by pedestrians and local vehicles due to an increase of ordinary traffic movement that might cause traffic congestion, and
- Increase of Traffic Safety Risks.

#### *10.9.4.1.2 Existing Control*

- There is no existing control/measure suggested for this Section.

#### *10.9.4.1.3 Significance of Impact*

The assessment of the significance impact in terms of traffic and transport shall be based on the two aspects including magnitude of effect and receptor sensitivity. Accordingly, the Institute of Environmental Management and Assessment (IEMA[57]) guidelines should be adopted for the evaluation. These criteria used to assess the magnitude of change and receptor sensitivity are presented in Table 10.61 and Table 10.62, respectively.

**Table 10.61 Magnitude of Effect**

| Magnitude | Description |
|---|---|
| Major | The proposals could result in an appreciable change in terms of length and/or duration to the present traffic routes or schedules or activities, which may result in hardship |
| Moderate | The proposals could result in changes to the existing traffic routes or activities such that some delays or rescheduling could be required, which cause inconvenience. |
| Minor | The proposals could occasionally cause a minor modification to routes, or a very slight delay in present schedules, or on activities in the short-term |
| Negligible | No effect on movement of road traffic above normal level |

**Table 10.62 Receptor Sensitivity**

| Magnitude | Description |
|---|---|
| High | Receptors of greatest sensitivities to changes in traffic flow, would include:<br>People whose livelihood depends upon unrestricted movement within their environment including commercial drivers and companies who employ them, local residents, schools and colleges. Accidental hotspots would also be considered. |
| Medium | Traffic flow sensitive receptors, would include:<br>People who pass through the area habitually, but whose livelihood is not wholly dependent on free access. Would also typically include: congested junctions, community services, parks, businesses with roadside frontage, and recreation facilities. |

57 https://www.iema.net/resources/event-reports/2020/02/13/iema-impact-assessment-guidance

| Magnitude | Description |
|---|---|
| Low | Receptors with some sensitivity to changes in traffic flow:<br>People who occasionally use the road network. Would also typically include: Public open spaces, nature conservative areas, listed buildings, tourist attractions, residential roads with adequate footway provision and places of worship. |
| Negligible | Receptors with very low sensitivity to traffic flow:<br>People not sensitive to transport effects. Would also refer to receptors that are sufficiently distant from the affected roads and junctions. |

Overall, in order to identify the significance of impact relating to the traffic and transport, the results from the receptor sensitivity and magnitude of effect are correlated and classified based on the below matrix in Table 10.63.

**Table 10.63 Significance of Impact Assessment Matrix**

| Magnitude \ Sensitivity | High | Medium | Low | Negligible |
|---|---|---|---|---|
| High | Major | Major | Moderate | Minor |
| Medium | Major | Moderate | Minor | Negligible |
| Low | Moderate | Minor | Negligible | Negligible |
| Negligible | Minor | Negligible | Negligible | Negligible |

*10.9.4.1.3.1 Impact on Receptor Sensitivity*

As observation and experience during the site visit, there are many receptors along the transportation routes of wind turbine components and materials to the Huadian Dak Lak Wind Power Project's areas such as households, schools, and other places of worship. However, regarding to some criteria suggested for the evaluation mentioned in Table 10.62, the impact of significance in terms of Sensitivity Receptor was assessed as **Medium.** Given some parts of the public roads might affect to local community due to the daily movement, the transportation of the wind turbine components and materials through the traffic routes does not impair the livelihood of nearby residential area.

*10.9.4.1.3.2 Magnitude of Impact*

## Methodology

The Guidelines for the Environmental Assessment of Road Traffic by IEMA identify that the main transport impacts that could arise from the advent of Huadian Dak Lak Wind Power Project relating to some following aspects:

- Severance
- Driver delay
- Fear and intimidation, and
- Accidents and road safety.
- Details of the assessment criteria for all aspects are described as following:

- Severance:

The potential for severance effects are based on an assessment of the magnitude of traffic flow impact, which takes into account the thresholds within the IEMA Guidelines and be presented in Table 10.64. The Traffic flow increase is also defined as the two-way Annual Average Daily Traffic Flow (AADT) specified by the material namely "Design Manual for Roads and Bridges – Pedestrians and Others and Community Effects".

**Table 10.64 Magnitude of Impact – Severance**

| Magnitude of Impact | Traffic Flow Increase (AADT) |
|---|---|
| High | >90% |
| Medium | 60-90% |
| Low | 30-60% |
| Very Low | <30% |

- Driver delay:

IEMA Guideline identified this term as an issue when the addition of new development-generated traffic resulting in an increase in the number of vehicles using main routes and junctions. This may lead to additional delays depending on the existing operation, levels of background traffic and the development-generated traffic.

**Table 10.65 Magnitude of Impact – Driver Delay**

| Magnitude of Impact | Definition |
|---|---|
| Driver Delay along Road Corridors | |
| High | Average vehicle delay in increase of more than 10 minute as a result of the Proposed Development during the peak hour periods |
| Medium | Average vehicle delay increases between 5 to 10 minutes as a result of the Proposed Development during the peak hour periods |
| Low | Average vehicle delay increase between 1 and 5 minutes as a result of the Proposed Development during the peak hour periods |
| Very Low | Average vehicle delay increases are less than 1 minute as a result of the Proposed Development during the peak hour periods. |

- Fear and Intimidation:

A further impact of traffic flows on pedestrian movement and nearby sensitive receptors is the element of fear and intimidation that individual travellers will experience with respect to vehicle movements. The impact of this factor is dependent on the volume of traffic, the heavy-duty vehicle (HDV) content, the width of footway and its proximity to the carriageway. Accordingly, IEMA Guidelines also do a suggestion of some thresholds based on previous researches which is demonstrated in Table 10.66.

**Table 10.66 Magnitude of Impact – Fear and Intimidation**

| Magnitude of Impact | Change in Average Traffic Flow over 18-hour day (vehicles/hour) | Average 18-hour HDV Flow | Change in Average Speed over 18-hour (mph) |
|---|---|---|---|
| Extreme | 1.800+ | 3.000+ | 20+ |
| Moderate | 1.200 – 1.800 | 2.000 – 3.000 | 15 – 20 |
| Slight | 600 – 1.200 | 1.000 – 2.000 | 10 – 15 |

- Accidents and road safety:

The assessment of accident risk and highway safety is based upon existing accident rates and specific local circumstances to identify accident clusters. Regarding the IEMA guidelines, a professional judgement will be needed to assess the implications of local circumstance, or factors which may increase or decrease the risk of accident. Some suggestion made by IEMA guidelines for the assessment of the magnitude of impact relating to accidents and road safety is demonstrated in Table 10.67.

**Table 10.67 Magnitude of Impact – Accidents and Road Safety**

| Magnitude of Impact | Definition |
|---|---|
| High | Expected increase in accident risk of 15% at the location of existing accident cluster |
| Medium | Expected increase in accident risk of 10% – 15% at the location of existing accident cluster |
| Low | Expected increase in accident risk of 5% – 10% at the location of existing accident cluster |
| Very Low | Expected increase in accident risk of less than 5% at the location of existing accident cluster |

## Assessment

Severance:

Project construction will generate traffic issues associated with the movement of turbine and transmission line component from Cam Ranh Port to the Project site. Regarding the estimation, the transportation time are approximately:

- Maximum 10 hours per round-trip (equivalent to nearly 222 km) for travelling from the Cam Ranh Port to the Laydown area of the Project to transport wind turbine components; and
- Maximum 3 hours per round-trip (equivalent to nearly 100 km) transporting material from local suppliers from Buon Ma Thuot City, Dak Lak Province to the Project's site.
- Given the transportation period is within 18 months, the average number of vehicles movements, including heavy load and non-heavy load vehicles transporting both equipment and construction materials are estimated maximum ten turns per day. This is equivalent of approximately five vehicles coming and leaving the sites per day. Therefore, the Traffic Flow Increase or AADT index is assessed as **Very Low** which is 30% of traffic and transport growth less than typical traffic movement on the two transportation routes of turbine components and materials.
- Driver delay:

The source of traffic congestion and delays will origin from the movement of oversized turbine components. Heavy trucks will likely move slower than typical other vehicles, particularly at bends or junctions. Based on the actual experience of Project's team during the visit by observing a transportation of Wind Turbine Tower of other Project heading to Gia Lai Province by traversing through the National Highway No.14, it was estimated less than 1 minute delayed in the National Highway No.14 (See Figure 10.42) and less than 5 minutes delayed at some other points of transportation route. Therefore, the assessment of the significance Impact relating to the driver delay aspect can be at **Very Low** to **Low** level based on the range specified in Table 10.65.


**Figure 10.42 A Transportation of Oversized Equipment via National Highway No.14**

- Fear and Intimidation:

As mentioned above, the significance of impact in terms of fear and intimidation depends mainly on the volume of traffic, the heavy-duty vehicle (HDV) content, the width of footway and its proximity to the carriageway. The estimated number of heavy-loaded vehicles to the Project's sites is less than 10 which is far away from the thresholds specified in Table 10.66. Additionally, there are at least two developments nearby Project situated also in Dak Lak Province including Tay Nguyen and Trung Nam Wind farms may propose the residential area an experience to the movement of the oversized and heavy-loaded vehicles. Therefore, the impact significance in relations to the fear and intimidation aspect is assessed as **Slight.**

- Accidents and road safety:

The likelihood of traffic incidents such as crashes or injury increases along with an increase of traffic volume, especially the presence of a number of heavy load vehicle movements during construction phase. Additionally, the Huadian Dak Lak Wind Power Projects are located in a mountainous and highland area of Dak Lak Province with constant foggy conditions, so traffic accidents are likely to occur during the construction phase.

Regarding the statistical data of the Ministry of Transport, there are nearly 3,000 cases of traffic accident around Vietnam, particularly, nearly 200 accidental cases happening in National Highway 1A[58]. Additionally, in accordance to the summary of Wind Turbine Accident data updated to 31 March 2021 by a private UK group[59], there have been around six traffic accident cases during 20 years (2000 – 2021) induced by transportation of wind turbine components which contributes only 6% to be in a range of 5% - 10% of total road traffic happening on the Highway road. Therefore, the impact significance of wind turbine transportation can be assessed as **Low** as mentioned in Table 10.67.

In conclusion, the magnitude of traffic and transport aspect is summarised in Table 10.68.

[58] http://sgtvt.hochiminhcity.gov.vn/HoatDongAnh/2021/VPS/thang%201/Phu%20luc%20bieu%20do.pdf
https://tuoitre.vn/155-nguoi-chet-vi-tai-nan-giao-thong-tren-quoc-lo-1a-trong-2-thang-20180306173027O1.htm
[59] http://www.caithnesswindfarms.co.uk/AccidentStatistics.htm

**Table 10.68 Traffic and Transport Magnitude for Huadian Dak Lak Wind Power Project's Site**

| Aspect | Magnitude of Impact |
|---|---|
| Severance | Very Low |
| Driver Delay | Low |
| Fear and Intimidation | Slight |
| Accident and Road Safety | Low |

##### *10.9.4.1.3.3 Determine the Significance of Impact*

Traffic and transport issue in terms of the advent of the Projects have a negative impact on traffic safety due to increases traffic volume and oversized and over mass load. The impact is expected to be affected to road networks and its users during the Projects' construction phase. Generally, the significance of impact relating to the traffic and transport during the construction phase is presented in Table 10.69.

**Table 10.69 Significance of Impact Relating to the Traffic and Transport**

| Impact Description | Impact Relating to the Traffic and Transport | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent |
| Impact Extent | **Local** | Regional | Global | |
| Frequency | Intermittent over 18 months of construction period | | | |
| Impact Magnitude | Negligible | **Small** | Medium | Large |
| Receptors Sensitivity | Low | **Medium** | High | |
| Impact Significance | Negligible | **Minor** | Moderate | Major |

#### *10.9.4.1.4 Additional Mitigation and Management Measures*

Prior to the commencement of construction, a detailed Traffic Management Plan (TMP) should be developed which will provide details on a range of traffic management measures including the timing and routeing of vehicles movements with the purpose of reducing the impact of construction traffic. Measures including in TMP should be:

- Scrutinised analysis and study of the entire route for transportation of the project components from the manufactured area to the project site.
- Active traffic controls (e.g. flaggers to direct traffic at the Project site entrance)
- Schedule construction deliveries and employee shift changes to minimise traffic congestion and delay
- Establish, train and monitor compliance with speed limits to reduce accidents and speed-related injuries
- Avoid peak times of day to reduce the risk of accidents
- Due to heavy load vehicle movement, some works will be required such as temporary removal of some trees, cooperating with local authority and seeking support from local community to expand the road for easily movement

- Collaborate with local communities and responsible authorities to improve signage (installation of convex mirror), visibility and overall safety of roads
- In terms of local pedestrians who is prone to be affected by movement of heavy vehicles of wind turbines components, there should be:
  - Installation of roadway illumination or enhancement of existing illumination to improve pedestrian's visibility, and
  - Retroreflective lights or decals should be equipped to the over-sized and over-mass transportation equipment to warn the pedestrians as passing by the residential areas.
- Information boards about traffic safety hazards and emergency contact information to be made available at the wind farm site
- Ensure that drivers carrying construction machinery and materials are instructed to drive within speed limits with careful consideration for village traffic
- Coordinate with emergency responders to ensure that appropriate first aid is provided in the event of accidents
- Establish a proper and accessible grievance mechanism to report concerns about public road conditions raised by local communities along the transportation route. The Project will carry out immediate investigation when the community submits related complaints
- Coordination between the Project proponent and the government agencies for road maintenance to identify necessary road repairs during Project construction, and
- Repair of any damaged road surfaces as needed which caused by the Project-related transportation.

#### *10.9.4.1.5 Residual Impacts*

As a result of implementation of proposed additional measures, the residual impact is considered **Negligible**.

#### *10.9.4.1.6 Monitoring and Audit*

- Monthly monitoring the implementation of all proposed mitigation measures specified in the Traffic Management Plan (TMP) should be conducted (such as specifying speed limits and safe distance for vehicles entering the site, using qualified drivers, stopping distracted driving)
- Bi-weekly road condition monitoring along the transportation route to understand road quality during construction phase.

### 10.9.4.2 Impact during Operational Phase

Operational traffic impacts will be associated with limited number of vehicles accessing the site for maintenance or security purposes, and safety risks or accidents due to the design of the road, driving behaviour of company drivers.

The potential impacts on traffic from operation activities (e.g. WTG operations, inspection and maintenance) are considered negligible so no further assessment is needed. However, some following measures still need to be implemented, as follows:

- Establish and monitor compliance with defensive driving guideline (e.g. speed limits to reduce accidents and speed-related injuries are limited of 20km/h), and
- The proposed grievance mechanism should be accessible for all villagers to report concerns associated with health and safety.

##### *10.9.4.2.1 Monitoring and Audit*

- Monthly monitoring the implementation of all proposed mitigation measures specified in the Traffic Management Plan (TMP) should be conducted (such as specifying speed limits and safe distance for vehicles entering the site, using qualified drivers, stopping distracted driving), and
- Regular road condition monitoring of the internal road to understand road quality during operations phase.

# 11. BIODIVERSITY IMPACT ASSESSMENT

In accordance with IFC PS1 and PS6, the objectives of the biodiversity impact assessment are to identify and quantify the potential Project impacts on biodiversity; design measures to avoid, minimise or mitigate potential adverse impacts; and identify likely residual impacts. The background assessment and baseline studies to identify relevant values have been reported in Chapter 8. This section includes:

- Impact assessment (IA) of the Project aspects with potential to result in direct and indirect adverse impacts on biodiversity values, focussing on habitats and threatened species;
- Development of mitigation measures to avoid and minimise potential adverse impacts on biodiversity, with priority given to impacts on features with significant biodiversity value; and
- Determination of residual impacts post-mitigation. In the event significant residual impacts are predicted to occur then additional mitigation measures are developed to avoid and minimise such effects, with biodiversity offsets considered as a last option in accordance with the mitigation hierarchy.

## 11.1 Scoping of Likely Impacts to Biodiversity Values

Table 11.1 defines the aspects of the Project that have potential to impact on biodiversity values to occur as a result of Project activities during different phases. These impacts to biodiversity are consistent with those identified in IFC PS6 and IFC EHS Guidelines for Wind Energy (2015), and relate to the Project activities that have been described for all phases of the proposed Project (see Section 2.1). These aspects may occur for the duration of the project, may only be relevant to a defined period of time (e.g. if construction areas are rehabilitated around the final Project footprint).

**Table 11.1 Scoping of Potential Impacts to Biodiversity Values**

| Impacts | Source of impacts |
|---|---|
| **Construction** | |
| Habitat conversion and degradation | ■ Loss of habitats due to footprint of short- and long-termed land acquisition<br>■ Reduction in quality of habitats due to (i) land clearance, (ii) discharge of waste, wastewater and dust and (iii) introduction and/or spreading of alien/invasive species. |
| Disturbance to fauna | ■ Interruptions or changes to fauna behaviours caused by noise, light, vibration and visual disturbances |
| Mortalities of fauna | ■ Fauna mortalities due to vehicle strikes, poaching and hunting and clearance of nests |
| **Operation** | |
| Habitat conversion and degradation | ■ Loss of habitats due to footprint of short- and long-termed land acquisition.<br>■ Reduction in quality of habitats due to (i) land clearance, (ii) discharge of waste, wastewater and dust, (iii) introduction and/or spreading of alien/invasive species and (iv) increasing edge effects. |
| Barriers and fragmentation effects | ■ Fauna movements (e.g. daily commute between roosting and foraging sites, migratory patterns) are reduced/ hindered due to Project components |
| Disturbance to fauna | ■ Interruptions or changes to fauna behaviours and exclusion of species from its habitats caused by noise. |
| Mortalities of birds and bats | ■ Mortality due to potential flight of volant species through the Rotor Swept Zone (RSZ) of the wind turbines.<br>■ Mortality of birds due to electrocution on the transmission line<br>■ Mortality of bats due to barotrauma |

## 11.2 Impact Assessment Criteria

In order to assess the significance of impacts due to the Project before and after mitigation, IA matrices have been used to evaluate the severity of impacts to habitats (Table 11.2) and species (Table 11.3). The matrices take into consideration the sensitivity of receptors and the magnitude of effects caused by the Project.

**Table 11.2 Habitat Impact Assessment – Significance Criteria**

| Habitat Sensitivity/Value | | Magnitude of Effect | | | |
|---|---|---|---|---|---|
| | | Negligible | Small | Medium | Large |
| Low | Habitats with no or local designation/ recognition; habitats of significance for species of Least Concern; habitats which are common and widespread within the region. | Negligible | Negligible | Minor | Moderate |
| Medium | Habitats within nationally designated or recognised areas; habitats of significant importance to globally Vulnerable, Near Threatened or Data Deficient species; habitats of significant importance for nationally restricted range species; habitats supporting nationally significant concentrations of migratory species and/or congregatory species; nationally threatened or unique ecosystems. | Negligible | Minor | Moderate | Major |
| High | Habitats within internationally designated or recognised areas; habitats of importance to globally Critically Endangered or Endangered species; habitats of importance to endemic and/or globally restricted-range species; habitats supporting globally significant concentrations of migratory species and/ or congregatory species; highly threatened and/or unique ecosystems, areas associated with key evolutionary species. | Negligible | Moderate | Major | Critical |

| Magnitude of Effect Definition | |
|---|---|
| **Negligible** | Effect is within the normal range of natural variation |
| **Small** | Affects only a small area of habitat, but without the loss of viability/function of the habitat |
| **Medium** | Affects a sufficient proportion of the habitat that the viability/function of part of the habitat or the entire habitat is reduced, but does not threaten the long-term viability of the habitat or species dependent on it. |
| **Large** | Affects the entire habitat or a significant proportion of the habitat to the extent that the viability/function of the entire habitat is reduced and the long-term viability of the habitat and the species dependent on it are threatened. |

**Table 11.3 Species Impact Assessment – Significance Criteria**

| Habitat Sensitivity/Value | | Magnitude of Effect | | | |
|---|---|---|---|---|---|
| | | Negligible | Small | Medium | Large |
| Low | Species which are included on the IUCN Red List of Threatened Species as Least Concern (LC). | Negligible | Negligible | Minor | Moderate |
| Medium | Species included on the IUCN Red List of Threatened Species as Vulnerable (VU), Near Threatened (NT) or Data Deficient (DD). Species protected under national legislation. Nationally restricted range species. Nationally important number of migratory or congregatory species. | Negligible | Minor | Moderate | Major |
| High | Species included on the IUCN Red List of Threatened Species as Critically Endangered (CR) or Endangered (EN). Species having a globally Restricted Range (i.e. plants endemic to a site or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km$^2$. Internationally important numbers of migratory or congregatory species. Key evolutionary species. | Negligible | Moderate | Major | Critical |

**Magnitude of Effect Definition**

| | |
|---|---|
| **Negligible** | Effect is within the normal range of variation for the population of the species. |
| **Small** | Affects a small proportion of a population, but does not substantially affect other species dependent on it, or the populations of the species itself |
| **Medium** | Affects a sufficient proportion of a species population that it may bring about a substantial change in abundance and/or reduction in distribution over one or more generations, but does not threaten the long-term viability of that population or any population dependent on it. |
| **Large** | Affects an entire population or species at sufficient scale to cause a substantial decline in abundance and/or change in distribution beyond with natural recruitment (reproduction, immigration from unaffected areas) may not return that population or species, or any population or species dependent upon it, to its former level within several generations, or when there is no possibility of recovery. |

## 11.3 Existing Mitigation Measures

Impacts to biodiversity can be mitigated right from the planning stage so that Project design effectively embeds impact avoidance and mitigation measures. The alternatives of Project components and the rationale why the curent layout/model was chosen were not provided in details. However, some information about the Project components' design and layout described in Section 2.1.4, Section 2.1.5 and Section 2.1.6 are relevant to mitigating impacts on biodiversity. These are detailed below:

- The criteria for selecting wind turbine for the Project include "having smallest footprint area" and "limiting impacts from noise and vibration". It is assumed that the chosen wind turbine model meets the described criteria above. An optimized footprint and reduced noise and vibration profile would contribute to reducing the effects of habitat loss and disturbance to fauna due to noise and vibration from the Project.

- The 22kV transmission line design has been selected to be underground, which helps to eliminate electrocution risks to birds.
- The locations of the 22/220 kV substation and 220kV tranmission line have been selected to mainly overlap plantations, which are considered modified habitats. This contributes to a reduction in the loss of natural habitats due to the Project.

The regulatory EPP and Safe and Civilized Construction Plan have been developed by the Project owner to set out mitigation measures for potential impacts to biodiversity during construction (see Table 11.4). These mitigation measures are assumed to be continued during operation where relevant.

**Table 11.4 Existing Biodiversity Mitigation Measures**

| Impacts | Existing mitigation measures |
|---|---|
| Habitat loss | ■ Land clerance should only take place within the boundary consented by governmental authorities. Permanent land acquisition should only occur for development of turbine foundations and substations<br>■ Develop a sanction plan and have a supervisor/inspector during the construction work<br>■ After completion of construction, ensure the restoration of the landscape at temporary used areas, and<br>■ Utilize existing roads as much as possible. |
| Disturbance and Displacement of Terrestrial Species | ■ Any Project-related traffic passing through the national roads, provincial roads and trails shall abide by regulations of National Technical Standard *TCVN 5949-1998*. The speed and transportation time (only after 20:00) shall be in accordance with the regulated limitation<br>■ All motor vehicles, heavy trucks, and construction equipment used in the Project must be checked regularly for noise and vibration, and<br>■ Avoid construction works from 22:00 to 6:00 the next day. |
| Barrier Creation, Fragmentation and Edge effects | There are no mitigation measures in this document. Further mitigation measures is suggested in the additional mitigation measure |
| Degradation of habitats | **Dust**<br>■ All transportation vehicles, machinery and equipment used for construction activities shall be certified by the Vietnam Registry Department. Avoid using old vehicles or equipment which do not meet present emission requirements<br>■ National Regulation *TCVN 6438 – 2001* shall be applied to evaluate the concentration of some air pollutants such as CO and hydrocarbons emitted by the transportation vehicles and construction equipment. All equipment shall be granted with the Emission Certification issued by the National Certification Authority of Vietnam in accordance to the *Decision No. 35/2005/QD-BGTVT*<br>■ Construction vehicles should be washed before leaving the construction site to minimise dust being produced in the outside roads and nearby residential areas<br>■ Enhancing water sprinkling as transportation, excavation, levelling, and compaction during drying season (2 times per day). Avoid overloaded transportation and travelling at night and peak hour<br>■ A canvas should be used to cover the truck compartment while travelling to avoid construction material (sand, stone, cement, and brick) spillage to the roads |

| Impacts | Existing mitigation measures |
|---|---|
| | ■ Machine and equipment should be stored in a covered storage to avoid flying dust caused by strong wind during the construction phase<br>■ Incineration of waste or construction materials (plastic bags) inside the construction site is prohibited, and<br>■ Substation location shall be fenced and isolated from the surrounding areas to avoid dust and debris released to the environment.<br>**Waste**<br>■ Construction waste shall be stored at a temporarily designated area to avoid being waterlogged and polluting to the surrounding environment<br>■ Construction waste materials shall be collected, classified and transported for proper treatment by licensed agency in accordance to Article 5, 6, and 7 of *Circular No. 08/2017/TT-BXD* on Construction Solid Waste Management dated 16 May 2017 by the Ministry of Construction<br>■ Reuse and recycle construction materials such as plank or timber pillar to compact or strengthen the low terrain, and<br>■ Spoil materials such as soil, stone, brick, etc. shall be properly managed by the Project's owner and contractor to avoid spill over onto agricultural land of local people; otherwise the Project's owner shall be responsible for compensation and support local people for remediation.<br>***Domestic Waste***<br>■ A small amount of domestic waste generated from the location of wind turbine foundation will be collected and buried sanitarily in-situ<br>■ Domestic waste generated from substation's location shall be collected and stored in 120-litter dustbin with lid, then transported by licensed agency for proper treatment<br>■ A waste management plan (inventory, dustbin, and cleaning schedule) shall be prepared by the subcontractor during the pre-construction stage<br>■ Provide trainings and drills on sanitation, security, and environmental protection regulations for workers and personnel working at site<br>■ Littering is prohibited while working on site, and<br>■ Reduce, reuse, and recycle of spoil materials for ground levelling.<br>***Hazardous waste:***<br>■ Hazardous waste materials such as oily rags, welding rods, and paint shall be collected, stored properly in bins with lids at temporarily designated areas before being transported by licensed agency for proper treatment, and<br>■ Regular inspection and maintenance of material and equipment vehicles travelling to the site to avoid leakage of oil and fuel to the environment.<br>**Wastewater**<br>■ Arrange all working staff at the construction site to stay in rented local houses and utilise toilets in place.<br>■ Contractors working for the Project shall equip 5 – 10 portable toilets enclosed with 3-conpartment septic tanks[60] (V=20m$^3$) and domestic bins serving the worker's demand at the Project's locations including clearing, levelling, and backfilling areas |

[60] Environmental Protection Plan (EPP) provided by the Project's owner

| Impacts | Existing mitigation measures |
|---|---|
| | ■ Utilise water efficiently for construction activities to avoid unnecessary loss of containment to the environment<br>■ Equipment shall be stored in indoor areas to avoid leakage of oil and lubricant to the environment<br>■ The repairing and maintenance of transportation vehicles shall be conducted at the garage in order to not release oil and grease and wastewater from car washing to the surrounding environment<br>■ Drainage systems are to be constructed in the construction areas. Run-off water (mainly rain water) will be collected by internal drainage system and then released into the environment by the inclination of the terrain. Regularly check and clean the drainage system to avoid blockage of soil, debris, and spoil, and<br>■ Main construction activities should be conducted during dry season to avoid contaminated run-off water into the environment in rainy season. |
| Invasive species | There are no mitigation measures in this document. Further mitigation measures is suggested in the additional mitigation measure |
| Mortality Impacts – Birds | |
| Mortality Impacts – Bats | |
| Mortality Impacts – Other fauna | |

## 11.4 Impact Assessment

This impact assessment is written on the basis that no land clearance/development has taken place. However, at the time of writing this impact assessment (as well as during biodiversity baseline collection), land clearance and construction of some Project components have started; which status is described in Table 11.5 below. It is expected that the mitigation measures recommended in this section will also be applied where possible for components that have already started construction.

**Table 11.5 Updated Development Status of Project Components**

| No. | Project's components | Current Status | Expected Completion Date |
|---|---|---|---|
| 1. | Turbine Area | Completed 8 foundations (out of 73 turbines) | ■ For foundation construction: February 2020 (excluding Cune 2)<br>■ For turbines installation: March 2022 |
| 2. | 22/220 kV Substation | Completed field levelling and part of the foundation | October 2021 |
| 3. | Access Roads | Completed the field levelling for access roads | October 2021 |
| 4. | Laydown Area | Completed the field levelling | October 2021 |
| 5. | Operational House | Not started | October 2021 |
| 6. | Worker Camp | | October 2021 |
| 7. | Internal Road | | December 2021 |
| 8. | 22kV Transformer | | April 2022 |

| No. | Project's components | Current Status | Expected Completion Date |
|---|---|---|---|
| 9. | 22kV Transmission Line | | April 2022 |

## 11.4.1 Loss of Terrestrial Habitat

### 11.4.1.1 Significance of Impacts

#### *11.4.1.1.1 Habitats*

Based on the outcomes of the geospatial assessment undertaken to define natural/modified habitat, the Project area totals 5,263.28 ha, wholly characterized by modified habitats (see Table 8.13).

The fixed-term and temporary land requirements of each Project component is provided in Table 11.6. The resulting habitat loss is only associated with modified habitats, including mostly agricultural land (see Figure 8.20 and Figure 8.21). The sensitivity of the modified habitats is regarded as low.

The total amount of land acquired by the Project (both fixed-term and temporarily used land) covers 119.71 ha. This is a relatively small extent in comparison to the area of plantations/agricultural land (mostly coffee plantations) available within the Project boundary (4,715.47 ha / 2.5%) (See Table 8.13). In addition, the mitigation measures that the Project owner plans to apply, as outlined in the regulatory EPP and Safe and Civilized Construction Plan, is considered effective to reduce the amount of land clearance. The magnitude of impact of habitat loss is considered to be small.

**Table 11.6 Land Disturbance Footprint of Each Project Component**

| No. | Items | Land area (ha) |
|---|---|---|
| 1 | **Fixed-term used land** | **119.0927** |
| 1.1 | Turbine foundations and security fence | 6.57 |
| 1.2 | Traffic roads (Upgrading inter-village roads and building new internal roads) | 45.5 |
| 1.3 | 22/220 kV substation | 4.6 |
| 1.4 | 220 kV transmission line | 0.0227 |
| 1.5 | 22 kV transmission line | 62.4 |
| 2 | **Temporarily-used land** | **161.55** |
| 2.1 | Traffic roads | 63 |
| 2.2 | Laydown area | 15.33 |
| 2.3 | 220 kV overhead transmission line | 0.02 |
| 2.4 | 22 kV underground and overhead transmission line[61] | 83.2 |

Table 11.7 summarizes the results of impact assessment (grey-shaded cells) of terrestrial habitat loss on habitat receptors.

[61] Most of the 22kV Transmission Line are laying along with the internal road system area which are within the land acquisition process.

**Table 11.7 Loss of Terrestrial Habitats (on habitat receptors)**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | | Positive | | Neutral |
| **Impact Type** | **Direct** | | Indirect | | Induced |
| **Impact Duration** | Temporary | **Short-term** | **Long-term** | | Permanent |
| **Impact Extent** | **Local** | | Regional | | International |
| **Frequency** | The impact is continuous within its duration | | | | |
| **Impact Magnitude** | Positive | Negligible | **Small** | Medium | Large |
| **Receptor Sensitivity** | **Low** | | Medium | | High |
| **Impact Significance** | **Negligible** | Minor | Moderate | | Major |

### *11.4.1.1.2 Species as Receptor*

Fauna and flora experience loss of habitats in two forms: direct loss due to Project components' clearance footprint and indirect habitat loss due to displacement from e.g. noise or visual disturbance. Species of conservation concern found during field surveys are listed in Table 11.8. Apart from these species, some potential endangered species could occur in the Project, such as Yellow-breasted Bunting; however, their presence was not confirmed during field surveys, (see Table 8.17).

**Table 11.8 Species of Conservation Concern Found in Field Surveys**

| No. | Scientific name | Common Name | IUCN | VRDB |
|---|---|---|---|---|
| **Flora** | | | | |
| 1 | *Dalbergia oliveri* | Cẩm lai / Tamalan | EN | EN |
| 2 | *Dipterocarpus intricatus* | Dầu lông | EN | NL |
| 3 | *Rauvolfia cambodiana* | Ba gạc cam bốt | NL | VU |
| **Non-volant (non-flying) mammals** | | | | |
| 4 | *Lutrogale perspicillata* | Smooth-coated otter | VU | EN |
| **Herpetofauna** | | | | |
| 5 | *Gekko Gecko* | Tokay gecko | NL | VU |
| 6 | *Coelognathus radiatus* | Radiated ratsnakes | LC | VU |
| 7 | *Ptyas korros* | Indo-Chinese rat snake | NL | EN |
| 8 | *Ophiophagus hannah* | King cobra | VU | CR |
| **Birds** | | | | |
| 9 | *Psittacula alexandri* | Red-breasted parakeet | NT | NL |
| 10 | *P. finschii* | Grey-headed parakeet | NT | NL |

The type of habitat loss that flora species will likely experience is direct loss. The locations of recorded endangered flora species are shown in Figure 8.6. However, since the surveys did not cover the whole

Project footprint, there is uncertainty regarding the occurrence of any indiviudals of these species elsewhere within the Project footprint.

Fauna can experience both direct and indirect habitat loss. The land classification map (see Figure 8.20 and Figure 8.21) presents the habitats where species of conservation concern identified during the field surveys occur. Species identified during the field surveys can occur in surface water (accounting for 1.89% of the Project area) and plantations/agricultural land (89.59% of Project area); with the Smooth-coated otter more dependent on surface water habitats. The Project footprint mostly covers plantations/ agricultural land, and does not transverse any surface water. However, it is also uncertain if any nests/dens of these species of conservation concern occur within the Project footprint. As no targeted surveys for the species have been carried out during the baseline, it is conservatively assumed that this otter species is present in wetland habitats within the Project area for the purposes of this impact assessment. Importantly, no wetland or riparian habitats will be directly affected by the construction or operation of the Project. The nearest turbine to any wetland is 250 m away and the majority are much further. This therefore reduce the potential for impacts on otter holts and primary foraging habitats. The loss of dry land plantation is highly unlikely to affect this species given it is sub-optimal foraging habitat compared to natural, dry land habitats that are inherently richer in biodiversity.

Different from direct loss, indirect loss is harder to quantify as it is not restricted within the clerance footprint and is species-specific. Little has been studied on the distance of which fauna is displaced during the construction phase of wind turbines. The displacement of fauna during construction is considered to be mostly associated to noise (for birds and non-volant mammals) and vibrations (herpetofauna). Kwon et al. (2018) modelled the level of noise emitted from different construction machines at different distances in urban areas, based on reference noise level at 15m taken from various international standards. They predicted that at 216m, most noise levels from various construction machines have been attenuated to below 56 dBA, except for drilling machine (62.34 dBA) and pile driver (64,90 dBA). According to the noise baseline (refer to Section 7.6.3), the background noise within the Project area ranges from 33.3 to 70.5 dBA, with most daytime noise is under 55 dBA. There is potential for fauna species to be impacted by noise emissions within 250 m from the construction site; beyond 250m, noise level from construction is expected to have attenuated to or below background noise level.

In terms of otters, Good industry practice (NIEA n.d.) indicates that the implementation of a buzzer zone of 30 m between construction works and otter holts is sufficient to protect the species from disturbance. This buffer area should be increased to 150 m for breeding holts – assuming holts may be present at the wetlands within the Project area – which is still outside the nearest turbine footprint (250 m). As no Project construction works are proposed within 250 m of wetland habitat, this would avoid potentially significant impacts on any otter dens should they be present. A monitoring survey prior to construction of any turbines within 250 m of any wetlands will be carried out as part of the ESAP to verify this conclusion.

During operation, fauna may also avoid the vicinity of Project components, which would result in indirect habitat loss. Studies have found that non-volant fauna do not show significant avoidance behaviours to wind farms (Agha et al. 2015; Łopucki, Klich & Gielarek 2017; Łopucki & Mróz 2016; Thaker, Amod & Harshal 2018), while this behaviour were proved in some specific avian species (Barré et al. 2018a; Bayne, Habib & Boutin 2008; Marques et al. 2020; Masden et al. 2009a; Thaker, Amod & Harshal 2018). The effects of displacement could be up to 650m for passerine birds (Bayne, Habib & Boutin 2008) and 1000m for bats (Barré et al. 2018b).

The receptor sensitivity is High as impacted species include one nationally CR species (king cobra) and two globally EN flora species (*D. oliveri* and *D. intricatus*), and two nationally EN animals (smooth-coated otter and Indo-Chinese rat snake).

A very small portion of these species' populations might be displaced from their habitats. However, considering that (i) most of the recorded species in the field survey are tolerant to modification, (ii) the habitats that can support these species still remain prevalent; (iii) bird and bat species that are more affected by indirect habitat loss can easily migrate to those remaining habitats and (iv) species might show adaptation to the wind farms and reduce avoidance behavior (Madsen & Boertmann 2008), the effects of habitat loss is considered to be Small.

The overall significance of impact is Moderate.

**Table 11.9 Loss of Terrestrial Habitat (on species receptors)**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | | |
| **Impact Type** | **Direct** | Indirect | Induced | | |
| **Impact Duration** | Temporary | **Short-term** | **Long-term** | Permanent | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Frequency** | The impact is continuous within its duration. | | | | |
| **Impact Magnitude** | Positive | Negligible | **Small** | Medium | Large |
| **Receptor Sensitivity** | Low | Medium | **High** | | |
| **Impact Significance** | Negligible | Minor | **Moderate** | Major | |

### 11.4.1.2 Additional Mitigation Measures

Additional mitigation measures are proposed during construction as follows:

- Conduct additional field survey to confirm the presence of Smooth-coated Otter within the project area as the evidence of this species being present came through an interview with only one person stating having observed 4 individuals of this species.
- A *Wildlife Shepherding Protocol* is to be used within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, fauna are to be relocated to their point of origin or similar natural adjacent areas;
- Use of appropriate noise suppression techniques (such as silencer, noise barrier) where applicable to limit the extent of indirect habitat loss.

### 11.4.1.3 Monitoring and Audit

The following monitoring measures and recommended for habitats and the habitats of species of conservation significance:

- Regular (weekly) inspections during construction are to occur along all Project boundaries and Project footprint to ensure compliance with clearing within marked boundaries/zones;
- Records of inspections and violation cases are to be kept and available when required; and
- During operation phase, monitoring of rehabilitation success/failure is to occur on all replanting sites. Monitoring frequency should be quarterly (biosis 2018). Where plant rehabilitation is determined to have failed, re-establishment is to occur with corrective measures after review of reasons of failure. Indicators for vegetation re-establishment should be at least 75% successful coverage.

### 11.4.1.4 Significance of Residual Impacts

The residual impacts from loss of terrestrial habiats are likely to be Minor to Negligible.

### 11.4.2 Disturbance to Terrestrial Species

The disturbance and displacement of terrestrial fauna species will primarily be caused by noise, light, presence of human and construction machines during construction. The construction phase is expected to last 18 months as according the to EPP (scheduled from July 2020 to September 2021).

During operation, disturbance is mainly from low-frequency noise emitted from wind turbine generators and affects the vocalization of species (Berger-Tal *et al*. 2019).

#### 11.4.2.1 Significance of Impacts

##### *11.4.2.1.1 Birds*

According to the field surveys conducted in the Project area, avifauna species consist of mostly IUCN LC species, except for the Red-breasted Parakeet (IUCN NT; VRDB NL) and Grey-headed Parakeet (IUCN NT; VRDB NL). The receptor sensitivity is therefore conservatively assessed as Medium.

It is known from the literature that auditory hair cells of bird can be regenerated after acoustic trauma (Janas, Cotanche & Rubel 1996; Köppl 2011) and physical damages to birds occur at a relatively high noise level (more than 140 dbA for a single blast, 125 dbA for multiple blasts and more than 110 dbA for a continuous [more than 72 hours] noise during construction) (Dooling & Popper 2007). The study of Kwon et al. (2018) showed that at 15 meters, noise level of different machines ranged from 60 to 71 dbA. Therefore, to experience acoustic trauma, the birds would be required to occur very close to the noise source. This is very unlikely, as presence of human and construction machines are likely to have displaced bird outside of the construction zone already before construction starts. The magnitude of impact is negligible.

Therefore, the significance impact of disturbance during construction on birds are considered to be negligible.

##### *11.4.2.1.2 Bats*

The field surveys found seven bat species, all IUCN LC and VRDB NE. Bats are quite low in abundance within the Project area. The receptor sensitivity is low as only LC species are affected.

Nigh-time construction activites of the Project may have negative effects on bats. Literature indicates that the foraging success of bats may be reduced in a noisy environment and bats may abandon noisy areas (Bunkley et al. 2014; Luo, Siemers & Koselj 2015). The effects of auditory damage on bats are poorly-studied due to noise. In terms of light disturbance, a study showed that bats were shown to avoid up to 50m of streetlights (Azam et al. 2018).

It is not clear what construction activities will take place at night; however, it is likely to not involve heavy machinery work that emits loud noise that will disturb nearby human communities. Considering that the noise and light disturbance is likely to be within a small area restricted to (e.g. 250 m) around the construction works. Furthermore the plantations dominated by coffee and cashew are not suitable for bats foraging, so the indirect habitat loss derived from displacement is considered to be small (see section 11.4.1.1.2); the magnitude of effect is considered to be small.

Therefore, the significance impact of disturbance during construction on bats are considered to be negligible.

##### *11.4.2.1.3 Non-volant Mammals*

The non-volant mammals found during the field surveys included the nationally EN Smooth-coated Otter. The receptor sensitivity is therefore considered high. Limited studies have been conducted on hearing damage caused by construction activities on freshwater otters. However, this species may be disturbed from its dens due to vibration, for example during construction works. The location where otters have been identified during the field surveys is far from the construction area for any turbines (about 250m from the nearest Project component - turbine A14, see Figure 8.15). In addition, wild mammals are sensitive to human presence and are likely to avoid the construction area. Therefore, the displacement impacts from noise and light are considered to be negligible.

Overall, the significance impact of disturbance during construction on otters are considered to be negligible.

#### *11.4.2.1.4 Reptiles*

Unlike other taxon, reptiles generally move slower and it was shown that they might ‘freeze’ as a species-specific response to threats including noise (Mancera et al. 2017), which increases its exposure time to noise emissions and therefore makes them more vulnerable to auditory damage. This assumes a conservative response, however, and it is more likely reptiles will move away from sources of noise. Furthermore some reptiles (i.e. snakes) only sense vibration. As vibration effects are generally localized within the immediate surroundings of the construction site (10 to 14m from the source) (Chen et al. 2019), it is unlikely that reptiles will experience significant impacts from vibration.

The reptilian diversity within the Project area includes four species of conservation significance – the Tokay Gecko (IUCN NL; VRDB VU), Radiated Ratsnake (IUCN LC; VRDB VU), Indo-Chinese Rat Snake (IUCN NL; VRDB EN) and King Cobra (IUCN VU; VRDB CR). The receptor sensitivity is therefore considered high. A small portion of individuals (particularly, those near the construction site) might be affected, but it is unlikely to threaten the long-term viability of these species’ populations nationally or regionally. The magnitude of impact is considered to be Moderate, reflecting the high sensitivity of these species.

**Table 11.10 IA of Noise Disturbance on Terrestrial Species during Construction**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | | |
| **Impact Type** | **Direct** | Indirect | Induced | | |
| **Impact Duration** | Temporary | **Short-term** | Long-term | Permanent | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Frequency** | The impact is impulsive and quite frequent within is duration | | | | |
| **Impact Magnitude** | Positive | **Negligible** | **Small** | Medium | Large |
| | Negligible for Birds and Non-volant mammals. Small for Bats and Reptiles | | | | |
| **Receptor Sensitivity** | **Low** | **Medium** | **High** | | |
| | Low for Bats, Medium for Birds and High for Non-volant mammals and Reptiles. | | | | |
| **Impact Significance** | **Negligible** | Minor | **Moderate** | Major | |
| | Negligible for Birds, Non-volant mammals and Bats. Moderate for Reptiles. | | | | |

### 11.4.2.2 Additional Mitigation Measures

Additional mitigation measures are recommended during construction phase:

- Conduct additional field survey to confirm the presence of Smooth-coated Otter within the project area as the evidence of this species being present came through an interview with only one person stating having observed 4 individuals of this species.
- A *Wildlife Shepherding Protocol* is to be used within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, fauna are to be relocated to their point of origin or similar natural adjacent areas;

- *Injured Wildlife Management Protocol* is to be applied when injured individuals are found during daily inspection;
- Fencing is to be placed around major project sites during construction to restrict access to local fauna, and therefore stopping wildlife becoming trapped or harmed by works;
- Use of appropriate noise suppression techniques (such as silencer, noise barrier) where applicable;
- Regularly maintain machinery;
- Use cowl, hood and shield to minimize light spill.

#### 11.4.2.3 Monitoring and Audit

- Conduct supervision on the implementation of mitigation measures for fauna disturbances daily during construction phase;
- Records of daily inspections, violation cases, records of construction schedule in which how many machines work at a same time, records of vehicle maintenance should be kept are to be kept and available when required.

#### 11.4.2.4 Significance of Residual Impact

With the application of mitigation measures, the significance of all impacts of disturbance and displacement are likely to be Negligible. No further mitigation is required.

### 11.4.3 Barrier Creation, Fragmentation and Edge Effect Impacts

#### 11.4.3.1 Significance of Impacts

##### *11.4.3.1.1 Barrier Creations*

Animals, mostly birds, spend extra energy to detour around the wind turbines (in case they do not completely avoid the wind farms), and the costs may become large as they cumulate through time. This may lead to reduction in reproduction success as animals require heavy investment of energy reserves during breeding; however the effects of cumulative energy loss to go around barriers are still remain poorly-understood (Masden et al. 2009b). It can be safe to assume that animals can adapt to changing their daily commute pathways, and can eat more when food is abundant to compensate for the cumulative energy loss. The negative effects are considered to be negligible.

For migratory populations, the extra energy to avoid the Project's components (e.g. turbines) is considered to be trivial. Although the effects of incurred energy costs to detour around the turbines are poorly-understood, such cost is considered negligible in comparisons to those required for flying in unfavourable wind and weathers (Masden et al. 2009a) that are more frequently encountered during the migratory trips. The effects could be larger in terms of multiple different windfarms sitting in an specific area (see Section 14.5.2).

The receptor sensitivity is Medium in lieu of the NT birds recorded in field survey.

##### *11.4.3.1.2 Fragmentation*

The landscape has already been significantly fragmented by large existing roads/built-up land, and there are no watercourses within the Project area. The development of additional internal access roads (which are generally shorter in lengths) adds negligible impacts to the existing level of fragmentation within the Project area. Non-flying species are unlikely to be fragmented by roads of this size, while birds and bats can easily cross these. The receptor sensitivity is considered as High due to the presence of EN species e.g. Smooth-coated Otter.

##### *11.4.3.1.3 Edge Effects*

There are no natural habitats located in the Project footprint (in other words, the Project components do not lead to clearance of the outermost of any natural habitats). The habitat receptor sensitivity is low. Edge effects are unlikely to occur.

**Table 11.11 Barrier Creation, Fragmentation and Edge Effect Impacts**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | | |
| **Impact Type** | **Direct** | **Indirect** | Induced | | |
| **Impact Duration** | Temporary | Short-term | **Long-term** | Permanent | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Frequency** | The impact is continuous within its duration. | | | | |
| **Impact Magnitude** | Positive | **Negligible** | Small | Medium | Large |
| **Receptor Sensitivity** | **Low** | **Medium** | **High** | | |
| | Low for Edge Effects, Medium for Bariers effects and High for Fragmentation effects | | | | |
| **Impact Significance** | **Negligible** | Minor | Moderate | Major | |

#### 11.4.3.2 Additional Mitigation Measures

- No additional mitigation measures are proposed.

#### 11.4.3.3 Monitoring and Audit

No additional monitoring and audit programs are proposed.

#### 11.4.3.4 Significance of Residual Impact

The significance of impacts are likely to be Negligible.

### 11.4.4 Degradation of Habitat Impacts

#### 11.4.4.1 Potential Impacts and Consequences

A range of Project activities have the potential to lead to degradation of flora and fauna habitats including excavation, construction, land clearing, movement of vehicles, drilling, refuelling, hazardous materials storage and maintenance, through the generation of dust, runoff; as well as release of potential contaminants; and introduction or spread of invasive species. Such aspects of Construction activities including: erection of transmission towers, erection of wind turbines and installation of cables/wires and installation of associated infrastructure (such as the substation and laydown area) have been assessed below.

#### 11.4.4.2 Dust

##### *11.4.4.2.1 Significance of Impacts*

During construction on land, the movement of vehicles as well as clearing and excavation activities have the potential to generate dust which may settle on vegetation adjacent to the construction area. Excessive dust deposition on flora may act to suppress growth through limiting photosynthesis and the dusty foliage may also become unpalatable to herbivores. Project construction activities will be temporary and dust generation is likely to be localised to active work areas.

However, rainfall and wind will generally remove dust from foliage; furthermore existing mitigation measures that Project owner has committed to will likely to have significantly reduced dust emissions.

The impacts from dust are therefore considered to be negligible. The receptor sensitivity is low as only modified habitats are affected.

**Table 11.12 IA of Degradation of Habitats Caused by Dust**

| | | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent | |
| Impact Extent | **Local** | Regional | International | | |
| Frequency | The impact is very frequent within its duration. | | | | |
| Impact Magnitude | Positive | **Negligible** | Small | Medium | Large |
| Receptor Sensitivity | **Low** | Medium | High | | |
| Impact Significance | **Negligible** | Minor | Moderate | Major | |

### *11.4.4.2.2 Additional Mitigation Measures*

Additional mitigation measures have been suggested in the Air Quality Impact Assessment (see Section 10.1.4.2). Apart from those, no further mitigation measures are proposed.

### *11.4.4.2.3 Monitoring and Audit*

Monitoring and audit programs are as proposed in the Air Quality Impact Assessment (see Section 10.1.4.4). Apart from those, no further monitoring programs are proposed.

## 11.4.4.3 Waste and Wastewater

### *11.4.4.3.1 Significance of Impacts*

Accidental release or spill of these wastes and wastewater can be toxic to flora and fauna locally if substances are released into the aquatic environment. Runoff from construction sites has potential to carry contaminants a substantial distance downstream. Construction activities such as refuelling, storage and other activities that involve oil and hazardous substances have the potential to result in accidental releases.

However, with the existing mitigation measures that the Project owner commits to do for waste and wastewater, the potential threats of habitat degradation are unlikely to happen. These implementations will also maintain existing water quality within the wetlands, meaning no significant impact is predicted on aquatic foraging habitats used by Smooth-coated Otters. The impact is considered to be negligible with the application of existing mitigation measures. The receptor sensitivity is low as only modified habitats are affected.

**Table 11.13 IA of Waste and Wastewater Management**

| | | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | **Positive** | **Neutral** | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | **Long-term** | Permanent |
| | The impact exists in construction phase and continuous into operation phase | | | |
| Impact Extent | **Local** | Regional | International | |

| | | | | | |
|---|---|---|---|---|---|
| **Frequency** | Impact is continuous within its duration. | | | | |
| **Impact Magnitude** | Positive | **Negligible** | Small | Medium | Large |
| **Receptor Sensitivity** | **Low** | Medium | High | | |
| **Impact Significance** | **Negligible** | Minor | Moderate | Major | |

### *11.4.4.3.2 Additional Mitigation Measures*

Additional mitigation measures have been suggested in the Water Resources Impact Assessment (see Section 10.3.4.1.4 ). Apart from those, no further mitigation measures are proposed.

### *11.4.4.3.3 Monitoring and Audit*

Monitoring and audit programs are as proposed in the Air Quality Impact Assessment (see see Section 10.3.4.1.6). Apart from those, no further monitoring programs are proposed.

## 11.4.5 Invasive Species

### 11.4.5.1 Significance of Impacts

During construction, invasive species have the potential to be introduced or further spread throughout the Project area through increased movement of people, vehicles, machinery, vegetation and soil. An increase in the prevalence of weeds or other pests has the potential to reduce the quality of habitat for some native flora and fauna and affect the success of revegetation.

The field surveys recorded three invasive species within the Project area, including Siam Weed, Black Mimosa and the Billygoat-Weed. Other invasive species that have been recorded in Dak Lak province is listed in Table 8.6. These were commonly found within the Project area during baseline field surveys.

The impacts of invasive species is small as it affects a small area of habitat but without the loss of viability/functions of the habitats. The Project area only consists of modified habitats; therefore the receptor sensitivity is low. Overall the impact significance from invasive species is negligible; however, additional mitigation measures for invasive species are recommended to prevent introduction of new species and spread of existing species, as per required by IFC PS6.

**Table 11.14 IA of Invasive Species Introduction**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | | |
| **Impact Type** | Direct | **Indirect** | Induced | | |
| **Impact Duration** | Temporary | **Short-term** | Long-term | Permanent | |
| | The potentials to spread invasive species mostly exist in construction period, thus is short-term. | | | | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Frequency** | Continuous within its duration | | | | |
| **Impact Magnitude** | Positive | Negligible | **Small** | Medium | Large |
| **Receptor Sensitivity** | **Low** | Medium | High | | |
| **Impact Significance** | **Negligible** | Minor | Moderate | Major | |

#### 11.4.5.2 Additional Mitigation Measures

The following mitigation measures will be applied during construction and continue during operation.

- Existing populations and the introduction of new invasive species are to be managed. These measures are to be outlined in an *Invasive Species Management Plan* and will include measures such as:
  - The provenance of any fill material brought onto the site is to be checked for invasive species contamination.
  - Transportation vehicles should be inspected before entering site and wash down on arrival and departure.
- Temporary-used land will be rehabilitated using native species after construction.

#### 11.4.5.3 Monitoring and Audit

During construction, daily supervision on the implementation of the *Invasive Species Management Plan* should be conducted*.* Records of inspections, violations should be kept and available when required. On a monthly basis, inspections should be done in Project area to identify any new proliferations and eradicate invasive species.

During operation, monthly monitoring should be done in rehabilitated areas to check for presence of invasive species and remove if any.

#### 11.4.5.4 Significance of Residual Impact

With the application of mitigation measures, the significance of impacts are likely to be negligible.

### 11.4.6 Mortality Impacts – Birds

#### 11.4.6.1 Significance of Impacts

**During construction**

How Project activities may lead to direct mortality of fauna species is different between the construction and operation phases. During construction, vehicle or machine strikes, falling debris, cutting down of trees that have juveniles nesting in them, and increased hunting or poaching conducted by workers pose risks to wildlife survival. The effects are considered to be small as species within the proximity of the construction site are likely to be displaced by multiple anthropogenic disturbances before construction starts. However, if active hunting and poaching are not hindered, and if wildlife do not abandon the area before clearance starts, the effects could be more severe than estimated. Further additional mitigation measures are recommended (e.g. *Wildlife Shepherding Protocol)* during construction stage to ensure wildlife deaths are from small to negligible. The receptor sensitivity is Medium in lieu of the NT birds recorded during field surveys.

**During operation**

For avifauna, risks of death are higher during operation phase due to potential collision with Project's facilities, mostly with turbine blades and transmission line. Transmission line risks include both collision with wires and accidental electrocution associated with perching on pylons. Large gliding species, such as raptor and heron species, are more prone to electrocution on transmission lines due to their large body size that can span the distance between two energized or grounded components (e.g. two wires, or between a wire and a non-insulated pole or pole equipment such as conductors).

The risk of collision with turbines varies depending on species present, numbers present, flight behaviour, location of the project in the landscape, local topography and habitat within and surrounding the site. This may include areas of aggregation and congregation, even where these may be kilometres away from the wind farm.

The baseline studies have identified 29 bird species that are prone to mortalities from collisions with turbine blades and electrocution on transmission lines (see Table 8.11). The impacts of mortalities are assessed within their global population backgrounds (see Table 11.15).

From the assessment in Table 11.15, one species, the Germain's Swiftlet (*Aerodramus germani*), was identified as vulnerable to mortality events that may equal an effect on 0.1% of its global population per year (the 0.1% figure is used as a precautionary figure to identify where population level effects may occur). This species is not a species of any conservation concern, and has a very high abundance within the Project area. The exceptionally high abundance within the Project area may be attributed to the swift farming practices in the Project area. Thus the mortality events for this species per year have the potential to reach 0.1% of the global population per year as a conservative estimate, although estimations of its populations are not available.

Although spending a high proportion of time in band 2 (which increases the risk of blade collisions) and having large wing spans, the raptor species recorded in the field surveys (Black-shouldered Kite, Shikra, Black Baza, Rufous-winged Buzzard, Grey-faced Buzzard, and Black Kite) are expected to be low in numbers in the Project area, according to the baseline studies. Mortality events in a year due the Project are therefore unlikely to reach 0.1% of global populations of these species.

Red-breasted Parakeet and the Grey-headed Parakeet species are characterised by flying in flocks, which could make these species more vulnerable to collisions; however, they were not recorded to fly up to band 2 during the field surveys. Likewise, mortalities of other species are unlikely to reach 0.1% of global populations due to not having large wing-spans, small abundances and/or having low/no time flying in band 2.

Although there is limited field survey data available, and avoidance behaviours and rates are species specific, given the limited value of the Project area to avifauna and the fact it comprises only of modified habitats, it is concluded that impacts on birds and their mortality rates will unlikely to be significant at the population levels, except for the Germain's swiftlet. However, this will be confirmed through further additional assessment and, if required, mitigation measures prior to construction and during operations.

**Table 11.15 Assessment of Mortality Potential at Population Levels**

| No | Common name | IUCN | VRDB | Flying in band 2 | Raptor | Large wing-span (≥ 50 cm) | Fly in flock (≥ 10 individuals) | Global populations (min) | 0.1% global populations | Field survey numbers | Total fly time (s) | Percentage of band 2 flying time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Shikra | LC | NL | Yes | Yes | Yes | No | 800,000 | 800 | 4 | 224 | 55% |
| 2 | Black-winged Kite | LC | NL | Yes | Yes | Yes | No | N/A | N/A | 8 | 508 | 64% |
| 3 | Black Baza | LC | NL | Yes | Yes | Yes | No | 10,000 | 10 | 2 | 47 | 32% |
| 4 | Rufous-winged Buzzard | LC | NL | Yes | Yes | Yes | No | 1,000 | 1 | 5 | 540 | 56% |
| 5 | Grey-faced Buzzard | LC | NL | Yes | Yes | Yes | No | N/A | N/A | 16 | 2,150 | 88% |
| 6 | Black Kite | LC | NL | Yes | Yes | Yes | No | 1,000,000 | 1,000 | 2 | 47 | 32% |
| 7 | Edible-nest Swiftlet | LC | NL | Yes | No | No | Yes | N/A | N/A | 2813 | 900,674 | 47% |
| 8 | Large-billed Crow | LC | NL | Yes | No | Yes | No | N/A | N/A | 28 | 250 | 84% |
| 9 | Sooty-headed Bulbul | LC | NL | Yes | No | No | Yes | N/A | N/A | 198 | 150 | 80% |
| 10 | Vinous-breasted Myna | LC | NL | Yes | No | No | Yes | N/A | N/A | 49 | 60 | 67% |
| 11 | Barn Swallow | LC | NL | Yes | No | No | Yes | 290,000,000 | 290,000 | 33 | 2,500 | 24% |
| 12 | Chinese Pond-heron | LC | NL | Yes | No | Yes | No | 25,000 | 25 | 5 | 180 | 67% |
| 13 | White-shouldered Starling | LC | NL | Yes | No | No | Yes | N/A | N/A | 14 | 45 | 67% |
| 14 | Asian Palm-swift | LC | NL | No | No | No | Yes | N/A | N/A | 53 | <200 | N/A |
| 15 | Little Swift | LC | NL | No | No | No | Yes | N/A | N/A | 10 | <200 | N/A |
| 16 | Greater Coucal | LC | NL | No | No | Yes | No | N/A | N/A | 35 | <200 | N/A |
| 17 | Green-billed Malkoha | LC | NL | No | No | Yes | No | N/A | N/A | 18 | <200 | N/A |
| 18 | Little Cormorant | LC | NL | No | No | Yes | Yes | N/A | N/A | 10 | <200 | N/A |
| 19 | Asian Green Bee-eater | LC | NL | No | No | No | Yes | N/A | N/A | 37 | <200 | N/A |

| No | Common name | IUCN | VRDB | Flying in band 2 | Raptor | Large wing-span (≥ 50 cm) | Fly in flock (≥ 10 individuals) | Global populations (min) | 0.1% global populations | Field survey numbers | Total fly time (s) | Percentage of band 2 flying time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Chestnut-headed Bee-eater | LC | NL | No | No | No | Yes | N/A | N/A | 23 | <200 | N/A |
| 21 | Red-breasted Parakeet | NT | NL | No | No | No | Yes | N/A | N/A | 31 | <200 | N/A |
| 22 | Grey-headed Parakeet | NT | NL | No | No | No | Yes | N/A | N/A | 49 | <200 | N/A |
| 23 | Black Bulbul | LC | NL | No | No | No | Yes | N/A | N/A | 38 | <200 | N/A |
| 24 | Red-rumped Swallow | LC | NL | No | No | No | Yes | N/A | N/A | 12 | <200 | N/A |
| 25 | Chestnut-tailed Starling | LC | NL | No | No | No | Yes | N/A | N/A | 4 | <200 | N/A |
| 26 | Eurasian Tree Sparrow | LC | NL | No | No | No | Yes | 190,000,000 | 190,000 | 39 | <200 | N/A |
| 27 | House Sparrow | LC | NL | No | No | No | Yes | 896,000,000 | 896,000 | 70 | <200 | N/A |
| 28 | Plain-backed Sparrow | LC | NL | No | No | No | Yes | N/A | N/A | 13 | <200 | N/A |
| 29 | Scaly-breasted Munia | LC | NL | No | No | No | Yes | N/A | N/A | 80 | <200 | N/A |

As the affected species may include NT bird species (i.e. the Red-breasted Parakeet and Grey-headed Parakeet), the receptor sensitivity is conservatively assessed to be medium. Impacted species may experience substantial changes in abundance and/or reduction in distribution over one or more generations, but does not threaten the long-term viability of that population or any population dependent on it. The magnitude of impact is Medium. The overall impact significance is therefore Moderate. This will be subjective to change according to Collision Risk Modelling and monitoring programme during operation.

**Table 11.16 IA of Blade Collision**

| | | | | |
|---|---|---|---|---|
| **Impact Nature** | **Negative** | Neutral | Positive | |
| **Impact Type** | **Direct** | Indirect | Induced | |
| **Impact Duration** | Temporary | Short-term | **Long-term** | Permanent |
| **Impact Extent** | **Local** | Regional | Global | |
| **Impact Frequency** | The transmission line and turbines will be operational nearly 24 hours a day. | | | |
| **Impact Magnitude** | Negligible | **Small** | Medium | Large |
| **Receptors Sensitivity** | Low | **Medium** | High | |
| **Impact Significance** | Negligible | Minor | **Moderate** | Major |

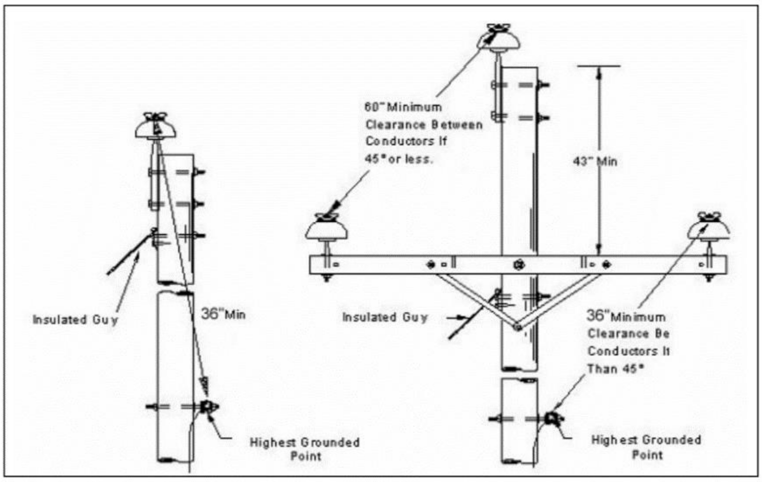
## 11.4.6.2 Additional Mitigation Measures

### *11.4.6.2.1 During Construction Phase*

- A Collision Risk Modelling is recommended to be undertaken to further assess collision risks for species that are vulnerable to collisions and electrocution (e.g. the Germain's swiftlet in this Project)
- A *Wildlife Shepherding Protocol* is to be used within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, fauna are to be relocated to their point of origin or similar natural adjacent areas.
- *Injured Wildlife Management Protocol* is to be applied when injured individuals are found during daily inspection;
- Hunting and poaching will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws;
- The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations.

### 11.4.6.2.2 During Operation Phase:

- Ensure that power towers and transmission lines meet safety standards such as Avian Power Line Interaction Committee (APLIC)[62] to minimise birds and bats electric shock risk:
  - Framing structures so that there is adequate separation between phases or phases and grounds to accommodate large perching birds. Based on the dimensions of eagles, APLIC recommends 132 cm of horizontal separation and 88 cm of vertical separation;
  - Applying covers on phases or grounds where adequate separation is not feasible. Examples of covers include insulator/conductor covers, bushing covers, arrester covers, cutout covers, and jumper wire covers. Cover designs should be evaluated and approved by company engineers prior to use. (Note: bird/animal protection covers are not intended for human protection);
  - Image below illustrates the typical avian safe structures: single phase (left), three-phase with lowered 8-foot crossarm (right). On three phase structures, a vertical clearance of at least 105 cm between un-insulated conductors, ground wires and grounded hardware on poles with 8-foot crossarms will provide the 196 cm required clearance.




- Development of an *Adaptive Bird Management Plan* is also required. The plan should include:
  - Post-construction monitoring (see section Monitoring and audit below) and limits of acceptable of number of mortalities (triggers).
  - Further mitigation measure should be undertaken if exceeding triggers, which may involves:
    - Installation of bird multi-sensor monitoring system and deterrent system;
    - Increase curtailment of wind farms

[62] APLIC offers a variety of training resources and guidance documents that identify causes and minimization methods for bird electrocutions and collisions with power lines. These resources include:
Avian Protection Plan (APP) Guidelines
Suggested Practices for Avian Protection on Power Lines document
Reducing Avian Collisions with Power Lines: State of the Art in 2012
Sage-grouse BMPs: Best Management Practices for Electric Utilities in Sage-grouse Habitat and Click here to view the Press Release

### 11.4.6.3 Monitoring and Audit

#### *11.4.6.3.1 During Construction*

- Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily during construction phase;
- Where fauna is identified during regular inspections, this is to be confiscated (if poached) and photographed for record keeping. Records of injured and/or shepherded wildlife should be kept;
- Records are to be kept and regularly reviewed (quarterly) for implementation of the workforce training program for fauna/flora awareness.

#### *11.4.6.3.2 During Operation*

Monitoring of birds during operation will be required as part of the *Adaptive Bird Management Plan*:

- Conduct carcass monitoring during operations in the vicinity (within 85m radius) of the turbines (Zimmerling et al. 2013) and along the transmission line frequently (monthly) by trained personnel/dogs and bird experts. All carcasses or feather spots (remains of at least 10 feathers indicating a fatality whose carcass has been largely removed by scavengers) will be GPS referenced, photographed and notes taken on the following:
  - Species (this may require investigation of remains or photographs by bat/ ornithological specialist);
  - Sex and age (if known or which  may require specialist input);
  - Date and time collected;
  - Turbine number, distance and compass direction (in degrees) from base;
  - Conditions (intact - fresh and no signs of scavenging; scavenged; feather spot - 10 or more feathers at one location indicating scavenging); and
  - Comments (e.g. any evidence of cause of death; recent weather conditions).
- Carcasses will be bagged and removed, and any not identified to species, age and sex held for examination, by a bird specialist.
- Periodic unannounced calibration checks will be undertaken to assess the finding efficiency (taking into account removal of carcasses by scavengers and observer variation) of observers and their dogs. These will involve the placement of 10 marked carcasses (recent evidence indicates that use of chickens and pheasants can lead to more rapid carcass removal than for raptor carcasses - Phil Whitfield *pers comm.)* and a follow up visit to assess how many were found.  This should be undertaken at least twice during both migration/dry season and non-migration/wet seasons to check for seasonal variation and influences (e.g. changes in crops, ground cover).
- Seasonal bird studies in year 1 and year 2 of operation, including ongoing monitoring to detail the understanding of bird utilization of the Project area. If species with significant conservation status are detected or monitoring indicates that turbines have a high collision risk, additional mitigation measures are to be considered and/or modified in these. Bird studies are highly recommended to be performed twice a year, especially during migration seasons (September – November, February – May).

### 11.4.6.4 Residual Impacts

A collision risk assessment is recommended to further quantify the significance of mortality impact to birds. To date no species of significant conservation concern have been recorded at the site but additional surveys are required to confirm this finding. Post-construction monitoring will be necessary to verify impacts on birds and be supported by an adaptive management plan that can be implemented if mortality exceeds acceptable limits i.e. has population level effects.

## 11.4.7 Mortality Impacts – Bat

### 11.4.7.1 Significance of Impacts

#### *11.4.7.1.1 During Construction*

Threats to bats during construction phase are largely related to incidental death from clearing of vegetation where bats may be roosting. Further additional mitigation measures are recommended during construction stage to ensure wildlife deaths are from small to negligible.

#### *11.4.7.1.2 During Operation*

During operation phase, besides collision with turbine blades, barotrauma (tissue damage provoked by rapid pressure change) occurring when flying close to the blades is another cause for bat mortality. Mortality of bats are influenced by species-, environmental- and structure-related factors (Thaxter et al. 2017).

All bats were observed to fly in band 1 during field surveys; however, it is important to note that bats flying in band 2 were hard to detect during night time. Fatality risk are associated with different bats' foraging preferences, which are described in Table 11.17 (Neil Furey, pers. comm.). Bat fatalities can also be correlated with environmental factors, such as weather, as most of the worldwide studies found that higher mortality rates occur on low-wind nights (Arnett et al. 2013). Lights, colour and heat emissions could lure prey insects close to the turbines, which consequently lead to increased bat presence in the vicinity of the turbines (Rodrigues et al. 2015).

There were seven bat species found in the surveys (all are IUCN LC and VRDB NL species). The receptor sensitivity is therefore considered Low. One species – the Javan Pipistrelle - has a foraging strategy high above the ground (foraging strategy III) which is associated with high collision risk, while the rest adopt strategies considered low to medium risk (see Table 11.18).

There is limited information about the global populations of these species available; therefore the effects that collision resulting from the Project might have at population levels are difficult to assess quantitatively. However, the global population trends of the species are noted to be stable or increasing according to IUCN Red List. The general abundance of bats within the Project area is also considered relatively low, so it is unlikely that mortalities resulting from the Project would have significant impacts in a global context. However, since the surveys were conducted during rainy weather when bats were not very active, abundances of bats in the Project area could be greater than sampled. At this time, the impact magnitude is considered to be small. The overall significance is negligible. However, monitoring is necessary to validate this assessment.

**Table 11.17 Bat Foraging Preferences and Associated Collision Risk**

| Categories | Description | Collision Risk |
|---|---|---|
| I | Insectivorous species that forage in the highly cluttered airspace within the forest interior (or forest interior specialists). | Low |
| II | Insectivorous species that forage in the partially cluttered airspaces such as clearings, streams, or other tunnels within the forest or just above the canopy (edge and gap foragers). | Medium |
| III | Insectivorous species that forage in the unobstructed airspaces found in large clearings or high above the forest canopy (open-space foragers). | High |

| Categories | Description | Collision Risk |
|---|---|---|
| IV | Fruit and nectar-eating bats that fly into the partially cluttered airspaces between tree canopies, roost in small numbers and forage locally. | Low |
| V | Fruit and nectar-eating bats that fly in unobstructed airspaces, roost in large colonies and forage over large areas. | Low |

Source: Neil Furey, pers. comm.

**Table 11.18 Risk Assessment of Bat Recorded in Field Surveys**

| S/N | English name | IUCN | VRDB | Total counts | Foraging behaviour | Collision risk |
|---|---|---|---|---|---|---|
| | Greater short-nosed fruit bat | LC | NL | 6 | Fruit and nectar-eating bats that fly into the partially cluttered airspaces between tree canopies, roost in small numbers and forage locally. | Low |
| | Hill Long-tongued Fruit Bat | LC | NL | 2 | | |
| | Nepalese whiskered myotis | LC | NL | 18 | Insectivorous species that forage in the highly cluttered airspace within vegetation interior. | |
| | Peters's Myotis | LC | NL | 3 | | |
| | Greater Asiatic yellow bat | LC | NL | 8 | Insectivorous species that forage in the partially cluttered airspaces such as clearings, streams, or other “tunnels” within the forest or just above the canopy (edge and gap foragers). | Medium |
| | Lesser Asiatic yellow bat | LC | NL | 3 | | |
| | Javan pipistrelle | LC | NL | 16 | Insectivorous species that forage in the unobstructed airspaces found in large clearings or high above the canopy (open-space foragers). | High |

**Table 11.19 IA of Mortality on Bats**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Type** | **Direct** | Indirect | Induced | | |
| | These impacts are a direct consequence from building the Projects. | | | | |
| **Impact Duration** | Temporary | Short-term | **Long-term** | Permanent | |
| | The direct mortality of bats are on-going throughout the Projects’ operation and construction phase. | | | | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Impact Frequency** | The threat is continous. | | | | |
| **Impact Magnitude** | Positive | Negligible | **Small** | Medium | Large |
| **Receptor Sensitivity** | **Low** | Medium | High | | |
| **Impact Significance** | Negligible | **Minor** | Moderate | Major | |

### 11.4.7.2 Additional Mitigation Measures

#### *11.4.7.2.1 During Construction Phase*

- A *Wildlife Shepherding Protocol* is to be used within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, fauna are to be relocated to their point of origin or similar natural adjacent areas;
- *Injured Wildlife Management Protocol* is to be applied when injured individuals are found during daily inspection;
- Hunting and poaching will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws;
- The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations.

#### *11.4.7.2.2 During Operation Phase*

- Using lights that have low ultraviolet wavelengths (reduce insect congregations around lights that bats forage on);
- Develop an *Adaptive Bat Management Plan* that includes:
  - Post-construction monitoring (see section below) and limits of acceptable of number of mortalities (triggers).
  - Further mitigation measure should be undertaken if reaching triggers:
    - Installation of suitable bat detectors fitted to the turbine or bat deterrent system;
    - Increase cut-in speed for rotors, as evidence suggests bats are more likely to collide with turbines in calmer conditions as low wind conditions provide better foraging and flying conditions than conditions with strong winds.

### 11.4.7.3 Monitoring and Audit

#### *11.4.7.3.1 During Construction*

- Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily during construction phase;
- Where fauna is identified during regular inspections, this is to be confiscated (if poached) and photographed for record keeping. Records of injured and/or shepherded wildlife should be kept;
- Records are to be kept and regularly reviewed (quarterly) for implementation of the workforce training program for fauna/flora awareness.

#### *11.4.7.3.2 During Operation*

- Monitoring of bats during operations will be required as part of the Bat Management Plan:
- Conduct carcass monitoring within 85m radius from the turbines (Zimmerling et al. 2013) during operations on a monthly basis by trained personnel and bat experts (within the first year). All carcasses will be GPS referenced, photographed and notes taken on the following:
  - Species (this may require investigation of remains or photographs by bat/ ornithological specialist);

  - Sex and age (if known or which  may require specialist input);
  - Date and time collected;
  - Turbine number, distance and compass direction (in degrees) from base;
  - Conditions (intact - fresh and no signs of scavenging; scavenged); and
  - Comments (e.g. any evidence of cause of death; recent weather conditions).

- Carcasses will be bagged and removed, and if species or  age and sex are not identified , a bat specialist will be consulted;
- Periodic unannounced calibration checks will be undertaken to assess the finding efficiency (taking into account removal of carcasses by scavengers and observer variation) of observers and their dogs. These will involve the placement of 10 marked carcasses and a follow up visit to assess how many were found.  This should be undertaken at least twice during both migration/dry season and non-migration/wet season to check for seasonal variation and influences (e.g. changes in crops, ground cover).
- Seasonal bat studies in year 1 and year 2 of operation, including ongoing monitoring to detail the understanding of bat utilization of the Project area. If species with significant conservation status are detected or monitored indicates that turbines have a high collision risk, additional mitigation measures are to be considered and/or modified in these. Bat assessment needs to be performed twice a year linked to the dry and wet season during year 1 and year 2 of operation.

## 11.4.8 Mortality Impacts – Other Fauna

### 11.4.8.1 Significance of Impacts

The mortalities of other fauna (including herpetofauna and non-volant mammals) mostly pertain to the construction phase. Threats include increased hunting and poaching risks due to increased numbers of people (e.g. workers) in the Project area and vehicle strikes/run-over. The receptor sensitivity is high based on the presence of endangered Smooth-coated Otter and four other endangered reptiles species (Tokay Gecko, Radiated Ratsnakes, Indo-chinese Rat Snake and King Cobra) in the Project area. The impacts is considered to range from Small to Medium as the populations of these species within the Project area could be low and loss of individuals would affect the viability of local populations.

**Table 11.20 IA of Mortality of Other Fauna**

| | | | | | |
|---|---|---|---|---|---|
| **Impact Nature** | **Negative** | Positive | Neutral | | |
| **Impact Type** | **Direct** | Indirect | Induced | | |
| **Impact Duration** | Temporary | **Short-term** | Long-term | Permanent | |
| **Impact Extent** | **Local** | Regional | International | | |
| **Frequency** | The impact is impulsive and quite frequent within is duration | | | | |
| **Impact Magnitude** | Positive | Negligible | **Small** | **Medium** | Large |
| **Receptor Sensitivity** | Low | Medium | **High** | | |
| **Impact Significance** | Negligible | Minor | **Moderate** | **Major** | |

### 11.4.8.2 Additional Mitigation Measures

- Develop a detailed Traffic Management Plan (TMP) prior to the commencement of construction (see Section 10.9.4.1.4) that should ensure vehicles speed are in compliance with relevant regulations.

- A *Wildlife Shepherding Protocol* is to be used within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, fauna are to be relocated to their point of origin or similar natural adjacent areas;
- *Injured Wildlife Management Protocol* is to be applied when injured individuals are found during daily inspection;
- Hunting and poaching will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws;
- The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations

#### 11.4.8.3 Monitoring and Audit

- Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily during construction phase;
- Where fauna is identified during regular inspections, this is to be confiscated (if poached) and photographed for record keeping. Records of injured and/or shepherded wildlife should be kept;
- Records are to be kept and regularly reviewed (quarterly) for implementation of the workforce training program for fauna/flora awareness.

#### 11.4.8.4 Significance of Residual Impacts

- With the additional mitigation measures, the residual impact is considered to be Negligible.

## 11.5 Next Steps

Based on the findings of these biodiversity impact assessments, the recommended next steps for the Project should involve:

- A Biodiversity Management Plan (BMP) to bring together all the mitigation and monitoring requirements and give details about how they should be carried out;
- As part of the BMP, an adaptive management plan with agreed levels of acceptable change (action triggers) linked to the findings of monitoring and with indications of what actions will be taken when limits are exceeded (e.g. when survey finds that impacts on birds and bats exceed what has been predicted, additional mitigations will be required to further reduce the effects);

# 12. SOCIAL IMPACT ASSESSMENT

## 12.1 Introduction

This chapter presents the assessment of socio-economic impacts resulting from the pre-construction, construction and operation of the Huadian Dak Lak Wind Power Project. The assessments are based on the impact assessment methodology detailed in Chapter 4 and the social baseline data presented in Chapter 9. This chapter aims to:

- Define the scope of the social impact assessment, including the area of influence and receptors considered;
- Identify the potential/existing social impacts associated with the pre-construction, construction, and operation activities of the Project. Issues concerning the perceptions and values of local residents are also put into consideration;
- Present existing controls to the impacts, which the Project Owner has already developed and implemented;
- Propose meaningful and effective mitigation measures and, where possible, enhance Project benefits; and
- Recommend an appropriate monitoring and auditing schedule.

The impacts are evaluated based on the Project-specific considerations, assumptions, and social-economic/cultural data. These parameters are then used to inform the significance of the impact across the Project phase cycle (i.e. pre-construction, construction, and operation). The social impact evaluation by ERM includes the following components:

- Consideration of the interaction of Project activities with the social receptors based on data provided by Project Owner and/or presented in the Feasibility Study (FS) report as well as the regulatory Environmental Protection Plan (EPP) report;
- Identification of the receptors, sensitivity/vulnerability and perceptions (if any) based on social-economic baseline data and consultations;
- Identification of potential impacts and benefits based on the method described above;
- Documentation of existing controls based on data provided by the Project Owner and/or presented in the Project FS and EPP reports;
- Evaluation of impact significance taking into account the vulnerability of the receptor and the magnitude of the impact;
- Development of additional mitigation/management (or enhancement) measures determined by understanding the impact and significance based on best practice; and
- Assessment of residual impact following an assumption that the mitigation and or management measures proposed are implemented effectively. In some cases, further discussion may be required to reassess Project design and/or how monitoring can play a part in the management process.

Each social impact was identified as part of the Project scoping process set out in the scoping methodology. These impacts have been selected based on a robust understanding of the proposed activities in the Project description (set out in the Project FS and EPP reports) and primary and secondary data gathered in the affected villages and by public consultation.

The significance of social and health impacts is then evaluated, taking into account the magnitude of the impact and the vulnerability of the affected receptors. The matrix provided in Chapter 5 is used to assign social, health, and cultural impact significance for both negative and positive impacts. Initially, the significance of the impact has been evaluated for the “general” population. The evaluation has then taken into account whether the identified vulnerable groups will be impacted differently. When this is the case, the impact on these vulnerable groups has been differentially stated in the assessment (i.e. an impact may receive an overall significance rating of moderate, but a high rating when considered in relation to a particular group of vulnerable receptors).

The change brought by the Project has been reflected in the frame of reference of the local setting with stakeholder views on impacts integrated into the evaluation. It is common that the Project affected people may have the perception that an impact is different (either lower or higher) than is actually likely be the case. Perceived impacts have been captured and differentiated to 'actual' impacts; however, they are no less important than actual impacts with respect to addressing community acceptance for the Project. In some cases, failure to adequately assess such impacts and develop supporting mitigation is likely to result in Project delays as in the case of actual impacts.

The assessment of impacts has considered not only the magnitude of impact and vulnerability ratings but also the perceptions or sensitivities of stakeholders as well as any planning and development objectives laid out for the administrative area in which the Project is located. The impact significance has been discussed pre- and post-mitigation implementation, with the residual impact being as low as practicable. If the residual rating is still not acceptable, the impact and Project activities will require further discussion with the Project Owner to agree on a more appropriate design or technology that will result in a lower impact significance.

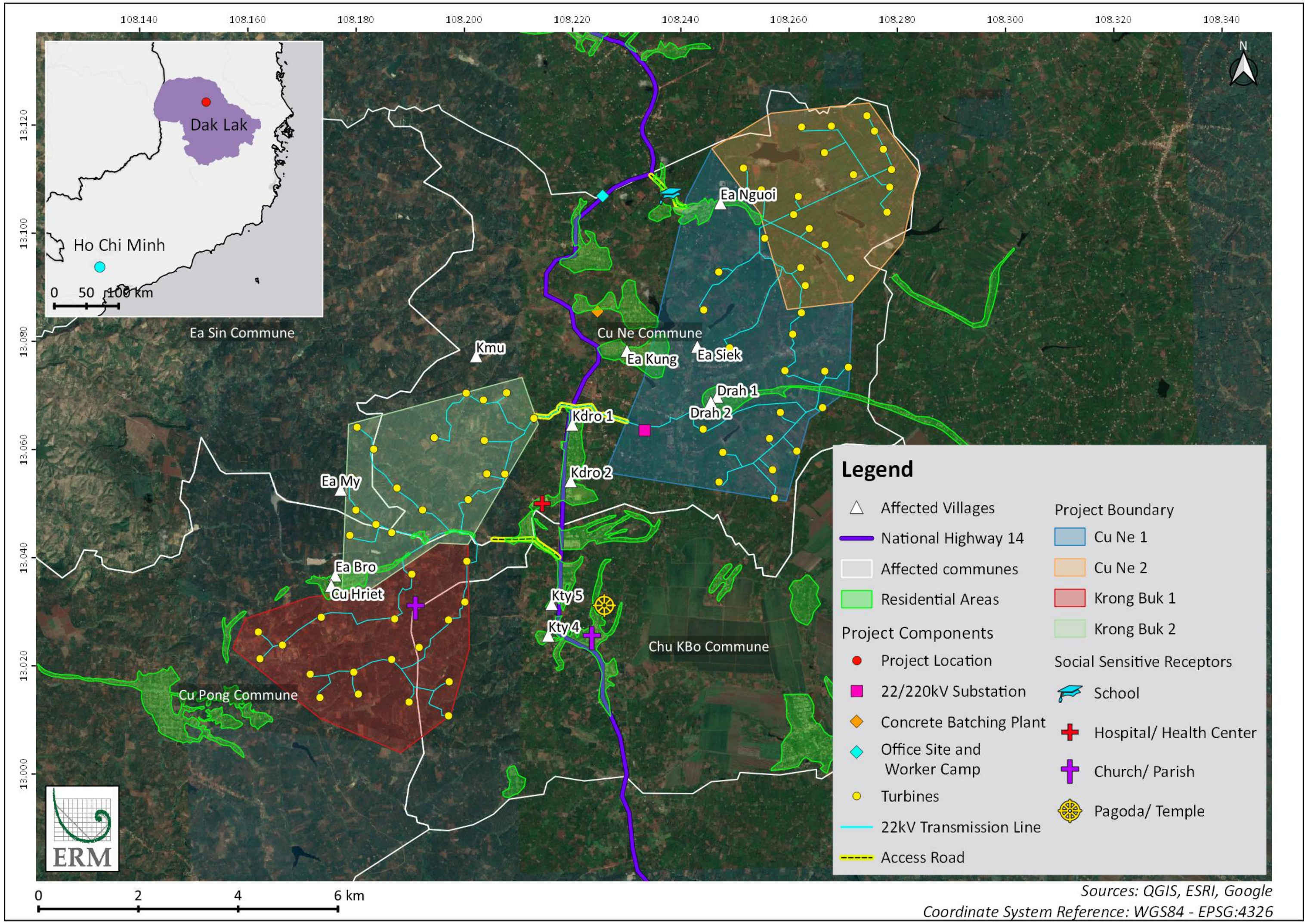
Impacts and benefits have been considered across the Project lifecycle (i.e. pre-construction, construction, and an operation phase of approximately 20 years).

The impacts identified during the social impact assessment will be mitigated and/or managed, aiming to reduce them to acceptable residual levels. Ideally, the Project Owner will adopt the proposed measures and implement them effectively throughout the appropriate Project phase. Often, in reality, however, the measures cannot be implemented as suggested and alternative actions are required; these are to be identified through monitoring. As such, the residual impact in some cases cannot always be determined as an acceptable level.

## 12.2 Scope of Social Impact Assessment

The social receptors are defined as communities currently residing in the Area of Influence (AoI) that the Project may impact as a result of their proximity to the Project site and/or associated facilities. Based on the scoping outcomes from Chapter 5, the Area of Influence for social impacts to the community is defined in Figure 12.1.

Project development activities causing potential impacts to stakeholders who are identified as receptors are summarised in Table 12.1. In each section, the Project's area of influence for a specific resource or receptor is described in the context of the identified impacts.




Source: QGIS, ESRI, Google, August 2021

**Figure 12.1 Area of Influence of Social Impacts**

**Table 12.1 Summary of Impacts, Receptors and Area of Influence**

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| ***Pre-construction Phase*** | | | |
| ■ Land acquisition<br>■ Land preparation (site clearance, excavation and levelling), fencing, and civil works | *Economic displacement and loss of livelihood:*<br>■ Loss of land and access to land owned by local people (i.e. Kinh peoples) and Indigenous peoples (i.e. Ede community)<br>■ Loss or relocation of assets on land<br>■ Change of land use<br>■ Loss of/impact on livelihood associated with loss of land resulting in full or partial loss of income<br>*Physical displacement:*<br>■ According to the current data available to ERM linked to land acquisition, field survey and interviews with affected local authorities and communities, there is no physical displacement due to land acquisition for the Project. Nevertheless, as the land acquisition is not completed, physical displacement cannot be discarded; therefore, this must be confirmed via a Land Acquisition Audit. | ■ Male and female land users who will have their land acquired by the Project;<br>■ Kinh ethnic majority peoples and Ede Indigenous Peoples and other ethnic minority households | ■ Project footprint includes all project components (e.g. turbine foundations, internal and access roads, substations, laydown areas, transmission line including Right Of Way (ROW)), and other facilities.<br>■ Affected villages include:<br>– Cu Hriet and Ea Bro villages of Cu Pong commune;<br>– Ea My village of Ea Sin commune;<br>– Kdro 1, Kdro 2, Drah 1, Drah 2, Ea Kung, Ea Siek, Ea Krom, Kmu, and Ea Nguoi villages of Cu Ne commune; and<br>– Kty 4 and Kty 5 villages of Chu Kbo commune. |
| ***Construction Phase*** | | | |
| ■ Land clearance, lay down area usage during construction of wind turbine pole, and construction for Project components (e.g. wind turbine | *Recruitment and employment of construction workers*<br>■ Impacts to labour and human rights of contracted workers engaged by contractors<br>■ Employment of children or other minors, forced or bonded labour | ■ Project workers | ■ Construction sites<br>■ Worker's accommodation (their houses or hostels, camps)<br>■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| pole, transmission line, substation, access road)<br>■ Higher risk activities include working at height, lifting operations, live electrical work, and use of vehicles/heavy equipment<br>■ Presence of influx and operation of worker's accommodation<br>■ Equipment and material transport and supply<br>■ Construction of turbine foundations, transmission line pylons, internal road, auxiliary works, and turbine installation<br>■ Wastes, emissions, and discharges generation, handling, and disposal<br>■ Operation of associated facilities such as concrete batching plant<br>■ Project vehicular movement (movement of trucks and lorries, transport of large-heavy equipment) | ■ Potential for discriminatory practices to occur in the hiring process<br>■ Potential for discrimination against workers that join unions (or other similar organisations) or take part in collective bargaining<br>■ Inappropriate or delayed payments to workers<br>■ Lack of clarity information on workers' rights<br>■ Gender inequality during contractual processes<br>■ Unjustified dismissals<br>■ Non-payment of overtime<br>*Working conditions*<br>■ Accidents, injuries, fatalities or other health and safety risks, which can arise from inappropriate working or unsafe conditions, such as excessive working hours, lack of appropriate training, insufficient lock-out/tag-out practices as well as equipment failure<br>■ Lack of appropriate EPP supply to workers<br>■ Higher risk activities include working at height, lifting operations, live electrical work, use of vehicles/heavy equipment<br>*Operation of worker's accommodation*<br>■ Impacts on worker's health and safety due to poor management of worker's accommodation | | ■ Krong Buk district |
| | *Community way of life, health, safety and security due to construction activities*<br>■ Impacts on mental health and wellbeing of people residing in the Project footprint and adjacent areas due to | ■ Ede People and the general community in the project location | ■ Construction sites in Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes<br>■ Krong Buk district |

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| | induced noise vibration, dust and gas emissions from vehicles<br>■ Risk of disease to the local population via contamination of groundwater (from borehole) and surface water (from ponds)<br>■ Risk of disease to the local population due to lack of proper hazardous and non-hazardous waste management<br>■ Risk of injury to local persons gaining unauthorised access to the construction or restricted sites | | |
| | ■ Community way of life, health, safety and security due to the presence of influx<br>■ Risk of communicable disease spread (such as sexually transmitted infections, dengue, malaria, influenza, diarrheal, and COVID-19)<br>■ Increased pressure on local health facilities/capacities<br>■ Increased pressure on local governance<br>■ Tension with local communities due to issues of cultural conflict<br>■ Security-related impacts or concerns (such as drinking, drugs consumption, gambling, theft)<br>■ Risk posed by Project security arrangements to those within and outside the Project site<br>■ Risk of gender-based violence, violence against children, sexual harassment/abuse due to the increase in number of non-local male workers<br>■ Risk to vulnerable groups as prostitution and/or child labour | ■ Project workers and affected communities | ■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| | *Traffic safety due to increase traffic volume*<br>■ Increased risk of traffic accidents and interaction between Project vehicles and local communities<br>■ Increased risk to pedestrian using rural roads that are impacted by the project | ■ Project workers and Affected Communities | ■ Local roads in and near Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes<br>■ Access roads<br>■ National Highway |
| ***Operation phase*** | | | |
| ■ General operation activities | *Community health, safety and security*<br>■ Relocation of houses used to watch farms due to health and safety reasons<br>■ Impacts on mental health and wellbeing of people residing in the Project footprint and adjacent areas due to induced noise vibration and shadow flicker due to the presence of turbines<br>■ Visual impact due to the presence of turbines | ■ Project workers and Affected Communities | ■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |
| | *Physical displacement*<br>■ Possible physical displacement due to health and safety reasons mainly linked to noise and/or blade throw impacts | ■ Affected people living within the 300 m safety buffer area | ■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |
| ■ Unplanned Events<br>■ Leakage and spill incidents<br>■ Fire and explosion<br>■ Vehicle accident<br>■ Blade throw<br>■ Transmission line snapping | ■ Community health<br>■ Community safety and security<br>■ Environmental Quality | ■ Local communities | ■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| ■ Natural hazards (e.g. flood and landslide) | | | |
| **Project's lifecycle (e.g. construction and operation phases)** | | | |
| ■ Employee recruitment during construction activities<br>■ Employee recruitment and supply demand | *Positive Impacts on Local employment and Community Development*<br>■ Increased local employment and income<br>■ Temporary direct employment for the Project and induced employment opportunities by local suppliers<br>■ Opportunities for small and medium local businesses<br>■ Community discontent due to high expectation to be hired as unskilled workers<br>■ Reduction of economic opportunities to local business due to employee demobilization at the end of the construction phase | ■ Project workers and Affected Communities<br>■ Opportunity seekers and business owners<br>■ Ede People and the general community in the project location | ■ Dak Lak Province<br>■ Krong Buk District<br>■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |
| ■ Project land acquisition, construction and operation activities | *Impact on IP and ethnic minority groups*<br>■ Disruption of ethnic minority way of life, direct impact on their livelihood<br>■ Relocation due to the impacts of noise, shadow flickering, blade thow etc. (This is only verified via a validation survey) | ■ Ede People as the land users of Agricultural land | ■ Ethnic minority settlement and agricultural area in Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |
| | *Impact on Gender*<br>■ Maintenance of structural gender inequality in work<br>■ Local Women's Ability to sustain livelihood<br>■ Women's workload<br>■ Women's Dependency | ■ Women of Affected Communities | ■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |

| Project Activities | Potential Impacts | Receptors | Areas of Influence |
|---|---|---|---|
| | ■ Women's Safety | | |
| | *Impact on Human Rights*<br>■ Disruption of ethnic minority way of life<br>■ Human Rights unprotected | ■ Right-holders | ■ Dak Lak Province<br>■ Krong Buk District<br>■ Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes |

## 12.3 Economic Displacement and Loss of Livelihood due to Land Acquisition for the Project (Pre-Construction)

### 12.3.1 Summary of Project's Land Use and Land Acquisition

#### 12.3.1.1 Project's Land Acquisition Scope

The land occupied for the Project includes permanent and temporary land with a total area of 119.0927 hectares and 161.55 hectares, respectively. In which, the permanent land acquisition will be used for WTG foundation, transformer foundation, 220 kV substation and maintenance road, while the temporary land used for construction hoisting site, worker's camp, construction and production facilities, cable trench, and construction road. All of the land area for the Project has been identified as agriculture land of households. Detailed land acquisition scope, method, status and future actions by project component are presented in Table 12.2.

Land acquisition for the Project has been conducted into two different phases with two separate approaches: Phase 1: Land use right transfer based on a willing selling - willing buying principle, and Phase 2: Land acquisition based on a State-led process.

It is estimated that 1,436 households are affected by the land acquisition for the Project (see Table 12.2). Affected households include Ede people, however the number of affected Ede households and vulneralbe households is not confirmed at the time of ESIA reporing due to lack of available data on the characteristics of affected households. It is expected that by the end of January 2022, land acquisition process for the Project will be completed.

The current data available to ERM linked to land acquisition, field survey and interviews with local authorities and affected communities show there is no physical displacement due to land acquisition for the Project. However, as the land acquisition is not completed, physical displacement cannot be discarded, therefore this must be confirmed via a Land Acquisition Audit.

### Table 12.2 Land Acquisition Scope and Status

| No. | Project Component | Acquired Area (ha) | | | | | Land Acquisition Approach | Land Acquisition Status | Number of Affected Households | Documents Reviewed | Expected Land Acquisition Completion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | KB 1 | KB 2 | CN 1 | CN 2 | Total | | | | | |
| **1** | **Fixed-term used land** | **32.72** | **26.92** | **31.2427** | **28.21** | **119.0927** | | | **1,436** | | |
| 1.1 | Turbine foundations and security fence | 1.62 | 1.62 | 1.62 | 1.71 | 6.57 | - 44 turbine foundations: Project-led land acquisition from households<br>- 29 turbine foundations: State led land acquisition from households | - 44 compensation plans submitted to KrongBuk DPC for approval (44 lands were purchased by Project staff)<br>- 15 turbine locations, compensatin payments were made; one turbine location is under re-measurement.<br>- 13 turbine locations that are under the management of An Thuan Coffee Company is under a negogiation process | 73 | - 44 Land Use Right Certificates for 44 land parcels<br>- One sample of Land Use Right Transfer Contract<br>- 44 Land Acquisition Notification Letters | January 2022 with the following tasks:<br>– Project's land is approved for wind power development in the District Land Use Plan<br>– Land acquisition decisions issued for 44 purchsed lands for turbines locations<br>– A regulatory land acquisition procedure will be conducted for 15 turbines locations<br>– Negotiation process and then a regulatory land acquisition procedure will be conducted for the 14 remaining turbine land parcels. |

| No. | Project Component | Acquired Area (ha) | | | | | Land Acquisition Approach | Land Acquisition Status | Number of Affected Households | Documents Reviewed | Expected Land Acquisition Completion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | KB 1 | KB 2 | CN 1 | CN 2 | Total | | | | | |
| 1.2 | Transportation roads (Upgrading inter-village roads and building new internal roads) | 11 | 11.5 | 13 | 10 | 45.5 | State led land acquisition from households | - More than 50% agreements signed<br>- A total of 577 affected households have signed the contracts, among them, 254 affected households have been compensated, and 255 affected households have transferred their land for construction | 1,363 | Memoranda of Agreement (MoA) and Contracts signed between the Project Subsidiary Companies and Krong Buk District Land Fund Development Center (LFDC) | January 2022 with the following tasks:<br>– Negotiation with the remaning affected households<br>– A regulatory land acquisition procedure will be conducted for all affected lands. |
| 1.3 | 22/220 kV substation | | | 4.6 | | 4.6 | Project-led land acquisition from households | – Under the approval for adding to District Land Use Plan<br>– 17 households were compensated and transferred | | | January 2022 with the following tasks:<br>– Project's land is approved for wind power development in the District Land Use Plan<br>– A regulatory land acquisition procedure will be conducted |

| No. | Project Component | Acquired Area (ha) | | | | | Land Acquisition Approach | Land Acquisition Status | Number of Affected Households | Documents Reviewed | Expected Land Acquisition Completion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | KB 1 | KB 2 | CN 1 | CN 2 | Total | | | | | |
| | | | | | | | | land for construction | | | |
| 1.4 | 220 kV transmission line | | | 0.0227 | | 0.0227 | State-led land acquisition from households | - Cadastral map excerpts have been submitted for approval<br>- As in Item 1.2 | | | January 2022 with the following tasks:<br>– Negotiation with the remaning affected households<br>– A regulatory land acquisition procedure will be conducted for all affected lands. |
| 1.5 | 22 kV transmission line | 20.1 | 13.8 | 12 | 16.5 | 62.4 | State-led land acquisition from households | - More than 50% agreements signed<br>- As in Item 1.2 | | | |
| **2** | **Temporarily-used land** | **15** | **15.00** | **13.95** | **14.29** | **161.55** | | | | | |
| 2.1 | Transportation roads | 15 | 16 | 18 | 14 | 63 | State-led land acquisition from households | - More than 50% agreements signed<br>- As in Item 1.2 | Included in Item 1.2 | | January 2022 with the following tasks:<br>– Negotiation with the remaning affected households<br>– A regulatory land acquisition procedure will be conducted for all affected lands. |
| 2.2 | Laydown area | 3.78 | 3.78 | 3.78 | 3.99 | 15.33 | Rental | Completed | N/A | | - |

| No. | Project Component | Acquired Area (ha) | | | | | Land Acquisition Approach | Land Acquisition Status | Number of Affected Households | Documents Reviewed | Expected Land Acquisition Completion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | KB 1 | KB 2 | CN 1 | CN 2 | Total | | | | | |
| 2.3 | 220 kV overhead transmission line | | | 0.02 | | 0.02 | State-led land acquisition from households | - More than 50% agreements signed<br>- As in Item 1.2 | Included in Item 1.2 | | January 2022 with the following tasks:<br>– Negotiation with the remaning affected households<br>A regulatory land acquisition procedure will be conducted for all affected lands. |
| 2.4 | 22 kV underground and overhead transmission line[63] | 26.8 | 18.4 | 16 | 22 | 83.2 | State-led land acquisition from households | - More than 50% agreement signed<br>- As in Item 1.2 | Included in Item 1.2 | | |
| 2.5 | Operation house | | | | | 0.03 | Rental | Completed | N/A | | - |

[63] Most of the 22kV Transmission Line are laying along with the internal road system area which are within the land acquisition process.

##### *12.3.1.1.1 Phase 1: Land Use Right Transfer based on a Willing Selling - Willing Buying Principle (From September 2019 to October 2010)*

The Project Owner, via their two project staff, purchased 44 land parcels from 44 households for turbine foundations. The Land Use Right Cetificates (LURCs) of the 44 land parcels were legally transferred to the two staffs of Green Circle, a local partner company of the Project:

- Lai Thi Thu Trang, with permanent residence in Hoan Kiem Quarter, Ha Noi City; and
- Dinh Hung Duong, with permanent residence in Kieu Thuy Quarter, Hai Phong City.

Detailed review of land use right transfer of the 44 land parcels is presented in Table 12.5.

Given the negotiation of land purchase processs is not documented for ERM to review, based on the review of land use right certificates of all 44 land parcels, it is concluded that the transactions of the the 44 land parcels for the Project are based on willing selling - willing buying principle. Further, based on the review of one land use right transfer contract between a local household and the Project staff, it is mentioned that the transaction between the household (including the signature of the head and all members of the households) and the project staff (Ms Lai Thi Thu Trang) is on a voluntary basis, under the witness and signatures of all representatives of adjunction households and the head of the village. The transactions of 44 LURCs is confirmed to be based on the willing buyer- willing seller method, which is based on the fact that these transactions were made without any interference by the Project and local authorities, but voluntarily between the previous land users and the Project staffs and that the land use right transfers were legally concluded with the name of the Project staffs certified as the current land user of the land parcels.

However, the use of the 44 purchased land parcels for a wind turbine development purpose is illegitimate as the current land use purpose of transferred land parcels is perennial crop land. As such, the Project Owner are working with Krong Buk District Land Fund Development Center to complete the procedure to acquire the purchased land parcels currently under the name of the two Project staffs for the Project with land use purpose conversion to wind farm development (see further Section 12.3.1.2.1).

##### *12.3.1.1.2 Phase 2: Land Acquisition based on a State-led Process (From May 2021 to January 2022)*

Land acquisition for other Project components is conducted as a State-led process, with the involvement of Krong Buk District Land Fund Development Center. In May 2021, the Project Subsidiary Companies signed a Memoranda of Agreement (MoA) and Contracts with Krong Buk District Land Fund Development Center (LFDC) for LFDC's support on land acquisition for the Project, including corrective actions for land use purpose conversion of the purchased 44 turbine locations (see Table 12.3).

**Table 12.3 Memorandum of Agreement and Contract between the Project and Krong Buk District (LFDC) on Project Land Acquisition**

| No | Project | Subsidiary Companies | Memorandum of Agreement between the Project and Krong Buk District LFDC on Project land acquisition | Contract with between the Project and Krong Buk District LFDC on Project land acquisition |
|---|---|---|---|---|
| 1 | Krong Buk No.1 Wind Farm (hereinafter as "KB1") | Krong Buk New Energy Investment Company Limited | 03/BBGN signed on 31 May 2021 | 04/2021/HD-BTHT signed on 31 May 2021 |
| 2 | Krong Buk No.2 Wind Farm (hereinafter as "KB2") | Krong Buk Wind Energy Company Limited | 04/BBGN signed on 31 May 2021 | 05/2021/HD-BTHT signed on 31 May 2021 |

| No | Project | Subsidiary Companies | Memorandum of Agreement between the Project and Krong Buk District LFDC on Project land acquisition | Contract with between the Project and Krong Buk District LFDC on Project land acquisition |
|---|---|---|---|---|
| 3 | Cu Ne No.1 Wind Farm (hereinafter as "CN1") | Cu Ne Renewable Energy Investment Company Limited | 01/BBGN signed on 31 May 2021 | 02/2021/HD-BTHT signed on 31 May 2021 |
| 4 | Cu Ne No.2 Wind Farm (hereinafter as "CN2") | Cu Ne Wind Energy Investment and Management Company Limited | 02/BBGN signed on 31 May 2021 | 03/2021/HD-BTHT signed on 31 May 2021 |

Based on the Memoranda of Agreement (MoA) and Contracts signed between the Project Subsidiary Companies and Krong Buk District Land Fund Development Center (LFDC) in May 2021, the Project request LFDC's support on land acquisition for the Project in compliance with the current State regulations. In order to speed up the land acquisition approval in meeting the Project's schedule, as stated in the MoA, the Project Owner will:

- Closely cooperate with the District LFDC and Commune People's Committees to carry out the inventory of loss and detailed measurement survey.
- Agree to pay in advance (1) the compensation based on the results of the inventory of loss and detailed measurement survey and (2) a monetary support equal to 2 times the compensation for affected households.
- Transfer the compensation and support amounts to the LFDC account so that LFDC can deliver the payment directly to the affected households agreed with the proposed compensation and support amounts.
- Furthermore, pay the different amount if the officially approved compensation, support, and resettlement (CSR) retrospectively determines a higher CSR value for affected households based on valuation and negotiation. If the official CSR value is lower than the paid amount, affected households do not have to refund the difference.

The District LFDC will support the Project's land acquisition in compliance with the current State's law and regulations. Project's land acquisition and CSR plan can be divided into phases based on the schedule. Based on the signed Contracts, District LFDC will be responsible for:

- Conducting quantity inventory, quality assessment, and loss determination related to land, trees, crops, properties, architectural works, and different types of plants grown on the land plots acquired and supports according to current regulations;
- Hiring a consultancy unit to appraise land price and submit it to competent authorities for approval to carry out compensation, support and resettlement (if any);
- Developing compensation, support and resettlement plans and submit them to competent authorities for approval;
- Developing cost estimates for compensation, support and resettlement and submit them to competent authorities for approval;
- Implementing compensation, support and resettlement plans for organizations, households and individuals whose land is acquired;
- Settling complaints and grievances about compensation, support, and resettlement related to the acquired land;

- Making dossiers requesting forced eviction and submit them to the competent authorities and coordinating with the Project Companies and relevant units to implement forced eviction (if any); and
- Coordinating with investors of technical infrastructure works such as: optical cables, electricity grid and telecommunications located in the site clearance area to be relocated, preparing documents to include the compensation value for approval (if any).

### 12.3.1.2 Land Acquisition Process

#### *12.3.1.2.1 For 44 Turbine Foundations of the Project*

The land acquisition process for the Project started in September 2019, and in October 2020, the Project obtained 44 Land Use Right Certificates (LURCs) transferred to two staffs of the Project's local partner company. Based on the review of the 44 LURCs obtained by the Project, the land use rights of the 44 land plots (144,380.7 $m^2$) for perennial crop purpose were transferred based on willing selling - willing buying principle between individuals and households. The average size of transferred land plots is 3,218.38 $m^2$, and the largest land area is 5,427.7 $m^2$ while the smallest is 2,800.8 $m^2$ (see Table 12.5).

Among the 44 purchased land plots, 14 land plots are for turbine locations of KB1, 14 for KB2, 10 for CN1, and 6 for CN2. These land parcels are in Cu Ne commune (26), Cu Pong commune (11), Chu Kbo commune (5), and Ea Sin commune (2) (see Table 12.4). While only 6 LURCs mentioned the previous owners, four of them are Kinh households (ethnic majority group) and 2 are Ede (IPs).

**Table 12.4 Purchased Land Plots by Sub-project and Commune**

| Sub-Project / Commune | KB 1 | KB 2 | CN 1 | CN 2 |
|---|---|---|---|---|
| Cu Pong | 10 | 1 | | |
| Chu Kbo | 4 | 1 | | |
| Cu Ne | | 10 | 10 | 6 |
| Ea Sin | | 2 | | |
| **Total** | **14** | **14** | **10** | **6** |

As the purchased land is used for the construction and installation of turbines, it is required that such land plots are acquired under the industrial land use category to develop a Wind Power Project in compliance with the State regulations, including land use purpose conversion. Therefore, in May 2021, the Project Subsidiary Companies signed Memoranda of Agreement (MoA) and Contracts with Krong Buk District Land Fund Development Center (LFDC) for LFDC's support on land acquisition for the Project, including corrective actions for land use purpose conversion of the purchased 44 turbine locations.

On 07 June 2021, Krong Buk District People's Committee issued 44 Land Acquisition Notifications related wind turbine locations of CN1, CN2, KB1, and KB2 (see Table 12.6). It was informed that 900 m2 (0.09 hectares) from each of the land plot purchased under the name of Lai Thi Thu Trang and Dinh Hung Duong will be acquired for the Project. The notifications also mention that detailed measurement survey will be conducted between June and end August 2021 (there is no further information on the use of remaining land of the purchased land plots). It is informed by the Project Owner that 44 compensation plans of the 44 purchased land parcels were submitted to KrongBuk DPC for approval. The compensation plans by the Land Center passed the third-party review and was submitted to the Natural Resources and Environment Section and Treasury authorities of Krong Buk District for review on 26 August 2021. While the compensation plan review is completed now, further formalities related to issuance of Decisions on Land Acquisition are pending until the project lands are registered and listed in the land-use plan of the district for wind power project development.

**Table 12.5 Land Use Right Certificates Obtained by the Project**

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CS 03830 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 84 | 27 | 2950.8 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 16 September 2019 | | A2-3 | KB1 |
| 2 | CS 03886 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 21 | 38 | 3663.5 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 09 November 2020 | | A3-2 | KB1 |
| 3 | CS 03815 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 101 | 37 | 2919 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 09 September 2020 | | A6-4 | KB1 |
| 4 | CS 03820 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 100 | 36 | 4001.8 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 09 September 2020 | | A7-2 | KB1 |
| 5 | CS 03829 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 90 | 47 | 2950.1 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 16 September 2019 | | A8-3 | KB1 |
| 6 | CS 03818 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 67 | 48 | 2950.2 | Perennial crop land | Until 2064 | Cu Pong, Krong Buk, Dak Lak | 16 September 2019 | | A9-2 | KB1 |
| 7 | CS 03753 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 43 | 49 | 2950.6 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 06 August 2019 | | A10-4 | KB1 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | CS 03354 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 93 | 10 | 2950.8 | Perennial crop land | Until 2043 | Cu Pong, Krong Buk, Dak Lak | 16 September 2019 | | A11-2 | KB1 |
| 9 | CS 03311 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 98 | 6 | 3271.1 | Perennial crop land | Until 2057 | Chu Kbo, Krong Buk, Dak Lak | 24 July 2020 | Nguyen Thanh Tuan and Hoang Thi Tinh - Ea Sin, Krong Buk, Dak Lak | A12 | KB1 |
| 10 | CS 303339 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 90 | 14 | 2957.2 | Perennial crop land | Until 2064 | Chu Kbo, Krong Buk, Dak Lak | 06 August 2020 | | A13-2 | KB1 |
| 11 | CS 03345 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 87 | 20 | 4489.5 | Perennial crop land | Until 2063 | Chu Kbo, Krong Buk, Dak Lak | 06 August 2020 | | A14 | KB1 |
| 12 | CS 03763 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 45 | 49 | 2986.7 | Perennial crop land | Until 2064 | Cu Pong, Krong Buk, Dak Lak | 13 August 2020 | | A15 | KB1 |
| 13 | CS 03811 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 70 | 48 | 2983 | Perennial crop land | Until 2064 | Cu Pong, Krong Buk, Dak Lak | 10 September 2020 | | A16-3 | KB1 |
| 14 | CS 03414 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 95 | 10 | 2999.8 | Perennial crop land | Until 2064 | Chu Kbo, Krong Buk, Dak Lak | 08 October 2020 | | A17 | KB1 |
| 15 | CS 03414 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 49 | 59 | 3126.1 | Perennial crop land | Until 2064 | Kdro, Cu Ne, Krong | 05 August 2020 | Y Xoem Rcham & H | B1 | KB2 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Buk, Dak Lak | | Ne Mlo, Cu Ne, , Krong Buk, Dak Lak | | |
| 16 | CS 03756 | Lai THI Thu Trang | Hoan Kiem, Ha Noi City | 75 | 58 | 2952.2 | Perennial crop land | Until 2063 | Chu Kbo, Krong Buk, Dak Lak | 14 August 2020 | | B2-2 | KB2 |
| 17 | CS 03779 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 77 | 58 | 2989.9 | Perennial crop land | Until 2063 | Cu Ne, Krong Buk, Dak Lak | 28 August 2020 | | B3-7 | KB2 |
| 18 | CS 03723 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 63 | 68 | 3098.1 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 29 July 2020 | | B4-2 | KB2 |
| 19 | CS 04564 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 92 | 63 | 3011.2 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 11 September 2020 | | B5 | KB2 |
| 20 | CS 03354 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 133 | 71 | 2950.2 | Perennial crop land | Until 2063 | Ea Sin, Krong Buk, Dak Lak | 31 August 2020 | | B7-2 | KB2 |
| 21 | CS 04570 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 136 | 71 | 2951.2 | Perennial crop land | Until 2063 | Ea Sin, Krong Buk, Dak Lak | 18 September 2020 | | B8-2 | KB2 |
| 22 | CS 03784 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 101 | 13 | 4071 | Perennial crop land | Until 2063 | Cu Pong, Krong Buk, Dak Lak | 26 August 2020 | | B9-2 | KB2 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | CS 03829 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 105 | 79 | 2989.8 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 08 October 2020 | | B13-2 | KB2 |
| 24 | CS 03743 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 38 | 78 | 3003.3 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 06 August 2020 | | B14-4 | KB2 |
| 25 | CS 03736 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 115 | 80 | 2950.5 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 09 August 2020 | | B15-7 | KB2 |
| 26 | CS 03724 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 113 | 80 | 3790.2 | Perennial crop land | Until 2063 | Cu Ne, Krong Buk, Dak Lak | 28 July 2020 | | B16-2 | KB2 |
| 27 | CS 03740 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 161 | 81 | 3001.7 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 06 August 2020 | | B18-2 | KB2 |
| 28 | CS 03718 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 130 | 59 | 2904.3 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 24 July 2020 | | B19-4 | KB2 |
| 29 | CS 03755 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 54 | 33 | 2500.7 | Perennial crop land | Until 2061 | Cu Ne, Krong Buk, Dak Lak | 14 August 2020 | | C1-2 | CN1 |
| 30 | CH 03004 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 3 | 42 | 5336.7 | Perennial crop land | Until 2064 | Drao, Cu Ne, Krong Buk, Dak Lak | 27 July 2020 | Y Guat Ayun & H Nguyen Mlo, Drao, Cu Ne, Krong Buk, Dak Lak | C2-2 | CN1 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 | CS 03811 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 54 | 33 | 2500.7 | Perennial crop land | Until 2061 | Cu Ne, Krong Buk, Dak Lak | 14 August 2020 | | C3-4 | CN1 |
| 32 | CS 03811 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 126 | 42 | 3370.7 | Perennial crop land | Until 2057 | Cu Ne, Krong Buk, Dak Lak | 29 September 2020 | | C4-2 | CN1 |
| 33 | CH 03746 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 139 | 52 | 3020.2 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 06 August 2020 | | C6 | CN1 |
| 34 | CS 03735 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 107 | 44 | 3001.3 | Perennial crop land | Until 2043 | Cu Ne, Krong Buk, Dak Lak | 03 August 2020 | | C7 | CN1 |
| 35 | CS 03735 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 127 | 64 | 2950.2 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 06 August 2020 | | C8 | CN1 |
| 36 | CS 03814 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 138 | 65 | 2800.8 | Perennial crop land | Until 2043 | Cu Ne, Krong Buk, Dak Lak | 29 September 2020 | | C9 | CN1 |
| 37 | CS 03756 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 143 | 65 | 2979.6 | Perennial crop land | Until 2060 | Cu Ne, Krong Buk, Dak Lak | 09 November 2020 | | C16 | CN1 |
| 38 | CS 03805 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 105 | 85 | 3356.2 | Perennial crop land | Until 2058 | Cu Ne, Krong Buk, Dak Lak | 24 September 2020 | | C17 | CN1 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | CH 88669 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 37 | 74 | 4210 | Perennial crop land | Until 2063 | Cu Ne, Krong Buk, Dak Lak | 27 July 2020 | Le Huu Ching & Nguyen Thi Hong Gam, Cu Ne, Krong Buk, Dak Lak | D4 | CN2 |
| 40 | CH 02281 | Dinh Hung Duong | Kieu Thuy, Hai Phong City | 25 | 6 | 4282.1 | Perennial crop land | Until 2064 | Ea Nguoi, Cu Ne, Krong Buk, Dak Lak | 31 July 2020 | Trieu Van Tuan & Nguyen Thi No, Cu Ne, Krong Buk, Dak Lak | D8-2 | CN2 |
| 41 | CS 03777 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 62 | 14 | 2938.4 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 28 August 2020 | | D15-3 | CN2 |
| 42 | CH 93220 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 71 | 34 | 4674.4 | Perennial crop land | Until 2064 | Ea Jin, Cu Ne, Krong Buk, Dak Lak | 20 August 2020 | Tran Van Chinh & Ho Thi Da Thao, Cu Ne, Krong Buk, Dak Lak | D17-3 | CN2 |
| | CH 93219 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 70 | 34 | 752.3 | Perennial crop land | Until 2064 | Ea Nguoi, Cu Ne, Krong Buk, Dak Lak | 20 August 2020 | Tran Van Chinh & Ho Thi Da Thao, Cu Ne, Krong Buk, Dak Lak | | |
| 43 | CH 03830 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 66 | 22 | 2974.1 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 28 September 2020 | | D18-2 | CN2 |

| No | Land Use Right Certificate No | Land User and In-Land property Owner | Permanent Residence | Land Portion No | Cadastral Map No | Area ($m^2$) | Land Use Purpose | Land Use Term | Land Location | LURC Issuance Date | Previous Land Owner | Turbine Location | Project |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 | CH 02374 | Lai Thi Thu Trang | Hoan Kiem, Ha Noi City | 110 | 11 | 3918.5 | Perennial crop land | Until 2064 | Cu Ne, Krong Buk, Dak Lak | 04 September 2020 | Tran Khac Tuan & Hoang Thi Diem, Cu Ne, Krong Buk, Dak Lak | D19-2 | CN2 |
| **TOTAL** | | | | | | **144,380.7** | | | | | | | |

**Table 12.6 Land Acquisition Notifications by Krong Buk District People's Committee**

| No | Land Acquisition Notification No | Issued on | Issued by | Land acquired from | Current Residence | Area of acquired land ($m^2$) | Land Portion No | Cadastral Map No | Land Location | Proposed time for Detailed Measurement Survey |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cu Ne 1, Batch 1** | | | | | | | | | | |
| 1 | 99/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 54 | 33 | Cu Ne, Krong Buk | June – end August 2021 |
| 2 | 100/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 126 | 42 | Cu Ne, Krong Buk | June – end August 2021 |
| 3 | 101/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 107 | 44 | Cu Ne, Krong Buk | June – end August 2021 |
| 4 | 102/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 127 | 64 | Cu Ne, Krong Buk | June – end August 2021 |
| 5 | 103/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 143 | 65 | Cu Ne, Krong Buk | June – end August 2021 |

| No | Land Acquisition Notification No | Issued on | Issued by | Land acquired from | Current Residence | Area of acquired land ($m^2$) | Land Portion No | Cadastral Map No | Land Location | Proposed time for Detailed Measurement Survey |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 104/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 37 | 74 | Cu Ne, Krong Buk | June – end August 2021 |
| 7 | 105/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 03 | 42 | Cu Ne, Krong Buk | June – end August 2021 |
| 8 | 106/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 139 | 52 | Cu Ne, Krong Buk | June – end August 2021 |
| 9 | 107/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 138 | 65 | Cu Ne, Krong Buk | June – end August 2021 |
| 10 | 108/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 105 | 85 | Cu Ne, Krong Buk | June – end August 2021 |
| **Cu Ne 2, Batch 1** | | | | | | | | | | |
| 11 | 110/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 62 | 14 | Cu Ne, Krong Buk | June – end August 2021 |
| 12 | 111/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 111 | 44 | Cu Ne, Krong Buk | June – end August 2021 |
| 13 | 112/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 71 | 34 | Cu Ne, Krong Buk | June – end August 2021 |
| 14 | 113/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 66 | 22 | Cu Ne, Krong Buk | June – end August 2021 |
| 15 | 114/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 110 | 11 | Cu Ne, Krong Buk | June – end August 2021 |
| 16 | 115/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 25 | 06 | Cu Ne, Krong Buk | June – end August 2021 |

| No | Land Acquisition Notification No | Issued on | Issued by | Land acquired from | Current Residence | Area of acquired land ($m^2$) | Land Portion No | Cadastral Map No | Land Location | Proposed time for Detailed Measurement Survey |
|---|---|---|---|---|---|---|---|---|---|---|
| **Krong Buk 1, Batch 1** | | | | | | | | | | |
| 17 | 130/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 84 | 27 | Cu Pong, Krong Buk | June – end August 2021 |
| 18 | 131/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 21 | 38 | Cu Pong, Krong Buk | June – end August 2021 |
| 19 | 132/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 100 | 36 | Cu Pong, Krong Buk | June – end August 2021 |
| 20 | 133/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 67 | 48 | Cu Pong, Krong Buk | June – end August 2021 |
| 21 | 134/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 49 | 59 | Cu Pong, Krong Buk | June – end August 2021 |
| 22 | 135/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 45 | 49 | Cu Pong, Krong Buk | June – end August 2021 |
| 23 | 136/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 70 | 48 | Cu Pong, Krong Buk | June – end August 2021 |
| 24 | 137/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 101 | 37 | Cu Pong, Krong Buk | June – end August 2021 |
| 25 | 138/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 43 | 49 | Cu Pong, Krong Buk | June – end August 2021 |
| 26 | 139/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 98 | 06 | Chu Kbo, Krong Buk | June – end August 2021 |
| 27 | 140/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 90 | 14 | Chu Kbo, Krong Buk | June – end August 2021 |

| No | Land Acquisition Notification No | Issued on | Issued by | Land acquired from | Current Residence | Area of acquired land ($m^2$) | Land Portion No | Cadastral Map No | Land Location | Proposed time for Detailed Measurement Survey |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | 141/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 49 | 59 | Chu Kbo, Krong Buk | June – end August 2021 |
| 29 | 142/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 95 | 10 | Chu Kbo, Krong Buk | June – end August 2021 |
| 30 | 143/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 93 | 10 | Chu Kbo, Krong Buk | June – end August 2021 |
| **Krong Buk 2, Batch 1** | | | | | | | | | | |
| 31 | 116/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 49 | 59 | Cu Ne, Krong Buk | June – end August 2021 |
| 32 | 117/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 75 | 58 | Cu Ne, Krong Buk | June – end August 2021 |
| 33 | 118/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 77 | 58 | Cu Ne, Krong Buk | June – end August 2021 |
| 34 | 119/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 63 | 68 | Cu Ne, Krong Buk | June – end August 2021 |
| 35 | 120/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 105 | 79 | Cu Ne, Krong Buk | June – end August 2021 |
| 36 | 121/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 115 | 80 | Cu Ne, Krong Buk | June – end August 2021 |
| 37 | 122/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 113 | 80 | Cu Ne, Krong Buk | June – end August 2021 |
| 38 | 123/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 130 | 59 | Cu Ne, Krong Buk | June – end August 2021 |

| No | Land Acquisition Notification No | Issued on | Issued by | Land acquired from | Current Residence | Area of acquired land ($m^2$) | Land Portion No | Cadastral Map No | Land Location | Proposed time for Detailed Measurement Survey |
|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 124/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 38 | 78 | Cu Ne, Krong Buk | June – end August 2021 |
| 40 | 125/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 161 | 81 | Cu Ne, Krong Buk | June – end August 2021 |
| 41 | 126/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 92 | 63 | Ea Sin, Krong Buk | June – end August 2021 |
| 42 | 127/TB-UBND | 07 June 2021 | Krong Buk DCP | Lai Thi Thu Trang | Hoan Kiem, Ha Noi | 900 | 136 | 71 | Ea Sin, Krong Buk | June – end August 2021 |
| 43 | 128/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 133 | 71 | Ea Sin, Krong Buk | June – end August 2021 |
| 44 | 129/TB-UBND | 07 June 2021 | Krong Buk DCP | Dinh Hung Duong | Kien Thuy, Hai Phong | 900 | 101 | 13 | Cu Pong, Krong Buk | June – end August 2021 |

##### *12.3.1.2.2 For 29 remaining Turbine Locations*

During ERM's interview with Krong Buk District LFDC in July 2021, it was informed that among the 29 remaining turbine locations, 16 land plots have gained in principle agreements with affected households. It is informed by the Project Owner that by November 2021, land compensation was paid to 15 out of 16 affected households. For the only one remaining households (C14 location), loss recount had to be conducted as the land owner rushed to plant additional trees. As a result, a new compensation plan was introduced, but the Krong Buk LFDC believes it unreasonably costly. As such it is expected to implement compulsory acquisition procedures after signing a contract with the Krong Buk LFDC.

Whereas the 13 turbine locations that are under the management of An Thuan Coffee Company will face difficulties due to the fact that there are currently unsolved issues related to coffee production between the Company and contracted farmers who are cultivating the land under the Company's management. The acquisition of these land parcels for the turbines requires intensive engagements among the Project Owner, local authorities, the An Thuan Coffee Company, and contracted farmers. Based on the update by the Project Owner in November 2021, a quadripartite meeting was held in August 2021, in which all parties exchanged opinions onnn compensation. Hamek, as the minority shareholder of the Project, will negotiate with the contact person of the coffee company on this issue on behalf of the Project Companies. Negotiation is currently in progress.

##### *12.3.1.2.3 For Other Components of the Project*

For the substation: As informed by the Project Owner, the cadastral map excerpt has been approved by the Department of Natural Resources and Environment of Dak Lak Province. The agreement on the location of the substation and transmission alignment has been approved by Dak Lak PPC. While the compensation plan review is completed now, further formalities related to issuance of Decisions on Land Acquisition are pending until the project lands are registered and listed in the land-use plan of the district for wind power project development.

Land acquisition for roads and transmission line: As updated by the Project Owner, a total of 594 affected households have signed the contracts, among them, 371 affected households have been compensated, and 372 affected households have transferred their land for construction:

- KB1: Contracts were signed with 197 households; 88 households were compensated and transferred land for construction.
- KN2: Contracts were signed with 150 households; 72 were compensated and 73 transferred land for construction.
- CN1: Contracts were signed with 209 households; 193 were compensated and transferred land for construction.
- CN2: Contracts were signed with 21 households; 1 was compensated and transferred land for construction.
- Substation: 17 households were compensated and transferred land for construction.

### 12.3.2 Potential Impacts

Potential impacts due to the land acquisition activities for the Project include:

- Economic displacement: loss of land and access to production land, resulting in loss of access, livelihood and income to the land users;
- Social/ cultural tension from dissatisfaction towards the compensation price and /or the unequal compensation between the affected households, especially among the Indigenous Peoples;

- Negative impacts on the reputation of the Project due to lack of Project's information disclosure with local authorities and communities while construction is taking place alongside the land acquisition process; and
- As the land acquisition process has not yet been completed, physical displacement cannot be discarded, therefore this must be confirmed via a Land Acquisition Audit. The current data available to ERM linked to land acquisition at the moment this ESIA was concluded, field survey and interviews with local authorities and affected communities' showed there is no physical displacement due to land acquisition for the Project.

These impacts on women and IPs are elaborated in the below sections.

***Economic Displacement and Livelihood Impacts***

Based on the scope of land acquisition for the Project, economic displacement due to land acquisition involves in:

- Acquisition of household's land;
- Restrictions on land use under the transmission line Right-of-Way (ROW); and
- There is no imposition of involuntary restrictions on the use of natural resources on people who live around the project area.

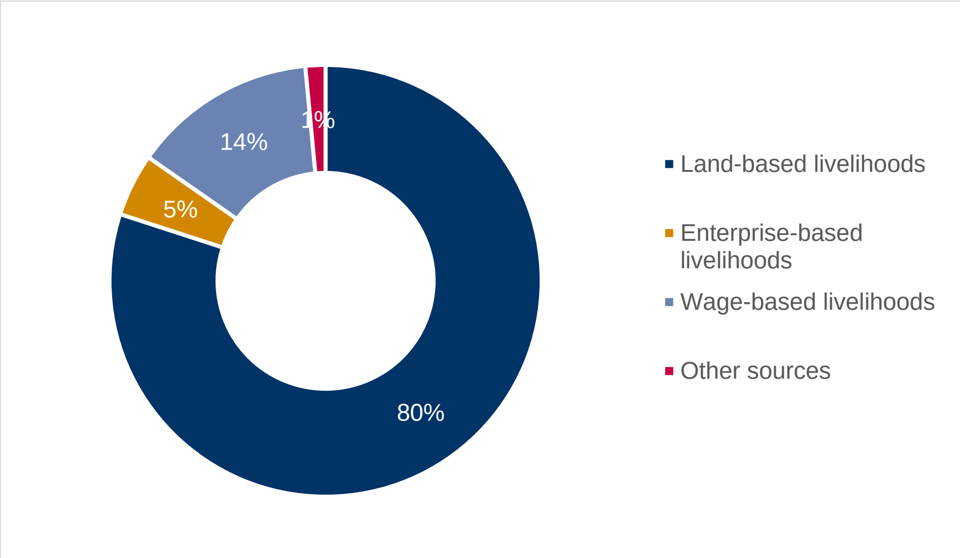
Currently, land at the Project site area are mainly used for agricultural production, particularly perennial crops. Main crops are coffee, avocado, durian, and pepper. Intercropping is regarded as a predominant cultivation method in the surveyed localities. The land acquisition would potentially impact affected households' future livelihoods and income from their agriculture production, which is considered the main occupation of the affected households. Land-based livelihoods remain key activities of affected villages (see Table 12.7). Among 144 households participated in the baseline interviews (see Chapter 9), land-based livelihoods is prominent (80%) of the household income structure (see Figure 12.2). For the interviewed Ede households, land-based livelihoods account for 82% of their household income sources.

**Table 12.7 Land-based Livelihoods in Affected Villages**

| Commune | Village | Land-based Livelihoods |
|---|---|---|
| Cu Ne | Kdro 1 | About 90% of households rely on agricultural production with the focal crop of coffee and have a monthly income of around VND 4 million. |
| | Kdro 2 | 100% of local households earn incomes from coffee planting. |
| | Drah 1 | 100% of households do agricultural production as the main livelihood with focal crops of avocado, durian, coffee, and jackfruit. |
| | Drah 2 | 100% of households rely on agricultural production. |
| | Kmu | 100% of households rely on agricultural production. |
| | Ea Kung | 95% of local household work in agricultural production. |
| | Ea Siek | Agricultural production is the main livelihood. |
| | Ea Krom | 100% of local households rely on agricultural production. |
| | Ea Nguoi | 90% of local households depend on agricultural production. |
| Cu Pong | Cu Hriet | All households mainly reply on agricultural production with main crops of avocado, coffee, pepper, and durian. |
| | Ea Bro | Agricultural production is the main livelihood to all local households. |
| Ea Sin | Ea My | All households live on agricultural production with main coffee and pepper crops. |

| Commune | Village | Land-based Livelihoods |
|---|---|---|
| Chu Kbo | Kty 4 | Agricultural production is the main livelihood to 90% of local households but its income reduces gradually due to weather conditions, low agricultural product prices, and high investment. |
| | Kty 5 | 99% of local household reply on agricultural production. |

Source: Socio-economic survey conducted by ERM, July 2021




Source: Socio-economic survey conducted by ERM, July 2021

**Figure 12.2 Household Income Structure of Affected Communities (N=144)**

During interviews with village heads and potentially affected households, an excessive number of local respondents addressed that local livelihood is potentially affected by the project implementation such as agricultural assets shrinkage (59.5%) and thus production and business operation obstructions (56.9%) (see Table 12.8). Further information on direct and indirect impacts shall be collected and assessed during the Land Acquisition Audit.

**Table 12.8 Livelihood Impacts Perceived by the Surveyed Household**

| Livelihoods Impacts | Cu Ne Commune (N=38) | | Cu Pong Commune (N=34) | | Ea Sin Commune (N=24) | Chu Kbo Commune (N=20) | All Surveyed Communes (N=116) | | All Surveyed Communes (N=116) |
|---|---|---|---|---|---|---|---|---|---|
| | Kinh | Ede | Kinh | Ede | Kinh | Kinh | Kinh | Ede | |
| Loss of agricultural assets | 13.2 | 18.4 | 2.9 | 38.2 | 83.3 | 85.0 | 42.2 | 17.2 | 59.5 |
| Negative impact on production and business activities | 7.9 | 21.1 | 5.9 | 32.4 | 83.3 | 80.0 | 40.5 | 16.4 | 56.9 |

Source: Socio-economic survey conducted by ERM, July 2021

It should also be noted that although turbine and transmission line foundations need a quite large size of land parcels, e.g. 900 $m^2$, it is found out from the household interview findings that households in the affected areas have large land holdings, particularly the average agricultural land for perennial crops per household of 18,630 $m^2$ (see Table 12.9). As such, the severely affected households (with acquired production land area equal to or higher than 10% of the total production land of the household) might be a modest number within the total affected households.

**Table 12.9 Different Types of Land Holdings of Potentially Affected Households**

| Land Type | Kinh Households (N=71) | Ede Households (N=73) | All Surveyed Households (N=144) |
|---|---|---|---|
| Average agricultural land for annual crops per household ($m^2$) | 15,942 | 11,412 | 13,286 |
| Average agricultural land for perennial crops per household ($m^2$) | 18,514 | 18,740 | 18,630 |
| Average forestry farming land per household ($m^2$) | 43,633 | 30,333 | 27,817 |
| Average residential and garden land per household ($m^2$) | 804 | 1,407 | 4,737 |

Source: Socio-economic survey conducted by ERM, July 2021

Livelihood impacts due to economic displace on IPs communities and gender will be discussed in Sections 12.11 and Section 12.12.

- ***Social and Cultural Tension in the Affected Communities***

Social and cultural tensions in the affected communities have been arisen and might be further emerged due to the following reasons:

First, the Project has applied two different approaches in acquiring land for the Project:

- Willing selling - willing buying approach for the first 44 turbine locations; and
- State-led approach based on a State-regulated CSR framework.

The two approaches may lead to unequal compensation between the affected households. This issue might be more serious among the Indigenous Peoples who are less receptive to the Project information and information linked to land acquisition.

Second, there might be dissatisfaction towards the compensation price, particularly to the affected households under the State-regulated CSR framework.

Third, tension within the community has been arisen during the construction work of some turbines in the purchased land, due to the fact that concerned people, including the 44 former land users did not know that the purchased land  was to be used for a non-agricultural production purpose. Community tensions seemed to be increased particularly when construction activities had impacts on local roads and neighbouring households while they did not have sufficient information related to the Project and its impacts and mitigation measures. As such while it is not recommended that the 44 former land users will be included in the eligible household list of the Resettlement and Livelihood Restoration Plan, they should be identified and prioritised in the proposed community development programs.

Fourth, as explained earlier, land acquisition needed for the establishment of 13 turbine locations, which are under the management of An Thuan Coffee Company may face difficulties. There has been tension related to coffee production and distribution between the Company and contracted farmers who are cultivating on the land under the Company’s management. Hamek, as the minority shareholder will on behalf of the Project Companies negotiate with the contact person of the coffee company upon land acquisition issue.

***Negative Impacts on the Reputation of the Project***

The Project has carried out construction activities in some turbine and substation locations based on purchased land parcels. However, the construction work should not have implemented if the land acquisition for a wind power project, including land use purpose conversion had not been conducted in compliance with the current State regulations. Community engagement has not been properly carried out prior starting construction, leading to community tension based on insufficient information about the Project and its impacts and mitigation measures. When such non-compliances were communicated in the affected community and wider via local newspapers, reputation of the Project might have been negatively impacted.

- ***Potential Physical Displacement***

Based on the current available data shared with ERM on the Project design and land acquisition scope for the Project, is seems that there will not be any physical displacement as the acquired land are for agriculture use and no physically displaced cases have been recorded up till now. However, as the land acquisition process for all project's components has not yet been completed, physical displacement is possible and needs to be confirmed as the land acquisition process is deemed to be completed. Potential physical displacement due to health and safety reasons will be discussed in Section 12.9.

## 12.3.3 Existing Control

The Project Subsidiary Companies have commissioned the Krong Buk District Land Fund Development Center (LFDC) to implement the land acquisition for the Project, including corrective actions for the purchased 44 turbine locations. Memoranda of Agreement (MoA) and Contracts for LFDC's support were signed between the two parties on 31 May 2021.

According to the legal entitlement applied for this Project, affected households will receive the compensation payment and different types of support (e.g. job transition support, life stabilization support, job recruitment assistance) in cash. There is no other compensation or supporting method to be applied to assist affected households.

A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package. Also, A Resettlement and Livelihood Restoration Framework (RLRF) has been developed within this ESIA package.

## 12.3.4 Significance of Impacts

Land acquisition impact nature is considered a negative impact as it will directly take away the people's source of livelihoods. The land acquisition process will result in either long-term or permanent economic loss. Due to the large land holdings of households in the affected areas, particularly the average agricultural land for perennial crops per household of 18,630 $m^2$, the severely affected households (with acquired production land area equal to or higher than 10% of the total production land of the household) might not be a prominent proportion of the total affected households. According to the available current data to ERM on land acquisition, 44 households (approximately 216 people[64]) are categorised under voluntary resettlement (land transactions were based on willing selling – willing buying) and 1,392 households (approximately 6,820 people) are under involuntary resettlement (economic displacement). Based on the current available data on the Project design and land acquisition scope for the Project, it seems that there will not be physical displacement, however, this will have to be reconfirmed once the land acquisition process is completed. Therefore, the land acquisition impact magnitude is predicted as Large.

The vulnerability profile among affected households is considered Medium in terms of local dependency on land-based livelihoods and the presence of ethnic minority communities. For vulnerable households, losing their land due to land acquisition for the Project can be perceived as high impact to them as it

[64] Based on the household survey finding which suggests that the average household size is 4.9 people.

might not be their intention to sell their land as land is the key source of their livelihood as a farmer. The overall impact significance is found Major.

**Table 12.10 Economic Displacement and Loss of Livelihood**

| Impact Description | Economic Displacement and Loss of Livelihood | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | **Long-term** | **Permanent** | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | Small | Medium | **Large** |
| Receptor Sensitivity | Low | **Medium** | High | | |
| Impact Significance | Negligible | Minor | Moderate | **Major** | |

## 12.3.5 Additional Mitigation and Management Measures

In addition to the mitigation and management measures required under the government-led land acquisition process, the following measures are recommended in order to meet international standards:

- Disclose the Community Grievance Mechanism (CGM) that is developed as part of the Stakeholder Engagement Plan (SEP) as soon as it is finalised, to support the local authorities in receiving and addressing land acquisition-related grievances. CGM should be disclosed to the affected communities, including affected ethnic minorities so that the affected community is aware of communications grievance lines and understand how to submit a grievance. Continuously coordinate with local authorities to solve any submitted grievance relevant to land acquisition activities.
- Disclose the SEP to ensure effective Project information disclosure and communication with affected households as well as relevant government stakeholder. Immediate disclosure of the Project update, ESIA findings, land acquisition and CSR policies should be conducted with land affected households through a culturally appropriate communication plan consisting of visual/graphic demonstration (e.g. leaflets, signs, video) and outreach activities (e.g. community events, informed sessions, open houses, meetings).
- Conduct a Land Acquisition Audit (LAA) to identify the gaps between the government-led process, the Project's practice and AIIB and IFC requirements on land acquisition and resettlement and current practices within the project. Gaps with the applicable standards which are not covered at this stage will be addressed through the LAA. Specific actions to minimize the gaps in providing appropriate compensation should be recommended and implemented.
- Develop and implement a Resettlement and Livelihood Restoration Plan (RLRP) based on the current Resettlement and Livelihood Restoration Framework (RLRF) to support the economically displaced households in restoring their livelihoods at least equal to similar level of livelihood condition before land acquisition. The RLRP should take the women, poor, and other vulnerable groups into account to ensure improvement of their standards of living to at least national minimum standards, they are not overlooked during Project implementation and left worse off.
- Assist the local community via a Community Development Plan (CDP) focusing on affected communities to ensure that local communities can benefit from the project. CDP will include community based development initiatives and programs to support the local communities where the project is located. A CDP would be implemented throughout the Project life and through a CDP, the Project can listen to concerns of the local people and thus build a relationship between the

Project and the surrounding communities. Households who had sold land for the Project without acknowledging land use purpose conversion for the wind power project should be prioritised in participating CDP programs. It is important that CDP budgets are committed on steady and multi-year timeframes, which reflects changing business needs and drivers for community development at various stages of the business or project cycle.

### 12.3.6 Residual Impacts

As a result of the implementation of the proposed measures, the economic displacement and loss of livelihood impacts will be reduced to **Minor**.

### 12.3.7 Monitoring and Audit

The following monitoring and audit programs are required:

- Creation and maintenance of a Consultation and Grievance record in relation to land acquisition.
- Preparation of the LAA and implementation of LAA Action Plan.
- Monitoring of the RLRP in a quarterly term.
- Preparation of a completion report for the RLRP.

## 12.4 Disturbance to Agricultural Production (Construction)

### 12.4.1 Potential Impacts

The social baseline survey indicates that the land-based livelihoods is a major source of livelihood for the surveyed population of the affected communities. Cultivation is the most common work among the surveyed population with land-based livelihoods. Coffee, avocado, durian, and pepper are main crops which are intercropped with coffee for increasing the production efficiency. Local farmers plant more diverse crops such as macadamia, maize, banana, and jackfruit for income security.

As the turbines and Project's components will be built mainly in agriculture land, a major concern raised by the local authority and local community during the social survey is that the Project activities, during the land clearing and construction of Project's components, are anticipated to cause soil erosion around the turbine locations, particularly in rainy season. The water runoff with sediment would cause the accumulation of sediment and disturbance to the adjacent production land including coffee plantations located adjacent to the turbines and the Project's Site, particularly soil stockpilling areas (see Figure 12.3).

Besides, risks to cultivation during the construction are exposed to the risk of soil and water degradation as a result of dust accumulation from construction work.

In addition, during the construction, land will be temporarily used for laydown area and crane installation area. These areas will be returned to the current land users upon completion of construction; however, disrupted access to farming areas is expected for short intermittent periods during the construction phase.

Source: ERM's site visit in May 2021

**Figure 12.3 Excavated Soil from Construction Phase**

## 12.4.2 Existing Control

Mitigation measure provided by the Project Owner and their contractors in the Feasibility Study Report, the Safe and Civilised Construction Plan, and EPP include:

- Excavation, filling and construction works shall be complied with the current regulations
- Dykes should be constructed along the construction works to avoid soil erosion
- Open ditches and ponds are constructed at the disposal site to prevent soil erosion
- Strengthen the foundations by embankment or plantation
- Plantation can be made in the temporary land area after the construction finishes to increase vegetation and minimise the soil erosion and landslide
- All construction activities including foundation excavation and site levelling are conducted in drying season to avoid erosion, and
- Disposed construction material pieces such as bricks and stones shall be reused. The excavated soil shall be used for backfilling and road construction. Other kinds of construction materials including irons and steels will be collected, transferred back to the manufacturer, reused, or scrap trading.

A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package and should be implemented as soon as possible.

## 12.4.3 Significance of Impacts

According to Chapter Environmental Impact Assessment, section Soil Impact Assessment, the impacts from soil erosion and soil contamination were assessed as of Moderate significance. In addition, given Project's acquired land is located in the key areas of agricultural production of the four affected communes, the impact magnitude is Medium**.** Although it is unlikely that the Project will have significant impact to the community incomes generated from agriculture production, the sensitivity of the receptors is assessed as Medium due to perceived concerns from local farmers surrounding the project site. As such, the agriculture production disturbance significance caused by the construction activity is assessed as **Moderate**.

**Table 12.11 Disturbance to Agriculture Production due to Construction and Operation Activities**

| Impact Description | Disturbance to Agriculture Production due to Construction Activities | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Neutral | | **Negative** |
| Impact Type | Induced | | **Indirect** | | Direct |
| Impact Duration | Temporary | **Short-term** | | Long-term | Permanent |
| Impact Extent | **Local** | | Regional | | International |
| Frequency | Intermittent (rainy seasons) during the construction and operation phase | | | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Sensitivity | Low | | **Medium** | | High |
| Impact Significance | Negligible | Minor | | **Moderate** | Major |

## 12.4.4 Additional Mitigation and Management Measures

Although the assessment in this ESIA determines that the impact is Minor, the Project is still expected to implement the following measures in addition to the measures provided in the local EPP as listed above and some recommendation have been offered by local authorities and communities to manage the impacts within this Minor significance. These include:

- The Project Owner should provide and communicate detailed information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers located near the Project locations. Due to the presence of the Ede IP and other ethnic minority groups in this area, culturally sensitive communication approaches should be taken into account;
- The Project Owner should disclose and implementing the Community Grievance Mechanism (CGM) that is understood by and accessible to all villagers. The mechanism will be simple, efficient, timely and consultative;
- Project Owner will closely monitor the temporary impacts on land of villagers during construction. Construction contractors must restore the soil to the quality as before being affected to return to the households. The Project will request construction contractors to prepare and implement the suitable construction methods to mitigate the impacts on land of villagers during construction of access roads and other Project's components.
- Should any incident occur and cause damage to the surrounding agriculture production, the Project Owner will ensure that such incident should be investigated to determine the Project's responsibilities and compensation amount if necessary. Standard for compensation will follow the Vietnamese civil law and be based on negotiations between the Project's contractors and the land users. If a related community grievance is submitted to the Project, it will be solved in accordance with the procedure described in the SEP and CGM.

## 12.4.5 Residual Impacts

As a result of the implementation of the proposed measures, the impact to agriculture activities during the construction will be **Minor**.

### 12.4.6 Monitoring and Audit

The following monitoring activities are recommended:

- Ongoing monitoring and periodical audit are required to check if the above mitigation measures are implemented.
- Comply with the monitoring and evaluation framework proposed in relevant management plans (i.e. SEP; solid waste sub-management plan and soil compaction, erosion and pollution sub-management plan of Construction E&S management plan) during the implementation of these plans.

## 12.5 Impacts on Worker Rights, Occupational Health and Safety (Construction)

### 12.5.1 Potential Impacts

***Worker's Rights, either Directly by the Project or Within its Supply Chain***

It is estimated that 343 workers are employed at the peak time of the Project construction phase. It should be noted that 59 management and technical positions are for foreign workers. More than 50% of workers in the construction phase (177 positions) are recruited from the communes and district where the Project is located. Without appropriate safeguards, there is potential for workers' rights to be impacted, including workers directly employed by Project Owner and the contractors engaged in delivering the Project. Increasingly there is an expectation by stakeholders that a company has not only oversight of its workers but also its contractors and those involved in its supply chain. If safeguards are not in place, a range of potential impacts can arise, including:

- Lack of awareness on worker's human and labour rights;
- Violation of worker's rights encountered by contractors;
- Potential employment of children, forced or bonded labour. This risk is often higher for vulnerable groups (e.g. migrant labour);
- Potential for discriminatory practices to occur in the hiring process (e.g. gender equity);
- Potential for discrimination against workers that join unions (or other similar organisations) or take part in collective bargaining;
- Inappropriate or delayed payments to workers;
- Unjustified dismissals; and
- Risk of association with contractors (e.g. service contracts) or third parties (e.g. recruitment agents) adhering to relevant laws and international standards and guidance.

**Worker's health and safety**

Besides the potential impacts to worker's rights, the nature of the Project and its construction activities presents a range of health and safety risks for the workforce, including those employed by the Project Owner and their EPC Contractors. Potential workforce health and safety risks include:

- Accidents and injuries: which may occur as a result of construction activities if safe work practices are not followed. Examples include:
  - Injury/fatality risks associated with working at heights (e.g. excavation, foundation construction, pylon, scaffolding, cranes);
  - Injury/fatality in a collision due to the movement of the vehicle and large mobile plant equipment such as backhoes, bulldozers, graders and mobile cranes present health and safety risks if not handled appropriately;

- Non-compliance with health and safety programs, poor safety culture, and inappropriate use of worker personal protective equipment (PPE) may place workers at risk of accidents and injuries;
- A surge in vehicle usage increases the potential for an accident or injury to occur; and
- Manual handling associated with day to day construction activities can result in injuries.

The above is not an exhaustive list of potential risks and hazards but presents examples of the types of activities that could contribute to an accident or injury during construction.

- Occupational diseases: that are caused or aggravated by exposure to workplace hazards and are often categorised into the following groups - musculoskeletal disorders, mental disorders, noise-induced hearing loss, infectious and parasitic disease, respiratory diseases, contact dermatitis, cardiovascular diseases, and occupational cancer. These diseases often develop as a result of poor working conditions and poor hygiene.
  - Some occupational diseases manifest shortly after exposure, while others take longer to manifest after exposure. Examples include:
  - Hearing impairment due to exposure to high noise levels during equipment transport and use of large machinery;
  - Respiratory disease due to exposure to dust and reduced ambient air quality;
  - Repetitive work movements which may cause lateral epicondylitis (i.e. tennis elbow);
- Infectious diseases are illnesses caused by a diverse range of pathogens that can be transmitted through means such as:
  - Disease vectors (e.g. mosquitos), which may result in diseases such as dengue fever or malaria;
  - Ingestion of unsanitary food and water, which may result in a parasitic infection or diseases such as salmonella, E.coli, and listeria; and
  - Human or pest contact, which may result in diseases such as sexually transmitted infections (STIs), tuberculosis, influenza and rabies.
- Workers' may contract infectious diseases via a number of pathways. Examples include:
  - Interactions with local community members, which can expose workers and vice versa to a range of communicable diseases (e.g. STIs, influenza.);
  - Un-hygienic and unsanitary facilities; and
  - Stagnant bodies of water created during the land clearing process, which can create disease vector habitat.
- The global COVID-19 situation is fluid and the duration of the crisis is yet unknown. Potential risks of spreading virus workers, especially from migrant workers to local workers and vice versa, are still expected.

Health and safety risks can impact workers in a range of ways – e.g. temporary illness to long-term health impacts. The worst-case scenario would be a fatality, or multiple fatalities, which has occurred on other large scale developments in Vietnam during the construction phase. It appears that workplace fatalities in Vietnam, particularly in the construction sector, are on the rise. In most cases, the accidents were caused by low awareness and ignorance about occupational safety regulations by employers and employees.

It should be noted that occupational health and safety hazards during the operation of wind energy facilities are generally similar to those of most large industrial facilities and infrastructure projects. They may include physical hazards, such as working at heights, lone working, working in confined spaces, working with rotating machinery, and falling objects. Prevention and control of these and other physical, chemical, biological, and radiological hazards are similar to those discussed in the assessment for construction phase.

### 12.5.2 Existing Control

Besides existing measures for air quality, noise and water usage control as mentioned in Chapter 10, several mitigation measures were included in the EPP regarding the management of labour and working conditions. The Project Owner and their contractors need to:

- provide the required PPE to workers as per regulations and train them in the proper use and maintenance practices;
- have regulations on occupational safety and closely monitor these regulations throughout the construction phase;
- have fire prevention and emergency plans to prevent and respond any incidents;
- establish rules on order, hygiene and environmental protection in worker camps.

Local laws in regards to Covid-19 is implemented strictly in the Dak Lak province.

A Stakeholder Engagement Plan (SEP) including a Worker Grievance Mechanism (WGM) has been developed within this ESIA package.

### 12.5.3 Significance of Impacts

As the number of workers is over 500 during the peak time, with a high percentage of foreign workers the magnitude of impacts on worker's rights and working conditions was ranked as Medium. In addition to general accidents, injuries, and infectious diseases, construction sites often involve activities that generate large amounts of noise and dust, repetitive activities, and interactions with hazardous substances. Such activities can present potential occupational diseases. Although practices in Vietnam are improving, there continues to be allegations of violations of worker rights in the construction industry. A large number of workforce in the industry are low-skilled with limited awareness of their rights; therefore, poor working conditions, long working hours, and delayed payment of wages violations frequently remain unreported. As such, the vulnerability of Area of Influence (AoI) was considered Medium. Therefore, the overall impact significance of human rights, health, and safety risks to workers during the construction phase was assessed as Moderate**.**

**Table 12.12 Impacts on Worker's Rights, Occupational Health and Safety**

| Impact Description | Impacts on Worker's Rights, Occupational Health and Safety | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | |
| Impact Type | **Direct** | Indirect | Induced | |
| Impact Duration | Temporary | **Short-term** | Long-term | Permanent |
| Impact Extent | **Local** | Regional | International | |
| Frequency | Frequent over 12 months of the construction period. | | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Vulnerability | Low | **Medium** | High | |
| Impact Significance | Negligible | Minor | **Moderate** | Major |

### 12.5.4 Additional Mitigation and Management Measures

In addition to the mitigation and management measures required under the regulation, the following measures are recommended in order to meet international standards:

***Policies and Procedures***

- Develop a Human Resources (HR) policies and procedures that are in line with Vietnam labour regulations, AIIB ESS1, and IFC PS2. The HR policy and procedure should include but not limited to:
  - Working conditions and Management of Worker Relationship;
    - HR Policy;
    - Working Relationship;
    - Working Condition and Terms of Employment;
    - Workers' Organization;
    - Non-discrimination and Equal Opportunity;
    - Retrenchment;
    - Grievance Mechanism;
  - Protecting the workforce: child labour and forced labour;
  - Occupational Health and Safety;
  - Workers engaged by Third Parties; and
  - Supply chain.

***Worker's Rights***

- The Project Owner develop and implement a Labour Management Plan;
- EPC Contractors shall establish employment practices that ensure workers are paid appropriately in accordance with working hours and in a timely manner, informed by national standards and industry benchmarks;
- Project Owner and their EPC Contractors shall comply with Vietnam Labour Code requirements related to the hiring of labour and with applicable requirements from the EHS international guidelines;
- Special attention shall be given to establishing clear contractual agreements through the inclusion of particular clauses between Project Owner and all of their subcontractors to avoid child labour, forced labour, and human trafficking and other violations of human rights;
- EPC Contractors shall establish employment practices to check legal worker's age in identification document upon recruitment to ensure no child labour or forced labour and avoidance of unjustified dismissals;
- EPC Contractors shall establish employment practices that ensure workers are not discriminated against on the grounds of ethnicity, sex, religion, political opinion, social origin, age, marital or relationship status, sexual orientation, or trade union activity. As part of the hiring process, age checks will be conducted;
- EPC Contractors shall ensure workers are made aware of their rights as part of the induction process;
- EPC Contractors should implement a "zero tolerance" policy towards inappropriate behaviour from and amongst the workforce;
- EPC Contractors Ensure workers have a right to join unions;

- Project Owner and EPC Contractors shall establish a grievance mechanism for workers. This should include an option for grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain, should have access to a grievance mechanism to ensure that their issues and concerns are identified and addressed. Contractors should be required to inform the Project about grievances raised;

***Occupational Health and Safety***

- The Project Owner shall develop and implement an Occupational Health and Safety (H&S) Management Plan (MP);
- EPC Contractors shall regularly inspect all critical components of the involved equipment and machinery;
- EPC Contractors shall establish operation and safety procedure for each equipment and make available for the workers involved;
- EPC Contractors shall ensure that only appropriately skilled and trained employees are assigned to the operation and maintenance of the corresponding equipment and machinery;
- EPC Contractors shall perform audits of different subcontractors involved in terms of health and safety topics to ensure these companies comply with the findings and remedial action follow-up;
- EPC Contractors shall establish health and safety internal rules and ensure worker's awareness of these rules;
- EPC Contractors shall ensure day to day compliance with the health and safety requirements (i.e. procedures, equipment usage, PPE usage, demonstration of safe behaviours, competent personnel, compliance with work permit system);
- EPC Contractors shall ensure safety measures are in place before workers perform high-risk tasks, such as working-at-height, loading and unloading of equipment, hot work, electrical works, use of scaffolds and heavy machinery;
- EPC Contractors shall monitor and report health and safety performance through site inspections to all involved subcontractors, using appropriate health and safety metrics, operations auditing as well as senior management review and follow-up;
- EPC Contractors shall monitor and report high-risk sites to restrict entry and prevent near misses, injuries and fatalities;
- EPC Contractors shall ensure training programs to adequately include the usage of appropriate PPE, good hygiene practices, awareness of infectious diseases, and the management of risks and hazards;
- EPC Contractors shall provide first aid box and competent first-aider at all construction sites and worker's accommodation facilities;
- Project Owner and their EPC Contractors shall conduct medical assessments of workers before they are mobilized to the site, including screening for infectious diseases and other health issues. This is to ensure workers are fit for work;
- Project Owner shall implement a system for selection and management of contractors/subcontractors/suppliers with clear criteria on required environmental and safety management capabilities;
- Project Owner and their EPC Contractors shall develop and implement a Worker Accommodation Management Plan in accordance with local regulations and IFC requirements to ensure the well-being of the workforce as well as the health, safety and security of local communities;

- EPC Contractors shall ensure the worker accommodation is constructed/leased and managed in accordance with Vietnam requirements and Worker's Accommodation: Processes and Standards developed by WBG, IFC and EBRD;
- Minimum requirements for the worker's accommodation facilities shall include:
  - Free of charge to workers, meaning that workers do not have to pay if they choose to stay in workers' camp built or owned by the Project Owner or the contractors;
  - Adequate living space for each worker;
  - At least one toilet shall be arranged for every 15 workers;
  - At least one shower/bathroom is provided for each 15 persons;
  - Wastewater, sewage, food and other waste materials shall be adequately discharged in compliance which Vietnam standard;
  - Male and female toilet/shower/bathroom shall be separated;
  - Sanitary, laundry and cooking facilities and potable water;
  - Adequate health, fire safety measures, including first aid and medical facilities;
  - Adequate heating and ventilation; and
  - Non-restrictive to workers' freedom of movement to and from the accommodation.
- Project Owner shall conduct regular audits of workers´ accommodation sites of all involved subcontractors.

### 12.5.5 Residual Impacts

While Project mitigation measures will help prevent impacts on workers' health and safety, there is the potential for accidents to occur as a result of human error, occupational diseases to occur as a result of work activities/conditions, and diseases to spread. To reduce the impact significance to Negligible, it will be important that the Project Owner's existing policies and procedures (which are designed to protect the health and safety of workers) are implemented and regularly monitored to ensure that the policies and procedures are being effectively implemented. As result of implementation of the proposed additional measures, the residual Project negative impact to community safety will be reduced to Minor.

### 12.5.6 Monitoring and Audit

Ongoing monitoring of the health and safety practices as well as labour contracts and management will be required. This can be conducted through regular audits, particularly of all the involved contractors, to ensure the Project Owner's expectations regarding health and safety practices are being implemented.

The following monitoring activities are recommended:

- Ongoing monitoring and periodical audit are required to check if the above mitigation measures are implemented;
- Monitoring and audit are also required to be conducted in accordance to the schedule proposed in the management plans relating to air quality, noise and traffic management;
- Monitoring the road condition along the transportation during construction phase;
- Comply with the monitoring and evaluation framework proposed in the relevant Management plans such as Traffic Management Plan, Community Health and Safety Management Plan and Stakeholder Engagement Plan.

## 12.6 Non-influx Impact on Community Health, Safety and Security (Construction)

### 12.6.1 Potential Impacts

General construction activities of an onshore wind project include land clearance, land preparation and civil work, transportation of materials and workers, construction and installation of turbines, and construction of associated facilities including the access road, and transmission line. These activities are likely to generate noise, dust, and risk to the community's health and traffic safety. Without proper management of noise, waste and dust from construction activities, local residents may experience a nuisance. This includes residents living near the construction sites and along the main routes that the Project workforce utilises. It was observed during the site visit that there are dwellings and a number of temporarily scattered agriculture huts of the local farmers within the 300 m radius of the turbine construction sites. Most farmers in their middle and late ages prefer staying in these watch huts during both day and night to look after their agriculture field and livestock. When Project construction work starts, local people might want to stay at their agriculture huts to start their small business to sell fast food and drinks to construction workers. Improper management of the dust, waste and wastewater, noise, and vibration generated during construction activities may cause disturbances or certain health impacts to these families – the main receptors.

Source: ERM's site visit in May 2021

**Figure 12.4 An Agriculture Hut where a Senior Farmer Couple Reside and Sell Drinks to Project Workers**

Potential impacts and consequences of noise, vibration, waste and waste water as well as dust are also discussed in detail in Sections of Noise Impact assessment, Water Quality Impact Assessment, Solid Waste Impact Assessment and Air Quality impact assessment accordingly.

***<u>Health Issues as a Result of Noise, Dust, Vibration, and Waste</u>***

The main sources of noise and vibration in the construction phase are transportation, mobilisation of construction material and operation of heavy machineries during the construction process (main site and transmission line), include piling activities. However, these construction activities do not represent a constant source of noise that will occur on a day-to-day basis for the duration of the construction schedule. These activities are expected to occur for only portions of the work, and will not occur for entire daytime periods. According to the noise modelling results conducted by ERM, The noise level is accelerated by many construction activities, in particular the wind turbine foundation construction which significantly affects to nearby residential areas. Based on the satellite image and data collected during the site survey, 147 sensitive receptors are identified to locate in the radius of 300 m of wind turbines. The nearest identified sensitive receptor is only approximately 39 m away from WTG B2 in Krong Buk 2, Cu Ne Commune, Krong Buk District, Dak Lak Province.

Waste and wastewater from construction are also an impact source on community health if not managed properly. During the construction phase, the domestic waste will be generated from up to 500 workers, non-hazardous and hazardous industrial wastes from construction activities. Improper management of waste and wastewater from construction would result in potential contamination of soil, groundwater and surface water as well as community health risks. The construction impact levels on surface and groundwater (due to rainwater runoff and wastewater discharge) of affected communes were assessed as low in ERM's water quality and waste impact assessment.

Meanwhile, dust may be generated during the earthworks and due to the mobilisation of construction materials to and from the Project site. Construction activities (such as soil disturbing activities, storage of materials such as concrete, and transportation of materials) without proper controls in place are likely to result in dust generation expected during the dry season. Based on the air quality impact assessment results, small-scale and centralized impacts were predicted for the exhaust emissions (from earthworks, construction activities and transportation).

Transportation of hazardous materials and hazardous waste from the construction site to the authorised treatment locations may also cause health risks to residents living by the transportation route or commuters travelling on the same road. The hazardous materials and waste, including engine/transformer oil, solvents, paints, used batteries, discarded lubricant, and fabric, electrical waste, medical waste, etc. may be released to the environment due to inadequate containment or traffic accidents, and consequently cause risks of fire, explosion and contamination of the environment to the community. During the implementation of construction activities, flammable gas, liquid or chemicals will be stored and used. As such, an emergency, such as fire, explosion or oil spill, may occur during the construction phase and may affect the nearby communes. These will be discussed in detail in the Unplanned Event Chapter.

***Unauthorized Access to the Project Site***

Unauthorized access of people nearby, especially children or vulnerable people, to the Project site is also likely to increase the risks of injuries and fatalities of public safety. It is the Project Owner and their contractors' responsibility to take necessary steps to ensure that local people and all workers are safe from activities on construction sites (see Figure 12.5).


Source: ERM's site visit in May 2021

**Figure 12.5 Safety Signal at a Turbine Construction Site which is Close to the Village Road**

***Traffic Safety Issue during the Construction Phase***

The main transportation routes used for equipment and materials for construction activities of the Project are mentioned in Section 2.5.2.5 Transportation of Equipment and Material.

The equipment transportation route is approximately 222 km from Cam Ranh Port in Nguyen Trong Ky Street, Cam Linh, Cam Ranh, Khanh Hoa Province to the Project's sites. The equipment transportation route at some points requires modification by widening the local curves, reinforcing bridges and dismantling line poles and other obstacles in order to meet the transportation requirements and facilitate external traffic conditions. Construction materials (levelling sand, brick, stone, iron, and steel) will be supplied by local vendors in Buon Ma Thuot City, Dak Lak Province or in the vicinities to be transported to the Project's site via transportation road system, through the National Highway No.14 and rural roads. It should be noted from the household survey that that local residents in the surveyed areas are less likely to be satisfied with the rural road system when most of them evaluate it as 'bad' (43.1%) and 'very bad' (2.8%) . A large number of concreted inner village roads have been heavily degraded while some branches of roads in other villages are even still unconcreted and muddy in the rainy season, making difficulties in local mobility and accessibility of cultivation area. As such, mitigation measures should be in place to minimisze the negative impacts.

The traffic safety assessment considers the potential effects of construction traffic on the road network within the vicinity of the Project site on the following aspects of traffic and transportation:

- The capacity of the existing road network to accommodate the traffic volumes generated by the Project; and
- Transportation safety on public roads due to Project-related traffic.

The key activities that are likely to have negative impacts on the local infrastructure and traffic safety include:

- Transport of equipment (turbines and transmission line components and material) from Cam Ranh port to the Project site; and
- Daily movement of construction workers.

In 2020, there were 17 traffic accidents in Krong Buk district, killing eight people and injuring 12 others. The district police made records of 1,335 cases of violations of the Law on road traffic, of which 1,200 cases were fined with the amount of money contributed to the state budget at VND 838.98 million.

As such, a cumulative increase of heavy trucks presence is likely to pose potential impacts to Project affected commune in terms of:

- Degradation of the public road infrastructure and network due to heavy load vehicle movement;
- Traffic congestion due to an increase of traffic movement; and
- Increase of local traffic incidents

- The household interview findings also indicate that local social security is emerged as an urgent issue including concerns related to traffic problems during the construction phase (54.3%), potential accident risks during Project construction and operation (45.7%). Furthermore, according to respondents (46.6%), the local security situation could be further exacerbated and complicated by an influx of non-local resident workers. For community environment, health, and safety, air pollution and local health degradation came out on top concerns claimed by 54.3% and 50.9% surveyed respondents respectively. In addition, noise pollution generated from both Project construction and operation also bother a considerable number of surveyed population, 44.8% and 37.9% respectively.

**Table 12.13 Project Impacts Perceived by the Surveyed Household**

| Project Impacts (%) | | Cu Ne Commune (N=38) | | Cu Pong Commune (N=34) | | Ea Sin Commune (N=24) | Chu Kbo Commune (N=20) | All Surveyed Communes (N=116) | | All Surveyed Communes (N=116) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Kinh | Ede | Kinh | Ede | Kinh | Kinh | Kinh | Ede | |
| Social Security | Traffic during the Project's construction (-) | 13.2 | 18.4 | 2.9 | 20.6 | 83.3 | 85.0 | 42.2 | 12.1 | 54.3 |
| | Migrant labour (-) | 2.6 | 15.8 | 2.9 | 23.5 | 70.8 | 80.0 | 34.5 | 12.1 | 46.6 |
| | Risks of the Project's construction and operation (-) | 2.6 | 18.4 | 2.9 | 29.4 | 66.7 | 60.0 | 31.0 | 14.7 | 45.7 |
| Environment, Health and Safety | Polluted air (-) | 7.9 | 15.8 | 2.9 | 26.5 | 87.5 | 90.0 | 41.4 | 12.9 | 54.3 |
| | Noise during the Project's construction (-) | 2.6 | 10.5 | 2.9 | 23.5 | 79.2 | 80.0 | 34.5 | 10.3 | 44.8 |
| | Noise during the Project's operation (-) | 2.6 | 10.5 | 2.9 | 26.5 | 54.2 | 65.0 | 26.7 | 11.2 | 37.9 |
| | Health degradation (-) | 2.6 | 18.4 | 5.9 | 23.5 | 79.2 | 85.0 | 37.9 | 12.9 | 50.9 |

Source: Socio-economic survey conducted by ERM, July 2021

## 12.6.2 Existing Control

Refer to Chapter 10 for existing controls proposed for dust, noise, traffic safety, and biodiversity impacts.

## 12.6.3 Significance of Impacts

From the assessment of dust, noise, water quality, solid waste and air quality in Chapter 9, given the short construction period (12 months), this magnitude of impacts on local residents were predicted to be Medium as it would likely intermittently affect 147 sensitive receptors are identified to locate in the radius of 300 m of wind turbines and local infrastructure and health and safety of at least four affected communes. The local community's sensitivity was ranked as Medium, taking into consideration that the local communities have raised several concerns on noise and air pollution were raised during the social baseline interviews. Therefore, the significant impact of the community health and safety risk was assessed as **Moderate**.

**Table 12.14 Impacts on Community Health, Safety and Security due to Construction Activities**

<table>
<tr><th>Impact Description</th><th colspan="4">Impacts on Community Health, Safety and Security due to Construction Activities</th></tr>
<tr><td>Impact Nature</td><td colspan="2">Negative</td><td>Positive</td><td>Neutral</td></tr>
<tr><td>Impact Type</td><td colspan="2">Direct</td><td>Indirect</td><td>Induced</td></tr>
<tr><td>Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Long-term</td><td>Permanent</td></tr>
</table>

| Impact Description | Impacts on Community Health, Safety and Security due to Construction Activities | | | | |
|---|---|---|---|---|---|
| Impact Extent | **Local** | Regional | International | | |
| Frequency | Frequent over 12 months of the construction period. | | | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Vulnerability | Low | **Medium** | High | | |
| Impact Significance | Negligible | Minor | **Moderate** | Major | |

## 12.6.4 Additional Mitigation and Management Measures

The Project Owner should implement the following additional mitigation measures to manage the potential negative impacts associated with construction activities:

- Project Owner and their EPC Contractors shall implement the imitation measures proposed in Chapter 10 for dust, noise, water quality, solid waste and air quality impacts to control the construction impacts; and
- Project Owner shall disclose the proposed grievance mechanism to make it accessible for all villagers to report concerns associated with health and safety issues. An immediate investigation shall be undertaken when complaints on accidents or near misses are submitted

In addition to measured proposed in the EPPs, the Project owners should implement the following additional mitigation measures:

- EPC Contractor should ensure:
  - All new drivers (including contractors for construction material transportation) must be licensed with good experience, and should be required to undergo safety training;
  - Flagmen should operate at the junction between the main roads and the access road to coordinate the trucks entering and exiting;
  - Speed limits should be enforced for all Project vehicles;
- The Project Owner should:
  - Together with EPC Contractor, develop a Traffic Management Plan for the construction phase. Procedure for responding to the traffic emergency should also be included in the plan;
  - Conduct disclosure and consultation with the surroundings communities and public facility (school) on key Project traffic routes, timing of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding community, through corporation with the local police to ensure local residents be aware of increase in the level of transportation activities during the Project Construction;
  - Disclose the proposed grievance mechanism so that it is accessible for all villagers to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project will undertake an immediate investigation;
  - Local communities should be familiarised with safety awareness and traffic management such as warning signs, limited speed and notifications of the risks of traffic accidents. This measure will need to be incorporated into a Community Health and Safety Management Plan;

- Project Owner should, where road conditions are poor occur as a result of Project activities, improve the road to ensure conditions meet the standard required for construction vehicle use; and
- Regular road condition monitoring along the transportation route to understand road quality during construction phase.

### 12.6.5 Residual Impacts

As result of implementation of the proposed additional measures, the residual Project negative impact to community safety will be reduced to **Minor**.

### 12.6.6 Monitoring and Audit

The following monitoring activities are recommended:

- On-going monitoring and periodical audit are required to check if the above mitigation measures are implemented at all levels of the Project supply chain; and
- Monitoring and audits are also required to be conducted in accordance with the schedule proposed in the management plans relating to dust, noise, water quality, solid waste, and air quality impacts management.

## 12.7 Impacts Associated with Migrant Workers Influx (Construction)

### 12.7.1 Potential Impacts

It is planed that the Project employs more than 343 workers (more than 50% of them are from the affected communes and district) during the construction phase of 12 months. The Project proponents will endeavour to source employees from the local area, subject to the availability of candidates with the required skills and experience. During construction, the EPC Contractors and subcontractors may arrange for workers to live in purpose-built accommodations. These facilities are expected to be sited, designed, and managed according to the standards specified in the IFC/WBG/EBRD guidance document.

The potential interaction between the workforce and local communities still poses the following risks:

- COVID-19 related risks;
- Increased risks of infectious diseases;
- General disturbance and tension between migrant workers and local communities; and
- Pressure on public service and infrastructure.

***COVID-19 Related Risks***

The global COVID-19 situation is fluid and the duration of the crisis is yet unknown. Potential risks of spreading the virus among the community, especially from workers to local communities and vice versa, are still expected.

***Increased Risks of Infectious Diseases***

Results from the social baseline survey indicated that the common infectious diseases in affected communes were influenza, dengue and hepatitis. From field observation, the main water source in the localities is ground water (from mainly dug wells). While some stated that this water source is safe for their daily use, the others are afraid that it might be alum-contaminated or polluted due to pesticide penetration. Around 10% of surveyed households (N=144) do not have any private toilets, as a result, there is outside defecation in garden areas, in fields or in the forest or some households share toilets with their relatives or neighbours. During the construction phase, the presence of non-local workers in the area may exacerbate the existing health issues in the commune and might lead to an increased risk of diseases, including:

- Water-borne disease associated with poor sanitation of construction site and worker accommodation facilities;
- Sexually transmitted infections (STIs) and HIV/AIDS; and
- Gastro-intestinal diseases and other food borne diseases such as Hepatitis A due to poor standards of food hygiene in site catering facilities including facilities provided in workers' accommodation.

***General Disturbance and Tension between Migrant Workers and Local Communities***

The EPC Contractors and subcontractors may arrange on-site accommodation facilities for non-local workers. As such, interaction between migrant workers and the local residents will not pose a significant risk. However, the presence of a non-local workforce from other Vietnamese provinces may result in the presence of behavioural traits, habits and lifestyle in the community, which may be alien to the local community, especially when the majority of local people are the Ede. These behavioural traits may cause discomfort/ inconvenience to the Ede ethnic minority group resulting in disagreement and conflicts. The potential impacts on the local community include:

- Risk of prostitution: Most non-local workers employed by EPC Contractors and subcontractors are males, living away from home, and most of them will be without families. Therefore, increased demand of sexual services could be possible. Poverty could be an incentive for women to get involved in sex work as an alternative livelihood option for a quick income source. Female-headed/single-mom households seem to be the most vulnerable to this risk. Furthermore, the vulnerability of these women will be increased if these women have babies as a corollary of the unsafe prostitution. In particular, given the temporary nature of contract work, it is possible that both the women and children will be abandoned when the construction phase ends and the contractors move on, leaving a new group of single female-headed households often dependent upon their extended family support networks.
- Increased tension: Conflicts among Project workers and locals can ensue from the use and treatment of local resources, establishment of settlements and difference in treatment of new construction workers and local people. Conflicts may also arise between the local people when the local people's recruitment policy is not transparent and non-equal access to opportunities between affected villages.
- Increased alcohol and drug abuse: The presence of contractual workers may also increase alcohol and drug abuse in the area as the contractor workforce may originate from urban areas where exposure to alcohol and drugs is much more prevalent, which could then be introduced into the local area (see Table 12.5).

**Table 12.15 Security Situations of Affected District and Communes**

| Locality | Security |
|---|---|
| Krong Buk | In 2020, there were 52 cases of violations of the law on social order in the district (a decrease of three cases compared to the same period in 2019), of which 50 cases were investigated and clarified (reaching the rate of 96.1%). The fight against crime and law violation was focused. In 2020, there were 16 cases of economic violation, 15 cases of environmental violation, 11 cases of drug abuse, two explosions, six suicides, three deaths due to drug shock, two deaths due to disease, and one case of food poisoning.<br>In addition, the police force handled 15 cases of illegal religious activities |
| Cu Pong | In 2020, there had been nine cases of violation in the commune, of which:<br>■ Two cases of property burglary; |

| Locality | Security |
|---|---|
| | ■ Three gambling cases involving 15 attendees;<br>■ Three cases of intentional destruction of property; and<br>■ One case of setting off firecrackers.<br>The commune also recorded four other accidents related to suicide (one case), electric shock (one case), drowning (one case), and unknown cause (one case).<br>In addition, seven people involved in the usage of narcotics and illicit drugs were detected. |
| Ea Sin | Regarding the prevention of COVID-19 pandemic, in the first six months of 2021, the commune health station received 34 medical declarations and nine cases for home health monitoring. Up to 29 July 2021, there is no infected case detected in the locality.<br>In term of security, in 2019, Ea Sin commune was the only locality of Krong Buk district to receive the title of "commune free of drug addicts and crimes". In 2020, rural security situation was stable. Specifically, the commune received only 14 crime reports, including six cases of property theft, two cases of murders, two gambling cases, two intentional injury cases, one property destruction case, and one case of violation of regulations on vehicle control. |
| Chu Kbo | Regarding the security situation, in 2020, the CPC directed the Commune Public Security Division to coordinate with relevant departments to strengthen the work of ensuring political security, social order and safety in the commune. However, criminal activities have become more complex.<br>In 2020, 54 cases occurred in the commune, an increase of 29 cases compared to 2019. Specifically, there were five cases of property theft, one property robbery case, one intentional injury case, seven cases of gambling, two cases of unexplained deaths, two cases of illegal drug possession, 22 cases handled administrative violations of illegal drug use, six cases of being compulsorily sent to detoxification establishments, three cases of illegal fireworks, two cases of fire, and three cases of traffic accidents. |

Source: Socio-economic survey conducted by ERM, July 2021

***Pressure on Public Service and Infrastructure***

The surveyed data indicated that overall, local communities in affected communes were satisfied with the availability and accessibility of existing public services, including piped water, electricity, health care, market, and schools (see further the socio-economic baseline on local evaluation public facilities and services including local health stations, schools, water and electricity supply, waste collection, local markets and roads). Given the small number of migrant workers to be employed during the construction phase, it is anticipated to be a minor pressure on these infrastructures and services at the commune level.

***Security Force***

At the time of writing, it was unclear whether the Project will directly employ security staff or contract a private security force to protect their Project site, workers, and assets. The number of security guards to be deployed on-site was also not available. In both cases, the Project's security arrangements might posed threats to local communities in terms of potentially inappropriate use of force, unlawful detention, and sexual violence/harassment against women.

## 12.7.2 Existing Control

Some mitigation measures were provided in the local EPP including management of workers/ staff and collaboration with local authorities for security status updates, as follow:

- Coordinating with local authorities and relevant agencies to organize programs such as education and awareness raising for workers in terms of health and safety measures, and how to minimize or avoid conflict with local people;

- Coordinating with local authorities to manage temporary resident registration for migrant workers and to monitor social security in the area where migrant workers will be accommodated.
- No measure was proposed for the protection of local workers' right, health and safety. No gender mainstreaming measure in place to address gender-based violence and sexual harassment.

### 12.7.3 Significance of Impacts

Given the proportion of migrant workers compared to the total population of the Project's footprint area and their relatively short presence in the area (12 months of construction phase), the impact magnitude of the influx-induced risks was assessed as Small. Given the significant number of Ede ethnic minority group in the Project area, the existing health conditions of local people, and reliable availability of local infrastructure the vulnerability of the community was deemed Medium, resulting in the impact significance of the influx worker issues as **Minor**.

**Table 12.16 Impacts on Community Health, Safety and Security due to the Presence of Influx**

| Impact Description | Impacts on Community Health, Safety and Security due to the Presence of Influx | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | | Positive | | Neutral |
| Impact Type | **Direct** | | Indirect | | Induced |
| Impact Duration | Temporary | **Short-term** | | Long-term | Permanent |
| Impact Extent | **Local** | | Regional | | International |
| Frequency | Frequent over 12 months of the construction period. | | | | |
| Impact Magnitude | Positive | Negligible | **Small** | Medium | Large |
| Receptor Vulnerability | Low | | **Medium** | | High |
| Impact Significance | Negligible | **Minor** | | Moderate | Major |

### 12.7.4 Additional Mitigation and Management Measures

The Project Owner should implement the following additional measures to maintain the impact level associated with the presence of migrant workers:

- Project Owner and their EPC Contractors shall strictly follow the Government's instructions on COVID-19, including compulsory COVID-19 tests and quarantine for migrant workers as well as wearing of face masks;
- Project Owner should develop a COVID-19 monitoring and response team, who are tasked with outbreak tracking and protocols and procedures developments as appropriate in line with local and national requirements and guidelines;
- Strictly follow the Government's instructions on COVID-19, including compulsory COVID-19 tests and quarantine for migrant workers, wearing of masks. The Project Owner should develop a COVID-19 monitoring and response team, who are tasked with tracking developments in the project countries and provinces, developing protocols and procedures as appropriate in line with local Government and international requirements and guidelines;
- Project Owner and their EPC Contractors shall conduct compulsory medical examinations (i.e. bi-annual health check-ups) for Project workers, including contractors, as required by national regulations, to ensure they are fit for work and to monitor the prevalence of communicable diseases
- Project Owner and their EPC Contractors shall ensure the health and safety of all workers and local communities by complying with relevant regulatory national requirements and international

best practices on medical safety and food hygiene on the construction sites if there will be installed canteens among the working areas and in the workers´ accommodation areas that are equipped with canteens;

- The Project Environmental and Social Focal Point should assign and deliver induction training to guide requirements for culturally appropriate behaviours, and an overview of the risks to migrant staff and workers. The training will include key cultural sensitivity awareness topics/programs to ensure workers, including security staff, do not unintentionally offend the local community;
- Project Owner and their EPC Contractors shall regularly engage with local authorities relevant to crime (i.e. local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation purposes when Project influx-related issues arise;
- A Code of Conduct, including requirements on social interaction with the local community, gender awareness, vulnerable groups and environmental protection obligations, shall be developed for all involved staff and workers within the construction site (including all subcontractors). An appropriate mechanism to address non-compliance shall also be included as part of the labour contract. All staff and workers within the construction site shall be trained and made aware of the Code of Conduct;
- Project Owner should establish and implement regulatory requirements and good practices in relation to a background check, hiring, rules of conduct, training, equipping of security personnel;
- Project Owner shall ensure that training to security force will include adequate and clear requirements in using force and appropriate conduct toward workers and affected communities. Project Owner shall not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat; and
- Project Owner shall implement the Stakeholder Engagement Plan and disclose a grievance mechanism for workers and affected communities to express concerns about the Project-related issues as well as security arrangements and acts of security personnel.
- Establish a Local Recruitment Policy in the Labor Management Plan which commits a certain percentage of local recruitment, including women from local communities;
- Establish employment practices to check legal worker age in identification document upon recruitment to ensure no child labour or forced labour;
- Establish employment practices that ensure workers are provided an easy to understand contract that specifies working hours, overtime hours, breaks, and holidays;
- Establish employment practices that ensure workers are paid appropriately and in a timely manner, informed by national standards and industry benchmarks;
- Establish safeguards if recruitment agents are utilised. This includes pre-screening of potential agents and establishment of appropriate contractual obligations with the agent to ensure appropriate oversight is in place (so that workers are not placed in debt);
- Develop Influx Management Plan integrated in the Labor Management Plan including specific gender sensitive measures such as training for workers on gender based violence, including sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community, and commitment/policy to cooperate with law enforcement agencies investigating perpetrators of gender-based violence;
- Establish safeguards to avoid gender-based violence and sexual harassment in the work place;
- Ensure the provision of occupational health and safety measures, including but not limited to: resting area and enough resting breaks during working hours, free PPEs.
- Disclose a grievance mechanism for workers. This should include an option for grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain,

should have access to a grievance mechanism to ensure that their issues and concerns are identified and addressed. Contractors should be required to inform the Project about grievances raised. Disclose the grievance mechanism to workers and local people;

- Collaborate with local/relevant authorities to organise educational or awareness-raising programs for local workers about their rights;
- EPC Contractor should register temporary residence for non-local workers to local authorities to ensure the management of Project's related workforce; Regularly engage with local authorities relevant to crime (i.e. local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation purposes when issues arise;
- EPC Contractor should conduct compulsory medical examinations (i.e. annual health check-ups) for Project workers, including contractors, as required by national regulations, to ensure they are fit for work and to monitor the prevalence of communicable diseases detected through annual medical check-ups;
- Project Owner should develop Human Resource policies and procedures as well as Project Code of Conduct with an adoption of EPC contractors, and disseminate these to all workers including workers of contractors and ensuring their compliance. HR policies and procedures include commitment to non-employment of child labor and forced labor, non-discrimination and equal opportunity, respect for freedom of association, and aspects pertaining to working conditions, retrenchment, and worker accommodation as required applied for all types of employees;
- Project Owner and EPC contractors should ensure that the accommodation for immigrant workers meet the standards as guidance provided in the "Workers and Accommodation: Process and Standards" – a Guidance note by IFC and ERBD; Workers Accommodation Management Plan will be prepared with gender sensitive measures;

### 12.7.5 Residual Impacts

As a result of the implementation of the proposed management measures, the impact on community health, safety and security associated with a non-local presence is expected to reduce **Negligible** throughout the Project construction period.

### 12.7.6 Monitoring and Audit

The following monitoring activities are recommended:

- Ongoing monitoring and periodical audit are required to check if the above mitigation measures are in implementation.
- Comply with the monitoring and evaluation framework proposed in relevant management plans (i.e. Labor Management Plan, Workers Grievance Mechanism in SEP) during the implementation of these plans.

## 12.8 General Disturbance to Local Community (Operation)

### 12.8.1 Potential Impacts

During the operation phase (about 20 years), disturbance to the local communities mostly comes from the impacts from workers' presence, operation and maintenance of the turbines and substations.

The number of workers will be reduced to 42 staff/workers for the operation phase. Hence, community health issues associated with migrant workers' presence such as the transmission of communicable diseases or conflict between workforce and local communities, include littering and noise, fighting due to heavy drinking, and gambling, are expected to be minimal. Potential cultural conflict and tension due to the difference in culture and living style between the migrant and local people are also not expected during this phase.

Operational traffic impacts will be associated with emissions from a limited number of vehicles accessing the site for maintenance or security purposes. The potential impacts on traffic from operation activities (e.g. wind turbine generator operations, inspection and maintenance) are considered negligible, so no further assessment is needed.

Shadow flickers and visual impact to community health and safety are discussed in further details in the Section 10.7 and Section 10.8 accordingly. A total of 312 sensitive receptors are identified under the impact of the shadow flickering.

Noise from the operation of turbines, substation and transformers of the Project is defined as another potential factor caused nuisance and disturbance to surrounding community. Noise impacts from the Project's WTGs operations are discussed in details in the Section 10.2– Noise Impact Assessment. As mentioned in Section 10.2.3.1.3, due to a dense of sensitive receptors situating around the WTGs, the impact associated with noise accelerates significantly during the operation phase. Overall, the negative impact is ranked as being of Major significance.

The risk from blade throw will be assessed in the Unplanned Events Chapter. Within the impact zone of Blade Throw, there are approximately 147 sensitive receptors living near the Project's site.

### 12.8.2 Existing Control

Refer to Chapter 10 for existing controls proposed for dust, noise, water quality, solid waste and air quality impacts during operation phase.

### 12.8.3 Significance of Impacts

The magnitude of the aforementioned impacts was predicted to be Medium during operation as a result of related impact assessments above. Although the local community will have already had experience with the disturbance from construction, the impacts from the operation are expected to be different in nature and impact sources such as noise from the operation of turbines and transformers and the physical presence of turbine. The receptor sensitivity was considered as Medium, resulting in the impact significance being **Moderate**.

**Table 12.17 Health and Safety Impacts and General Disturbance to Local Community**

| Impact Description | Health and Safety Impacts and General Disturbance to Local Community | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Sensitivity | Low | **Medium** | High | | |
| Impact Significance | Negligible | Minor | **Moderate** | Major | |

### 12.8.4 Additional Mitigation and Management Measures

The Project Owner is required to implement the additional measures as proposed in Noise Impact Assessment, Visual Impact Assessment and Shadow Flicker Impact Assessment and other measures as below:

- As part of the Project SEP implementation, Project Owner should conduct close communication with local communities on Project environmental and social risks. Future risk-communication efforts will be undertaken in the context of continuing, intense social distrust and will have to be designed in a culturally appropriate way;

- Project Owner shall implement community grievance mechanism is implemented to obtain and resolve community's feedback and concerns in a timely manner;
- Project Owner shall ensure the implementation of community health and safety management and emergency preparedness and response measures are effectively maintained;
- Project Owner shall conduct regular compliance assessments; undertake site visits as required, identify any environment-related and social-related issues; and
- Project Owner shall document issues, propose necessary corrective actions, and prepare these in a corrective action plan.

To remain the significance of the impact as minor or reduce to negligible, the Project is required to implement the additional measures as proposed in Sections of Noise Impact Assessment, Visual Impact Assessment and Shadow Flicker Impact Assessment and other measures as below:

- Project Owner should keep implementing the SEP including grievance procedure during the Project's operation;
- Project Owner should keep implementing the CDP to support the local people in improvement of their socio-economic conditions. The CDP should be implemented throughout the Project's operation period and considered as Corporate Social Responsibility program of the Project Company;
- Basic skill requirements for operation phase should be announced at least six months in advance so that local people can have appropriate training orientation for themselves;
- Local procurement should be promoted during operation of the Project. In particular, the Project should use local foods/products and local supply to enhance benefits to the local communities.

### 12.8.5 Residual Impacts

Following the implementation of proposed additional measures, the residual impact is expected to be reduced to Negligible.

### 12.8.6 Monitoring and Audit

The following monitoring activities are recommended:

- Ongoing monitoring and periodical audit as proposed in the ESMP to ensure the above mitigation measures are in implementation, and
- Monitoring and audit are also required to be conducted in accordance to the schedule proposed in Chapter 10 for Noise Impact Assessment, Visual Impact Assessment, and Shadow Flicker Impact Assessment

## 12.9 Relocation Impact Due to Health and Safety Reasons (Operation)

### 12.9.1 Potential Impacts

The potential operation phase's impacts on communities due to Health and Safety Reasons still poses the following risks:

- Blade ejection failure (see further in Chapter Unplanned event, section Blade Ejection Failure);
- Noise impact (see further in Chapter Environmental Impact Assessment, section Noise Impact Assessment); and

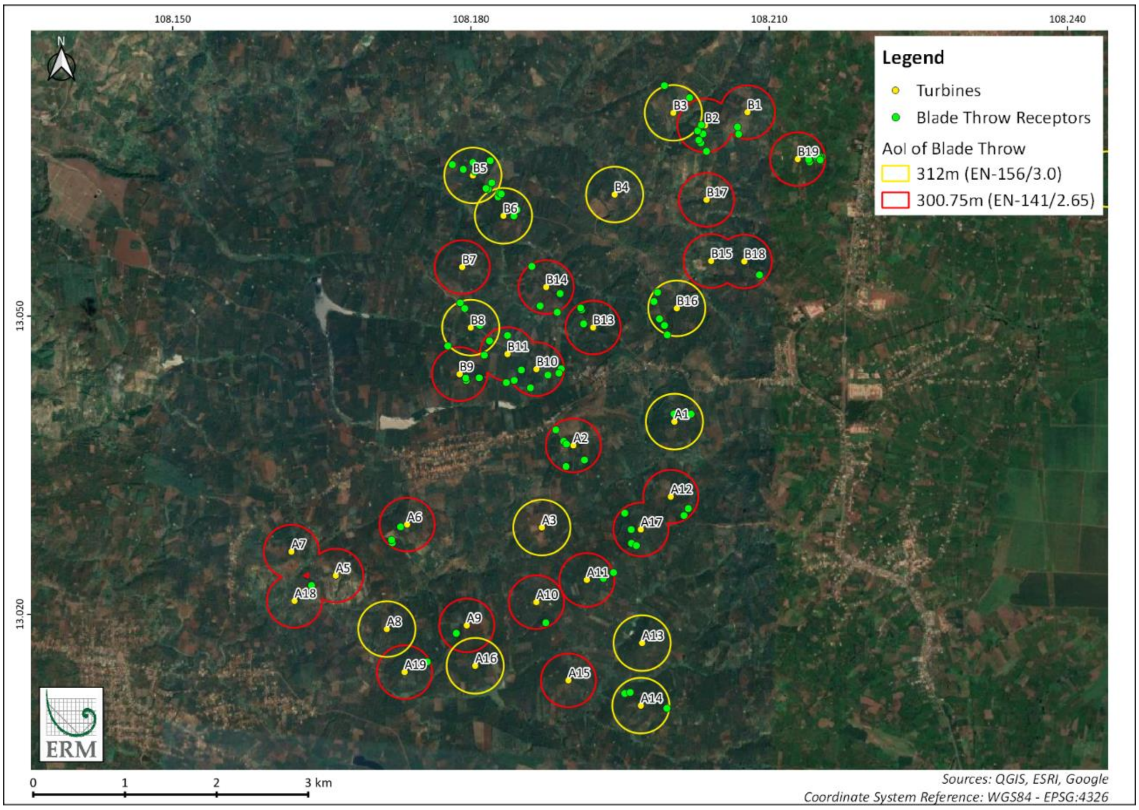
- Shadow flicker impact (see further in Chapter Environmental Impact Assessment, section Shadow Flicker Impact Assessment).

As mentioned in Section 10.2, the noise modelling based on Project's wind turbine specification has concluded that households residing within a radius of 300 m from the turbine ground may be exposed to significant noise impacts from the turbine operation.

Additionally, according to Article 11 of Circular No. 02/2019/TT-BCT dated 15/1/2019 by the Ministry of Industry and Trade on wind power project development, the wind power work must be 300 m away the residential area. Although the huts/houses nearby the wind turbine built on the cultivation area and not considered a residential area, living in the farm watching huts/houses is part of the Ede ethnic minority people's customary practice in the area, and many of them live all day long in the huts/houses. Also, there are newly developed residential areas (see Figure 12.10).

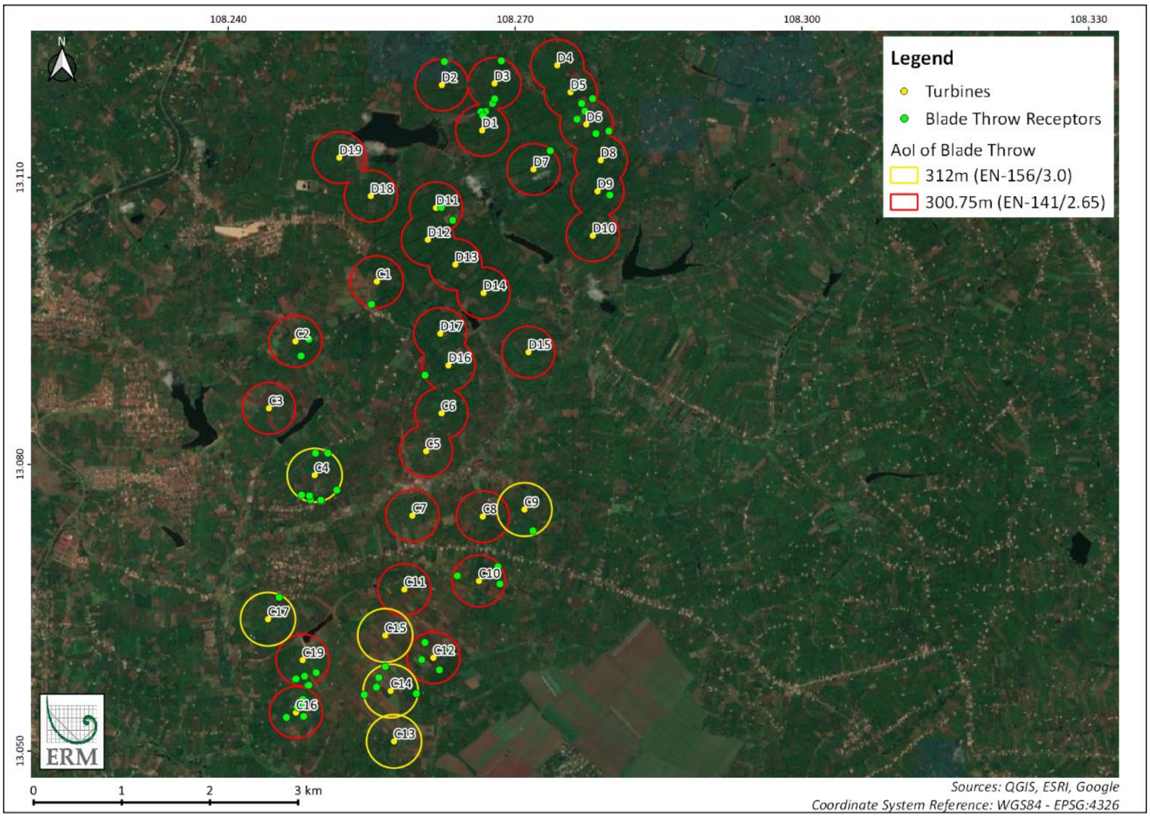
Based on modelling and GIS mapping analyses, there are:

- Approximately 147 sensitive receptors (103 sensitive receptors in 300.75m of wind turbine EN-141/2.65 and 44 receptors in 312m of wind turbine EN-141/3.0) within the impact zone of blade throw;
- 32 sensitive receptors associated with eight WTGs with predicted high noise exceedance; and
- 312 sensitive receptors are identified under the impact of the shadow flickering based on real case scenario.



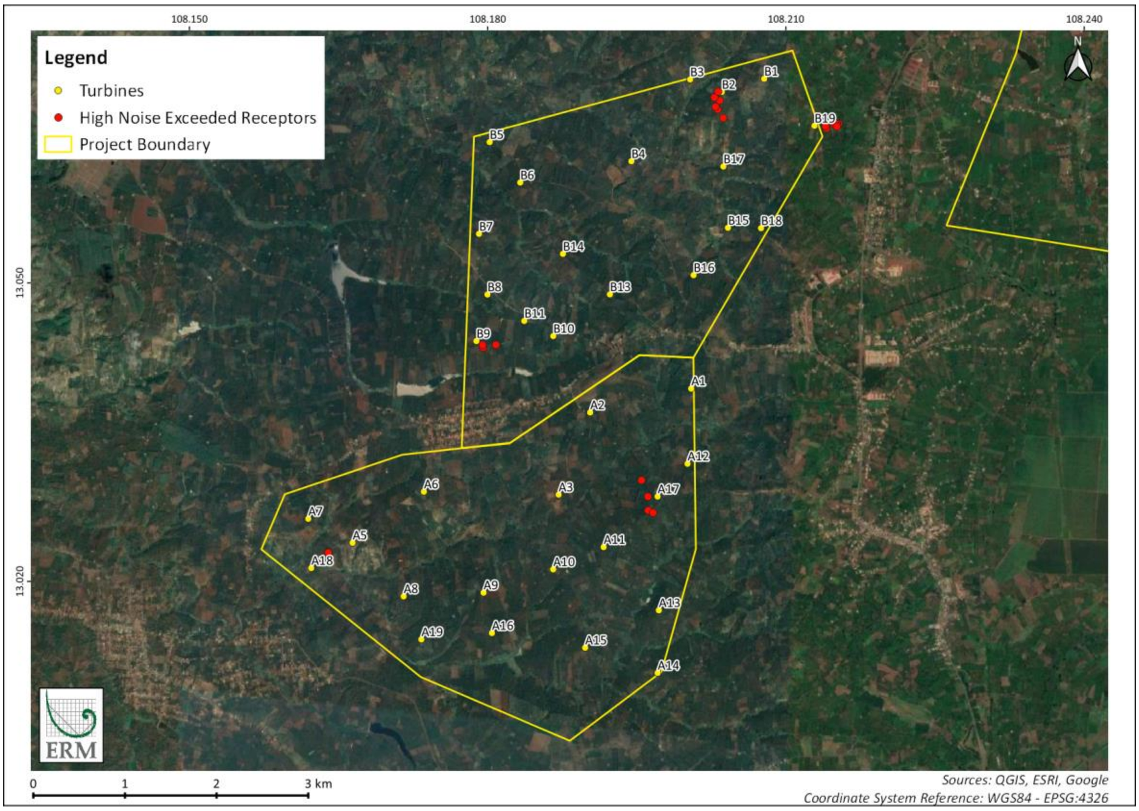

Source: QGIS, ESRI, Google,October 2021

**Figure 12.6 Blade Throw Receptors – Krong Buk 1&2**



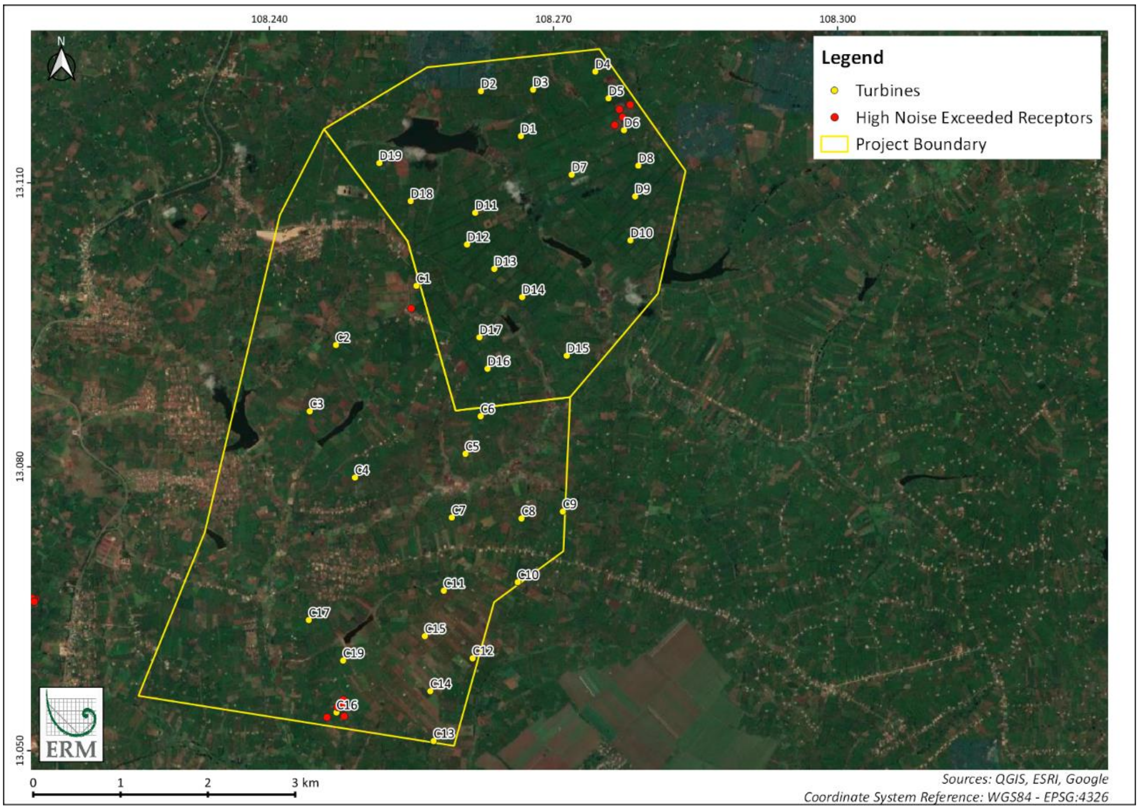

Source: QGIS, ESRI, Google,October 2021

**Figure 12.7 Blade Throw Receptors – Cu Ne 1&2**




Source: QGIS, ESRI, Google,October 2021

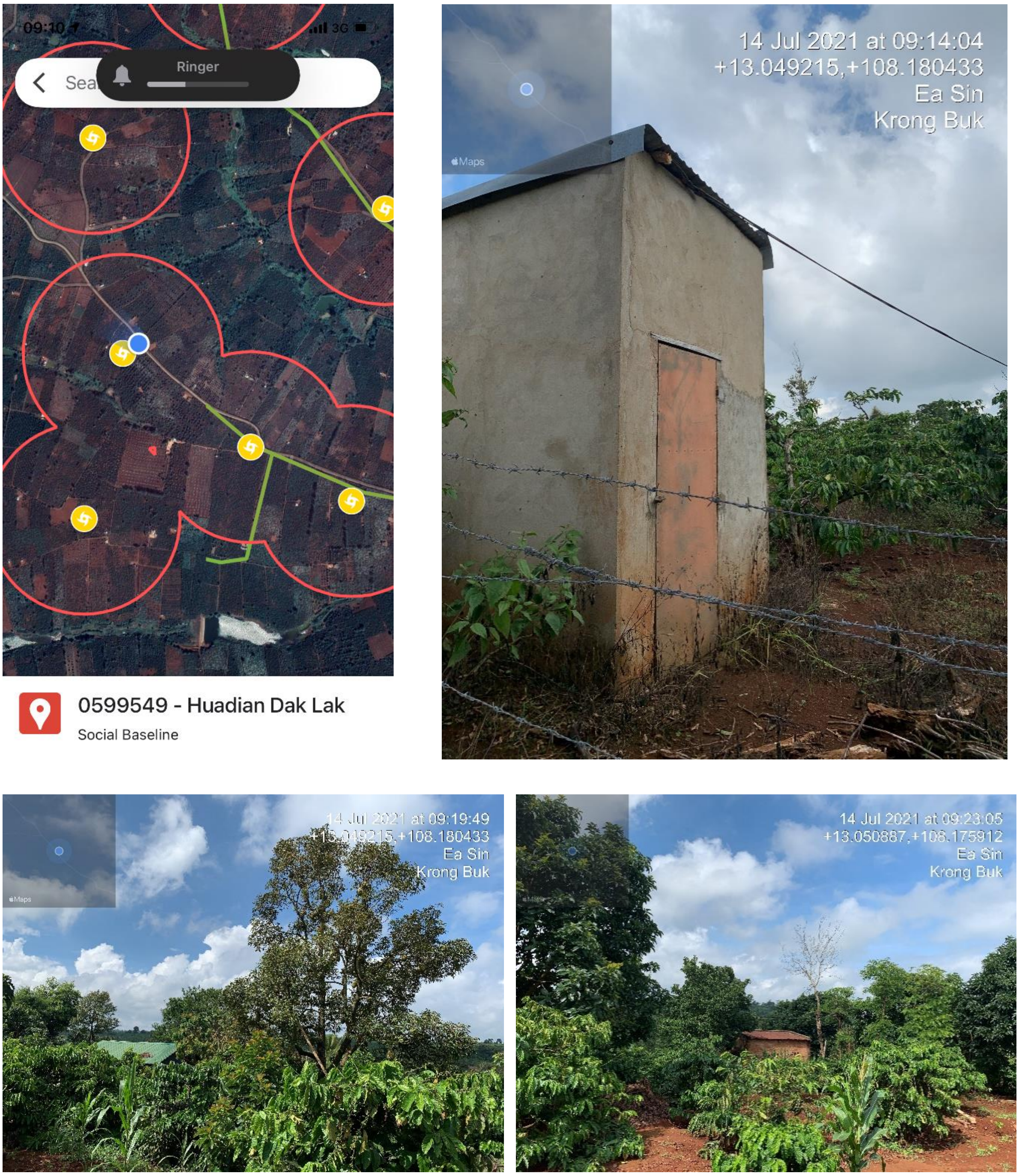
**Figure 12.8 High Noise Exceeded Receptors – Krong Buk 1&2**




Source: QGIS, ESRI, Google,October 2021

**Figure 12.9 High Noise Exceeded Receptors – Cu Ne 1&2**

In case of dwellings experienced shadow flickering, a detailed grievance mechanism should be available and the local community must be aware of the availability of grievance mechanism to submit their complaints regarding nuisances related to shadow flicker from turbines. Ensuring close monitoring through engagement with local stakeholders including informing to affected communities during the operational phase where there are predicted impacts from shadow flickers. It is suggested that additional field survey to understand if there are really affected households by these three phenomena (e.g. shadow flicker, noise, and blade throw impacts) then according to the results, more mitigation measures are to be imposed and determination is made if relocation of the impacted receptors is needed.




Source: ERM's site visit in July 2021

**Figure 12.10 Some of the Sensitive Receptors of Blade Ejection Failure**

## 12.9.2 Existing Control

No existing control in place.

## 12.9.3 Significance of Impacts

Dwelling and farm watching house relocation impact nature is considered as negative impact as it will take away some of the affected people's access directly. While it required validation surveys and consultations with affected persons over different phases of the Project, the relocation would cause permanent agricultural land loss and physical displacement to affected people who stay in the house and most of them will experience access restriction to their land during construction and operation. The impact magnitude is Large.

The vulnerability profile among affected households can be said to be high as they are an ethnic minority and many of them have illiterate breadwinners with limited skills to change their job but still manage to gain enough income to pass the poverty income rate. Losing their land or relocation due to health and safety reason can be perceived as high impact to them as it might not be their intention to sell or move away from their land as it is the key source of their livelihood as a farmers. Therefore, receptor sensitivity is High, leading to the physical displacement impact significance being **Major**.

**Table 12.18 Physical Displacement Impact from Land Acquisition Due to Safety Zone**

| Impact Description | Physical Displacement Impact from Land Acquisition Due to Safety Zone | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | Long-term | **Permanent** | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | Small | Medium | **Large** |
| Receptor Sensitivity | Low | Medium | **High** | | |
| Impact Significance | Negligible | Minor | Moderate | **Major** | |

## 12.9.4 Additional Mitigation and Management Measures

The following additional mitigation and management measures are recommended in order to meet international standards:

- Conduct Validation Surveys to verify sensitive receptors as residential dwellings (e.g. type of structure, use, any humans residing permanently in these, etc.).
- Monitor the land acquisition process to ensure it complies with Vietnamese regulations, AIIB and IFC performance standards. This activity should be supported by documentation recording the land acquisition process. This will be required for internal and external audits accompanied by LAA, RLRF, and RLRP.
- Based on the CSR completion report, identify the gap between national, AIIB ESS2 and IFC PS 5 requirements on land acquisition and resettlement. Then formulate a Corrective Action Plan to close the gaps found.
- Prepare and include a SEP within the ESIA which covers Grievance Management Plan (GMP). GMP should be disclosed to the affected communities prior to the Project's construction implementation. As such, the affected community is aware of communication's grievance lines and understand how to submit a grievance.
- Continuously coordinate with commune PC to solve any submitted grievance relevant to land acquisition activities.
- When physical relocation is confirmed, Project shall develop and implement the Resettlement and Livelihood Restoration Plan (RLRP) for those identified as Project affected households. The LARP will be designed to ensure sustainable restoration and enhancement of income for impacted land users including the institutional arrangement, grievance redresness mechanism, and budget for each ativities. The Project Owner should priority the relocation before the turbine construction occurs to also minimise the disturbance impacts cause by the construction activities to the local

people staying in the huts/houses. The RLRP should take into account the women and other vulnerable groups to ensure they are not overlooked during Project implementation and left worse off.

### 12.9.5 Residual Impacts

With mitigation measures in place, the project may reduce the impact to **Moderate** significance along the year of project operation.

### 12.9.6 Monitoring and Audit

The following monitoring and audit actions are recommended:

- Prepare the Completion report for the land acquisition process.
- Monitor implementation of the RLRP on a quarterly basis.
- Prepare the Completion report for the RLRP.
- Maintain Consultation and Grievance records in relation to land acquisition.

## 12.10 Positive Impacts on Local Employment and Community Development (Construction and Operation)

### 12.10.1 Potential Impacts

The potential impacts on local employment and business during the Project's construction phase are considered as follow:

- Increase local employment and income;
- Provide temporary direct employment for the Project and induced employment opportunities by local suppliers;
- Provide opportunities for small and medium local businesses; and
- Community discontent due to high expectation in business and worker recruitment.

Baseline information showed that the large proportion of the surveyed population obtained primary and lower secondary education. As such, it can be assumed the education level in the Project area is low, which qualifies people for unskilled work.

The construction is expected to employ approximately 343 workers during peak times through direct hire and subcontractor recruitment. The Project Owner and EPC is committed to hiring local people for unskilled and semi-skilled positions. It is foreseen that without training, local people could meet of the required number of local employment, and the increase the employment opportunities for local people, training should be considered by the Project Owner. As such, the Project will create jobs and extra incomes for a small number of local people during the 12 months of construction phase

With the high percentage of local workers, the demand for services (e.g. groceries, restaurants, hairdressers, transport) and induced jobs are predicted small.

By the end of the construction phase, worker demobilization will occur. Fifty-four workers including 20 local wokers will work the operation phase. The significant reduction in workforce, as a result, will reduce the local community's income, but the skills and experience gained during the construction could remain and increase the job opportunities in other industries nearby for such local workers.

The impacts to the local economy from employment and business opportunities arising during Project construction and operation include local employment and local procurement. In addition to employment opportunities, the Project will also require goods and services for its construction activities such as construction materials, equipment, cleaning, catering and other hospitality services. However, it is noted from the socio-economic affected communes. Most of local people living close to the Project Site has very limited commercial activities, mainly with mobile traders who are from center of Krong Buk district. Therefore, the above-mentioned opportunities will probably provide additional markets for the existing small and medium local businesses of the Krong Buk district. These may include sands and rocks suppliers, excavator and bulldozer equipment suppliers, restaurants, and lodging providers. On the other hand, grocery suppliers and food provider services might be provided by local business owner.

During the operational phase, the local economy will be positively influenced by an increase in taxation revenue of the Province, demand for materials and services and tourism development. The Project expects to employ 20 local employees (37% of total employees) during the operational phase. According to the local EPP report, while most of the labours during the operation phase will be the skilled labourers and will be likely recruited from outside of the area, priority will be given to the local community of Krong Buk district and Dak Lak province to fill the required unskilled/semi-skilled positions such as security personnel and kitchen support workers.

## 12.10.2 Significance of Impacts

Based on the above analysis, the Project is expected to have a positive impact in terms of employment, procurement and induced job opportunities, and increase the economic condition of the local people.

Given the Project Owner's commitment to optimize local employment and procurement, the Project would likely bring a positive impact to local communities. The impact during construction time is categorized as short-term impact as it is 12 months duration. The Project can give direct benefit to the local economy via tax to the local government. Given the number of economic opportunities possibly created in relation to the scale of local population through the project lifecycle, the impact magnitude is considered Medium. However, the positive impact cannot be achieved without enhancing measures and could create community discontent due to high expectations to be employed and benefit from Project activities, meaning the receptor sensitivity is Low, making the overall impact significance **Minor.**

**Table 12.19 Local Employment and Business during the Project Construction**

| Impact Description | Local Employment and Business during the Project Construction | | | | |
|---|---|---|---|---|---|
| Impact Nature | Negative | **Positive** | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | **Small** | Medium | Large |
| Receptor Sensitivity | Low | **Medium** | High | | |
| Impact Significance | Negligible | **Minor** | Moderate | Major | |

## 12.10.3 Existing Control

No existing control in place.

## 12.10.4 Enhancement Measures

Based on the above analysis, the Project is expected to have a positive impact in terms of employment, procurement, and induced job opportunities and increase the economic conditions of the local people. In order to enhance positive impacts, the following measures are recommended:

- Facilitate employment for local workers (e.g. un-skilled workers and provide adequate training for the tasks to be performed);

- Encourage contractors to hire local labour by the provision of a clear stipulation/commitment of using local labour, particularly in regards to economically displaced households, in the EPC contract and instruct the EPC contractors to prioritise qualified local people as construction workers in accordance with the needs of the Project;
- Communicate clear information about Project-related employment and business opportunities and prioritize local people wherever feasible. Such communication should be conducted at least two weeks before recruitment so that local people have enough time to prepare for the recruitment process (for example, preparing administration documentation for job application.);
- As locals are more likely to qualify for low-skilled jobs, the Project Owner should negotiate with Contractors to provide detailed requirements on educational qualifications and skills for each job opportunity;
- Work closely with local/relevant authorities to synchronize the Project's needs in terms of local labour as well as locals' capacity; and
- Provide grievance mechanism process from the beginning of Project construction process to manage community complaints and expectation on job hiring and purchasing process.

Based on ESIA requirements to optimise the benefits to the local community through employment and business opportunities, the Project Owner should implement the following additional measures to increase the adaptability local communities:

- Project Owner shall formalise, in all contracts, a clause on the Project's commitment to local employment and acquiring local goods and services wherever possible
- The Project Community Development Plan (CDP) should target the promotion of local employment, local business support, and improvement of health and sanitation as recommended during the social baseline interview with local communities. The CDP should also consider priority for women and other vulnerable groups, and
- Project Owner shall track and monitor the community grievance mechanism (as set out in the Stakeholder Engagement Plan) to handle concerns associated with Project employment/workforce recruitment.

### 12.10.5 Residual Impacts

With the proposed measures in place, the impact will be enhanced during the year of Project construction.

### 12.10.6 Monitoring and Audit

The following records are suggested to be kept:

- Number of workers hired local and non-local
- Type and frequency of information disclosure to community and government on workforce hiring
- Number of grievances received regarding workforce recruitment

## 12.11 Impacts on Indigenous Peoples (Construction and Operation)

As concluded in Section 5.2.2, the Ede located in the Project' area fulfil all four characteristics of IPs as defined in the AIIB ESS3 and IFC PS7 and is considered as IPs. Despite their recent significant progress in socio-economic development and high integration into the mainstream society, Ede people have maintained their own cultural uniqueness of a matrilineal system (see further Chapter 9).

### 12.11.1 Vulnerability Analysis

#### 12.11.1.1 High Poverty Rate

According to Decision No. 861/QD-TTg dated on 4 June 2021 by the Prime Minister and Decision No. 433/QD-UBDT on approving the list of Zone III, II, I communes and the list of extremely difficult villages belonging to ethnic minorities and mountainous areas for the period 2021-2025, Krong Buk district has two Zone I communes (Cu Ne and Pong Drang communes), one Zone II commune (Cu Pong commune), and one Zone III commune (Ea Sin commune) with 13 villages categorised as "extremely difficult villages". It should be noted that ethnic minority households occupy 59.4% of the commune households and the number of poor ethnic minority households accounts for 77.2% (or 223 households) of the total number of poor households in the commune. In four Project affected communities, there is a common pattern that ethnic minorities including Ede people have a much higher poverty rate compared to the Kinh households.

- Cu Ne commune: Ethnic minority households occupy 59.4% of the commune households and the number of poor ethnic minority households accounts for 77.2% (or 223 households) of the total number of poor households in the commune.
- Cu Pong commune: There are 1,873 ethnic minority households (accounting for 67.1%), of which 233 households are poor household (accounting for 82.6% of the total poor households in the commune.
- Ea Sin commune: There are 371 ethnic minority households, of which 224 households (71.6%) are classified as poor.
- Chu Kbo: There are 134 ethnic minority households, of which 33 ethnic minority households (20% of the total poor households) are poor.

#### 12.11.1.2 Agriculture Dependency

The analysis of main livelihoods of Ede ethnic minority people as found in the Socio-ecnomic baseline of Vol 2 ESIA, showed that Ede people's livelihoods are not dynamic as agriculture still occupies a major position in their livelihood typology, and on-farm income accounts for the largest share of household income. Low access to education and lack of capital may be great contributors to a less dynamic livelihood strategy of indigenous people. Statistically, the largest percentage of the 226 working people is engaged in land-based livelihoods (91.2% or 206 people), with the majority engaged in cultivation (see Table 12.20). Wage-based livelihoods have a smaller number of population with 19 people or 8.4%. Meanwhile, only one person or 0.4% generates their household income from enterprise-based livelihoods.

**Table 12.20 Main Livelihoods of the Surveyed Working Population**

| Main Livelihoods | | N (226) | % |
|---|---|---|---|
| Land-based | Cultivation | 205 | 90.8 |
| | Husbandry | 1 | 0.4 |
| Wage-based | Public servant | 8 | 3.5 |
| | Company worker | 6 | 2.7 |
| | Day labourer | 5 | 2.2 |
| Enterprise-based | Small business | 1 | 0.4 |

Source: Socio-economic survey conducted by ERM, July 2021

#### 12.11.1.3 Literacy

Most of the surveyed population are literate with 86.7% or 286 people while around 13.3% or 44 people are illiterate (see Table 12.21). Of the 44 illiterate people, there 21 people in working-age group (aged from 28 to 57 years), two people under working age (aged of eight and 14), and 21 over working age (from 58 to 88 years old). While reasons for illiteracy have not been further investigated in the study, this may be attributed to difficult living conditions, poverty, disability, and geographical remoteness.

**Table 12.21 Surveyed Population by Literacy**

| Literacy | N (330) | % |
|---|---|---|
| Illiterate | 44 | 13.3 |
| Literate | 286 | 86.7 |

Source: Socio-economic survey conducted by ERM, July 2021

#### 12.11.1.4 Educational Attainment

Most of the surveyed literate people (92.3% or 264 people) have been attending or completed general education, specifically 33.6%, 36%, and 22.7% at primary, lower secondary, and upper secondary education levels respectively (see Table 12.22). Furthermore, about 2.9% or eight literate people reached university education level (one dropped out, two attending, and five graduated), 1% or three people reached college level (one dropped out and two graduated), and one person completed vocational education (0.3%). It is worthy to note that ten people or 3.5% can read and write even though they have not attended any format education programs.

**Table 12.22 Surveyed Population by Educational Attainment**

| Educational Attainment | N (286) | % |
|---|---|---|
| Literate without schooling | 10 | 3.5 |
| Primary education | 96 | 33.6 |
| Lower secondary education | 103 | 36.0 |
| Upper secondary education | 65 | 22.7 |
| Vocational school education | 1 | 0.3 |
| College education | 3 | 1.0 |
| University education | 8 | 2.9 |

Source: Socio-economic survey conducted by ERM, July 2021

#### 12.11.1.5 Child Marriage and Consanguineous Marriage

Child marriage and consanguineous marriage have been persistent problems among ethnic minority communities in Dak Lak province and have become a barrier to poverty reduction and social security. According to statistics, from 2015 to now, Dak Lak province had more than 2,600 cases of child marriage. According to the socio-economic survey of 53 ethnic minorities in 2019, the rate of child marriage[65] in Dak Lak reached 29%, mostly concentrated in Ea Sup, Krong Buk, Ea H'leo, Krong Bong,

[65] Phuc An (2020) and Vietnam Academy for Ethnic Minorities (2020)

M'Drak, Krong Pac, Lak, and Cu M'gar districts. The province recorded 1,815 consanguineous marriages in Ede, M'Nong, Mong, Tay, Nung, Dao, and Gia Rai communities in 2019. Child marriage and consanguineous marriage are more prevalent in Zone III communes and extremely difficult ethnic minority villages than in other areas.

The study recorded a small number of child marriages in the surveyed villages. Two Ede surveyed men in Kdro 2 village of Cu Ne commune and Cu Hriet village of Cu Pong commune were married despite their under-marriage-age status.

### 12.11.1.6 Challenges of Ede Community Development

In the course of Ede ethnic minority development, there are some challenges to surveyed communities in terms of local infrastructure, public services, environment, and social security according to evaluation of the surveyed households (see Table 12.23). Specifically, common difficulties of local infrastructure are normally asociated with low quality and degrading roads and limited public services such as water, electricity, and market. Environmental pollution is also a worrying problem in the locality along with local insecurities due to social evils and the influx of migrant workers during the implementation of many existing industrial projects in the locality. Consistently, the findings from KIIs showed that social evils including bike racing, thieves, drunkards, fighting, and even drug use are commonly reported among young people, especially Ede community in Cu Hriet (Cu Pong commune), Drah 1, Drah 2, and Ea Siek (Cu Ne commune).

**Table 12.23 Main Ede Community Challenges**

| Challenges | Description | No. of Responses by Surveyed Households | Cu Pong Commune | | Cu Ne Commune | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Cu Hriet | Ea Bro | Kdro 1 | Kdro 2 | Drah 1 | Drah 2 | Ea Kung |
| Road | Dusty, unconcreted, and waterlogged roads are causing travel difficulties for local people, especially in the rainy season. | 55 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Market | The market area is far from local residential areas. | 34 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Water | Water shortage for daily usage and irrigation during the dry season, and allum contamination of water sources are common problems. | 27 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Local schools | Degraded school facilities, lack of school facilities, and lack of English classes are challenging local efforts in improving education quality. | 24 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |

| Challenges | Description | No. of Responses by Surveyed Households | Cu Pong Commune | | Cu Ne Commune | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Cu Hriet | Ea Bro | Kdro 1 | Kdro 2 | Drah 1 | Drah 2 | Ea Kung |
| Health stations | Inconvenient location of local health stations and lack of permanent well-qualified medical staff | 18 | ✓ | ✓ | | ✓ | | ✓ | ✓ |
| Internet and mobile services | The Internet and mobile connection in the surveyed areas is slow and unstable. | 5 | ✓ | ✓ | | | ✓ | | ✓ |
| Other infrastructures | Street lighting system, cemetery building, and community building are recommendations from respondents | 13 | ✓ | ✓ | ✓ | | | ✓ | |
| Environment | Environmental pollutions (i.e. indiscriminate littering, household solid waste incineration, household wastewater, and coal production) | 33 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Local security | Social evils such as bike racing, thieves, drunkards, fighting, and even drug use occur in the surveyed communes. In addition, traffic accident and risks from the influx of migrant worker also emerge in the locality. | 28 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Source: Socio-economic survey conducted by ERM, July 2021

## 12.11.2 Potential Impacts

***Requirement of FPICon/FPIC from Affected IPs Communities***

AIIB ESS3 and IFC PS7 acknowledge that IPs may be particularly vulnerable and will require borrower/client therefore seeks the consent of affected communities when a project has any one of the following three types of activities:

- Commercial development of their cultural resources and knowledge (AIIB and IFC requirement);
- Physical displacement from their traditional or customary lands (AIIB and IFC requirement);
- Commercial development of natural resources within customary lands under use that would impact the livelihoods or the cultural, ceremonial, or spiritual uses that define their identity and community (AIIB and IFC requirement); and

- Use of cultural heritage, including knowledge, innovations, or practices of Indigenous Peoples for commercial purposes (IFC requirement)

Findings from the ERM scoping and social baseline study revealed that the livelihoods of Ede people highly rely on land-based production and that land acquisition impact is on individual households who belong to the Ede ethnic minority. It is unlikely that the Project's land acquisition will affect any land/ natural resources that are under customary use of Ede community. It is important to note that further relocation might to take place due to land acquisition impacts induced by noise impact on sensitive receptors, shadow flickering and blade throw. Such circumstances would require through additional fieldwork to confirm the exact number and type of residential dwelings and if so, perform consultations with affected households through this additional fieldwork. According to the information provided by the Project Owner and local authorities, physical displacement (if any) may induce relocation of IPs from their household's land or natural resources subject to traditional ownership or under customary use by IPs.

No impact on the cultural heritage are anticipated at time of this reporting. The project will not make commercial use of Ede cultural heritage or traditional knowledge and practices. Therefore, the FPICon/FPIC and consent through broad community support is not required (see detailed in Vol 1 ESIA). However, proper Informed Consultation and Participation (ICP) according to IFC PS7 with the Ede community is required to action through the implementation of a Stakeholder Engagement Plan.

***Land Acquisition and Livelihoods Impact***

As mentioned above, as Ede people are identified as a forest/natural resource dependant community, the loss of land will potentially lead to Loss of livelihood and/or income from the land-based livelihood, and thus a more vulnerable status to those households.

Social/cultural conflicts among the community might arise. Local people may lose trust in the local authority and Project Owner when they are not able to ensure equality in terms of compensation payment for land acquisition.

***Impacts on Health, Safety and Security***

Project's impacts on health, safety and security due to labor influx and activities during construction are discussed on the previous sections. These impacts would be of higher significance on ethnic minority people and communities given their low educational background, high dependency on natural resources, and limited modern healthcare access.

There is an increase in the percentage of local people concerning the threats associated with migrant workers to women. First and foremost, due to the COVID-19 epidemic context, local people are afraid of diseases which go along with the influx of migrant workers to their community. In addition, since there are many strangers coming to the village, local women will have a certain degree of worry as they do not know who these people are and what their backgrounds. Furthermore, the social situation in the community will become more complicated and might be dangerous for women in particular. Specifically, they will not dare to go out at night and they always feel insecure when they work in their coffee planting area alone (CP13, male respondent, Ede ethnicity, Ea Bro village, Cu Pong commune, 13 July 2021). It is recommended for both local authority and the Project to closely monitor and manage the migration of non-resident workers.

***Improper Consultation with Affected IPs Communities***

During the socio-economic baseline consultation, the affected Ede communities requested that more information on the Project development should be disclosed to them. Further specific information about the Project include:

- Land acquisition and compensation, support, and resettlement;
- Project implementation timeline
- Employment opportunities for the locals

- Project impacts on community environment
- Project impacts on community health
- What happens to the village or commune when the Project starts
- Negative impact mitigation strategies

They suggested that Project information is communicated through public community consultation, local authorities, or face-to-face meetings. The community consultation should be made available to the local people from the potentially affected communities in an appropriate form, manner, and language, specifically:

- It is crucial to invite all villagers, including men and women, vulnerable and non-vulnerable people to the meetings to get their perspective on the Project activities when necessary.
- The community consultation may be organised through face-to-face interactions or meetings. This may include translation of the Project documents into local ethnic languages verbally by using interpreters at community meetings.
- Pictorial communications and visualised tools will be used frequently during consultation or group meetings.
- The community consultation may be organised in the cultural house and at an appropriate time with consideration to local production schedule.

***Positive Impacts***

The Ede community in the Project area will likely benefit from the upgrade of infrastructure (e.g. upgrading the existing inter-village road and Project's internal and access road) and job opportunities. They are also beneficiaries of as ethnic minority development activities implemented by the Project during the Project construction and operation as suggested in the Indigenous Peoples Plan (IPP).

### 12.11.3 Existing Control

- A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package.
- An Indigenous Peoples Plan has been developed within this ESIA package.

### 12.11.4 Significance of Impacts

Given FPIC is not required, a wide range of impacts from the Project, from livelihoods, to health and security, are predicted in all affected villages where Ede people live. Social and cultural conflict issues might if such potential impacts are not properly communicated and managed. As such, the impact magnitude is Medium

The receptors' sensitivity is assessed to be Medium in terms of high poverty rate, low educational attainment, high dependency on land-based livelihoods, and emerging challenges for community development. Eventually, the Project impacts on Ede livelihoods, way of life and cultural values during the land clearance and construction phase and the operation phase of the Project is assessed as Moderate significance.

**Table 12.24 Impacts on Indigenous Peoples**

| Impact Description | Impacts on Indigenous Peoples | | | |
|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | | Neutral |
| Impact Type | **Direct** | Indirect | | **Induced** |
| Impact Duration | **Temporary** | Short-term | Long-term | **Permanent** |

| Impact Description | Impacts on Indigenous Peoples | | | | |
|---|---|---|---|---|---|
| Impact Extent | **Local** | Regional | International | | |
| Frequency | Throughout the Project's life cycle | | | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Sensitivity | Low | **Medium** | High | | |
| Impact Significance | Negligible | Minor | **Moderate** | Major | |

## 12.11.5 Additional Mitigation and Management Measures

The Project is expected to implement the following mitigation measures:

- Disclose and implement a Stakeholder Engagement Plan during construction and operation. The SEP should include an Informed Consultation and Participation process for the Indigenous Peoples;
- Provide and communicate detailed information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project locations;
- It is recommended that once the ESIA has been finalised, it should be publicly disclosed to local authorities and community, with the participation of Indigenous People. The public disclosure should be in a form that allow two-way communication approach (i.e. public meeting, etc.) and in a culturally appropriate manner and understandable form for local people (non-technical languages). Provide assistance of local language that more familiar with IP context/understanding.
- Review all public consultation process to ensure:
  - The continued access to natural resources independent of Project's land purchasing; and
  - The provision of access, usage, and transit on land that the Project is developing on (i.e. access and use of land within the Project's footprint), subject to overriding health, safety, and security considerations to the Affected Communities of Indigenous Peoples.
- Disclose and implement a community grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative. It should be disclosed in a culturally appropriate manner, with local language and easy to access.
- Disclose and implement the IPP based on the results of socio-economic baseline survey and consultations with relevant local authorities and communities. The implementation of the IPP should propose development programs that aid the avoidance and minimization of negative impacts on IPs, ensure social and economic benefits to IPs in a culturally appropriate and gender responsive manner; and strengthen the social, legal and technical capabilities of IPs to enable them to represent the affected IPs more effectively.
- Include affected IPs households as priority in RLRP and CDP programs when the management plans are developed.
- A Chance Find Procedure should be developed for the pre-construction and construction phase, given that the Project is located nearby the IP's location with probably physical cultural heritage.

### 12.11.5.1 Residual Impacts

As a result of the implementation of the proposed additional measures, the residual impact on lands, natural resources and cultural heritage of the Ede People during construction and operation phases is expected to be Minor.

### 12.11.6 Monitoring and Audit

Comply with the monitoring mechanism proposed in the SEP, IPP, RLRP, CDP and Chance Find Procedure during the implementation of these plans.

## 12.12 Gender Impact Assessment (Construction and Operation)

### 12.12.1 Potential Impacts

***Maintenance of Structural Gender Inequality in Work***

When the Project maintains human resource policy and planning that exclude a gender dimension, structural gender inequality in work might be strengthened. In the renewable energy sector in Vietnam, there is a small proportion of women in management, technical, and field-based roles and a high concentration of women in office positions such as administration, finance, and human resources. Gender awareness in human resource policy should:

- Refer to an understanding of the significance of gender in the positioning of people in the sector workforce, and a recognition that gender affects occupational choices, career patterns and working practices;
- Reflect the need for gender issues to be incorporated into worker training; and
- Relate to the representation of women in decision making in the company and Project.

***Local Women's Ability to Sustain Livelihood***

As indicated in the household survey findings, for women's ability to sustain their livelihood, a large proportion of local respondents (61.8%) stated that women livelihood would not be much affected by the Project implementation (see Table 12.25). This could be explained by the fact that the Project has just been in early implementation state and visible impacts have not been experienced yet. Reportedly, to some extent the Project construction may at best damage the road which is not a major problem as the Project can rehabilitate the road, therefore for women, this is not actually a threat. In addition, it is the employment opportunities generated from the Project that relieve some of the respondents as employment for women can be diverse especially women who are engaged in the business and service sector.

> Since the Project operating in the locality, more job opportunities will be created along with the Project development, businesses will thrive, and women can have better jobs besides cultivation (CN 09, male respondent, Kinh ethnicity, Kdro 1 village, Cu Ne commune, 14 July 2021).

Meanwhile, some respondents (11.1%) addressed some potential impacts on local women regarding women's health, working environment, and women's role in the community (see Table 12.25). Initially, according to the respondents, the Project construction will generate an excessive amount of dust due to vehicle travelling and wind turbine installation which can affect women and community as a whole while they are working near the Project area. Furthermore, this can also obstruct women from working as they have to work near the Project area. In addition, in case the community is affected by the Project, the husband might have to find jobs in faraway places therefore household burden is going to be placed on women's shoulders.

Meanwhile, over a quarter (27.1%) do not have any perception on the given matter as they are either not affected by the Project or they cannot depict any visible impacts.

**Table 12.25 Women's Ability to Sustain Their Livelihood**

| Responses | Cu Ne Commune (N=49) | | Cu Pong Commune (N=46) | | Ea Sin Commune (N=28) | | Chu Kbo Commune (N=21) | | All Surveyed Communes (N=144) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % |
| Yes | 3 | 6.1 | 5 | 10.9 | 3 | 10.7 | 5 | 23.8 | 16 | 11.1 |
| No | 32 | 65.3 | 29 | 63.0 | 14 | 50.0 | 14 | 66.7 | 89 | 61.8 |
| Not clear | 14 | 28.6 | 12 | 26.1 | 11 | 39.3 | 2 | 9.5 | 39 | 27.1 |

Source: Socio-economic survey conducted by ERM, July 2021

***Women's Workload***

Women's workload is also taken into account to consider whether it is increased by the Project development or not, common considerations are associated with accessibility to household production land and production infrastructure. Likewise, 65.3% of the respondents asserted that women workload remains unchanged even under the Project development (see Table 12.26). As shared by the respondents, although the Project may implement in the community, they will keep cultivating on their land plot as it is unchangeable.

Only 7.6% of the respondents depict the increase in women's workload. For these households, they assumed that women will abandon the land plot if there is a wind turbine near their working area. Hence many difficulties will occur during job transition (CN19, female respondent, Ede ethnicity, Kdro 2 village, Cu Ne commune, 15 July 2021). The remaining population (27.1%) do not have any responses on this matter.

**Table 12.26 Increase in Women's Workload**

| Responses | Cu Ne Commune (N=49) | | Cu Pong Commune (N=46) | | Ea Sin Commune (N=28) | | Chu Kbo Commune (N=21) | | All Surveyed Communes (N=144) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % |
| Yes | 3 | 6.1 | 5 | 10.9 | 2 | 7.1 | 1 | 4.8 | 11 | 7.6 |
| No | 33 | 67.3 | 29 | 63.0 | 15 | 53.6 | 17 | 81.0 | 94 | 65.3 |
| Not clear | 13 | 26.5 | 12 | 26.1 | 11 | 39.3 | 3 | 14.3 | 39 | 27.1 |

Source: Socio-economic survey conducted by ERM, July 2021

***Women's Dependency***

Women dependency on men is worth noticing as this depicts the link between genders and gender roles in the household. A similar pattern to the aforementioned parameters can be seen in both the percentage of people who agreed with the idea of women dependency on men may increase and those who oppose, 9.7% and 63.9% respectively (see Table 12.27). First of all, some respondents believe that once women lose their livelihood or are unable to carry on their work due to the impact of the Project, they have to rely on their husband because they find more difficulties to get new jobs apart from cultivation (CN19, female respondent, Ede ethnicity, Kdro 2 village, Cu Ne commune, 15 July 2021).

Meanwhile, others asserted that if there are any possible impacts created by the Project, both men and women will experience an equal amount of influence, hence the dependency due to Project impact is unrealistic (CP40, female respondent, Ede ethnicity, Cu Hriet village, Cu Pong commune, 13 July 2021). In addition, the Project development is also perceived as an opportunity for local women especially those in the business and service area. According to some surveyed people, if women have compensation money from the Project, they will develop household business and become independent on household income, hence they will not have to rely on their husband (CN09, male respondent, Kinh ethnicity, Kdro 1 village, Cu Ne commune, 14 July 2021). In addition, women independency also reflects in the fact that they are able to find jobs on their own, even day labour jobs. This could be because women's role in the community is improved and women can work as equal as men. The remaining 26.4% did not provide any responses.

**Table 12.27 Increase in Women's Dependency on Men**

| Responses | Cu Ne Commune (N=49) | | Cu Pong Commune (N=46) | | Ea Sin Commune (N=28) | | Chu Kbo Commune (N=21) | | All Surveyed Communes (N=144) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % |
| Yes | 3 | 6.1 | 4 | 8.7 | 2 | 7.1 | 5 | 23.8 | 14 | 9.7 |
| No | 33 | 67.3 | 29 | 63.0 | 16 | 57.1 | 14 | 66.7 | 92 | 63.9 |
| Not clear | 13 | 26.5 | 13 | 28.3 | 10 | 35.7 | 2 | 9.5 | 38 | 26.4 |

Source: Socio-economic survey conducted by ERM, July 2021

***Women's Safety***

There is an increase in the percentage of local people concerning the threats associated with migrant workers to women, 26.4% while nearly half of the surveyed households (48.6%) do not think this is a threat (see Table 12.28). First and foremost, due to the COVID-19 context, local people are afraid of diseases which go along with the influx of migrant workers to their community. In addition, since there are many strangers coming to the village local women will have a certain degree of worrying as they do not know who these people are and what their backgrounds are. Furthermore, the social situation in the community will become more complicated and might be dangerous for women in particular. Specifically, they will not dare to go out at night and they always feel unsecured when they working in their coffee planting area alone (CP13, male respondent, Ede ethnicity, Ea Bro village, Cu Pong commune, 13 July 2021). Moreover, community security may be prone to the influx of migrant workers due to the emerging number of social problems such as pretty thieves or conflicts (ES09, male respondent, Kinh ethnicity, Ea My village, Ea Sin commune, 14 July 2021). It is recommended for both local authority and the Project to closely monitoring and manage the migration of non-resident workers.

**Table 12.28 Impacts on Women's Safety Due to the Influx of Migrant Workers**

| Responses | Cu Ne Commune (N=49) | | Cu Pong Commune (N=46) | | Ea Sin Commune (N=28) | | Chu Kbo Commune (N=21) | | All Surveyed Communes (N=144) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % |
| Yes | 16 | 32.7 | 7 | 15.2 | 10 | 35.7 | 5 | 23.8 | 38 | 26.4 |
| No | 19 | 38.8 | 27 | 58.7 | 10 | 35.7 | 14 | 66.7 | 70 | 48.6 |
| Not clear | 14 | 28.5 | 12 | 26.1 | 8 | 28.6 | 2 | 9.5 | 36 | 25.0 |

Source: Socio-economic survey conducted by ERM, July 2021

## 12.12.2 Existing Control

- A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package
- An Indigenous Peoples Plan has been developed within this ESIA package.

### 12.12.3 Significance of Impacts

Based on the above discussions, the Project's gender impacts will mostly relate to the women's livelihoods, work and well-being. Such impacts will be most significant during the pre-construction, construction phase, and its consequence will last for long-term. The impact magnitude is therefore Medium.

However, based on the social survey results, local women found that there is a low possibility of increasing women's workload or dependency on men and destabilising their current livelihoods due to the impacts of the Project. Eventually, it could be concluded that the Project will pose negative impacts on women's livelihoods and health condition during its land clearance and construction phase and the operation phase. The impact significance is assessed as Minor.

**Table 12.29 Gender Impacts**

| Impact Description | Gender Impact Assessment | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | **Positive** | Neutral | | |
| Impact Type | **Direct** | Indirect | **Induced** | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Sensitivity | **Low** | Medium | High | | |
| Impact Significance | Negligible | **Minor** | Moderate | Major | |

### 12.12.4 Additional Mitigation and Management Measures

The Project is expected to implement the following mitigation measures:

- Ensure that the Project's social management plans including SEP, IPP, RLRP, and CDP will include gender mainstreaming measures to ensure women's participation and benefits from all of the Project's activities. This will include but not limited to:
  - Create job opportunities and adequate trainings for women to increase their income, particularly for poor ethnic minority women;
  - Include measures to encourage women's participation in community activities, Project's information disclosure;
- Ensure gender responsive social protection for the labour force during the project implementation and maintenance HIV/AIDS, sexually transmitted infections (STIs), and other communicable diseases
- Contractors are recommended to utilize local work labours giving preference to women labourers in both skilled and unskilled types of labour. For unskilled types of labour, it should be ensured that they are equally paid with men on time and days. Gender responsive social protection for the labour force should implemented by the Project, including awareness raising on and programming responding to the risks of gender based violence;
- Ensure that occupational safety of women labourers are taken care of by contractors; and
- Ensure that women are well informed and have full access to the Community Grievance Mechanism in SEP.

### 12.12.5 Residual Impacts

As a result of the implementation of the proposed additional measures, the residual impact on women in all Project phases is expected to remain Minor**.**

### 12.12.6 Monitoring and Audit

- Comply with the monitoring mechanism proposed in the SEP, IPP, RLRP, and CDP during the implementation of these plans. All of the implementation reports of those plans should include gender issues.
- A mid-program and completion RLRP audit of livelihood restoration measures undertaken by third-party to determine if the livelihoods of displaced people are restored and sustained, and that no further interventions are considered necessary.

## 12.13 Human Rights Impact Assessment (Construction and Operation)

### 12.13.1 Potential Impacts

***Inability of Stakeholders to Participate and/ or Access Remedy***

A lack of engagement could constrain a community's freedom of opinion and expression and access to information. Potentially affected stakeholders have a right to be consulted, and to provide input on the activities that may impact them. To be effective, stakeholders require sufficient project information prior to providing informed feedback.

There is the potential that relevant stakeholders may not be able to participate in the engagement process and/ or grievance process. This is particularly relevant to vulnerable groups. Vulnerable status may stem from an individual's or group's race, colour, gender, language, religion, political or other opinion. Other factors that may be considered include factors such as age, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.

The Project Owner has established a Stakeholder Engagement Plan to support ongoing, active engagement with stakeholders, particularly local communities. The stakeholder engagement plan will be implemented throughout construction, operation and decommissioning, ensuring that stakeholders have access to Project information and grievance mechanisms from affected communities and workers.

***Impact to Workers' Rights, Either Directly by the Project or Within its Supply Chain***

The Project will employ a range of people, both directly and indirectly, during the construction phase (approximately 500 people) and operation phase (42 people). Without appropriate safeguards there is potential for the rights of workers to be impacted, including workers directly employed by the Project subsidiary companies as well as by the EPC contractors and subcontractors engaged by the Project during the construction and operational phases of the Project. Increasingly there is an expectation by stakeholders that a company not only has oversight of its workers, but also its contractors and those involved its supply chain.

Similar to construction, if safeguards are not in place, a range of potential impacts can arise, including discrimination within the workplace, mistreatment of migrant labour or other vulnerable groups, prevention of workers joining trade unions, and use of forced or child labour. If left unmanaged, this can result in instances of modern slavery.

This can ultimately impact on the rights of workers, such as an employee's right to enjoy just and favourable conditions of work, right to freedom of expression, right to freedom of movement, right to form and join trade unions, and right to be free from discrimination, amongst other rights.

***Impact of an Accident or Injury to occur Involving a Worker***

The nature of the Project presents occupational health and safety risks, which can result in impacts on worker rights, specifically their right to life, right to liberty and security, and right to health.

Construction and operation will involve a range of activities that could contribute to or present an occupational health and safety risk, resulting in an accident or injury. The worst case scenario would be a fatality.

***Impact Associated with Employment of Security Personnel***

The Project will employ a range of security measures, including the employment of security personnel. With an aim to minimise health and safety risks associated with having a wind power development in close proximity to local communities. The use of security personnel itself also presents risks. This includes abuse of power and use of inappropriate, disproportionate or excessive force by security personnel. This can impact the safety of nearby communities, and it presents implications for the community's right to life, fair and humane treatment, liberty, and security of person.

### 12.13.2 Existing Control

- A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package
- An Indigenous Peoples Plan has been developed within this ESIA package.

### 12.13.3 Significance of Impacts

Based on the above discussions, human rights impacts involved several rights of affected communities, workers, and other stakeholders, including right to life, right to liberty and security, and right to health, right to enjoy just and favourable conditions of work, right to freedom of expression, right to freedom of movement, right to form and join trade unions, and right to be free from discrimination. Such impacts will be most significant during the construction phase, and its consequence will last for long-term. For this reason, the magnitude of the impact is considered medium.

The project affected areas include the presence of Ede IPs and other vulnerable groups.  Also, the project will recruit a prominent foreign workers in its workforce. As such there are epistemic, social and cultural barriers for the two groups to fully understand and practice human rights in the local context of the Project area. For this reason, the receptor sensitivity is assessed as Medium and the overall impact significance is Moderate.

**Table 12.30 Human Rights Impacts**

| Impact Description | Human Rights Impact Assessment | | | | |
|---|---|---|---|---|---|
| Impact Nature | **Negative** | Positive | Neutral | | |
| Impact Type | **Direct** | Indirect | Induced | | |
| Impact Duration | Temporary | Short-term | **Long-term** | Permanent | |
| Impact Extent | **Local** | Regional | International | | |
| Impact Magnitude | Positive | Negligible | Small | **Medium** | Large |
| Receptor Sensitivity | Low | **Medium** | High | | |
| Impact Significance | Negligible | Minor | **Moderate** | Major | |

### 12.13.4 Additional Mitigation and Management Measures

- It will be important that the Stakeholder Engagement Plan that has been developed to guide ongoing engagement with stakeholders is actively implemented. This should include regular reviews and updates based on stakeholder feedback. Continued vigilance will be needed to ensure ongoing support is provided to vulnerable groups.

- Ensure all workers (including contractors) are aware of their role in the engagement and grievance management processes, as part of the workforce induction process. This should enable grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain, should have access to a grievance mechanism to ensure that workers issues and concerns are being addressed.
- Implement the Project's grievance mechanism. This will provide an appropriate channel for stakeholders to voice their concerns, including opportunities for written and verbal communication. Ensure vulnerable groups are informed of their rights and the ways in which they can communicate their grievance.
- Develop and implement the policies across the Project's supply chain, including:
  - Labour management policies;
  - Community relations policies; and
  - Supply chain policies, including the supplier, vendor and contractor expectations.
  - These requirements should be embedded in relevant contracts, including agreements with EPC contractors.
- Employment practices will ensure that workers are not discriminated against on the grounds of race, colour, sex, religion, political opinion, national extraction, social origin, age, marital or relationship status, sexual orientation or trade union activity, other than in compliance with local content policy. As part of the hiring process, age checks will be conducted.
- Employment practices will ensure that passports or other forms of identification are not withheld. The identification can be stored in a safe location, but workers should always have access to their identification.
- Employment practices will ensure that workers are paid appropriately and in a timely manner, informed by national standards and industry benchmarks.
- Employment practices will ensure that workers are provided an easy to understand contract that specifies working hours, overtime hours, breaks, and holidays.
- Safeguards should be established if recruitment agents are utilised. This includes pre-screening and contractual obligations to ensure appropriate oversight of recruitment fees (so that workers are not placed in debt), and ensure passports or other forms of identification are not withheld.
- As part of the induction process, ensure workers are made aware of their rights.
- Development and implementation a HSE Plan. Provide an induction and on-going training for all workers regarding health and safety, including identification and management of risks and hazards and wearing appropriate personal protective equipment.
- Requirement that workers (including contractors) complete a JHAs prior to undertaking work, as well as daily toolbox discussions to ensure hazards are identified and management measures are implemented.
- Ensuring equipment is well maintained and sufficient lighting is available to maintain a safe work environment.
- Development of a traffic management plan to reduce the risk of accidents.
- Provision of 24/7 medical support to treat minor health issues, provide preventative care, and stabilize personnel; and coordinate with local medical emergency services for a higher level of care as needed.
- Conduct local risk assessments to identify security threats to determine the appropriate security requirements.

- Develop and implement a Workforce Code of Conduct, which outlines workforce behaviour expectations while onsite, in the workers camp and when interacting with local communities. This will apply to the security personnel.
- Document and investigate allegations of human rights abused by public or private security personnel. Report incidents of inappropriate force used by security personnel, and ensure appropriate action is taken to address the incident.
- Take appropriate disciplinary action where required, such as removal of personnel credibly alleged to have committed a human rights abuse.

### 12.13.5 Residual Impacts

As a result of the implementation of the proposed additional measures, the residual impact is expected to be Minor.

### 12.13.6 Monitoring and Audit

Ongoing monitoring of the stakeholder engagement program should be undertaken. Particular attention should be given to ensure that differentiated measures are effectively engaging vulnerable groups, including women, the elderly, the poor, and the disabled.

Additionally, it will be important to monitor and documented allegations of human rights violations, and where necessary investigate and take disciplinary action.

## 12.14 Summary

Significance of the impacts discussed in the above sections before and after mitigation is summarised in Table 12.31.

**Table 12.31 Summary of Social Impact Assessment**

| Sections | Impacts | Significance of Impacts | | |
|---|---|---|---|---|
| | | Impact Nature | Before Mitigation* | With Mitigation** |
| **Pre-construction Phase** | | | | |
| 10.5 | Economic Displacement and Loss of Livelihood due to Land Acquisition for the Project | Negative | Major | Minor |
| **Construction Phase** | | | | |
| 10.6 | Disturbance to Agriculture Production | Negative | Moderate | Minor |
| 10.7 | Impacts on Worker Rights, Occupational Health and Safety | Negative | Moderate | Minor |
| 10.8 | Impact on Community Health, Safety and Security (Non-influx) | Negative | Moderate | Minor |
| 10.9 | Impacts Associated with Migrant Worker (Influx) | Negative | Minor | Negligible |
| **Operation Phase** | | | | |
| 10.10 | General Disturbance on Local Community | Negative | Moderate | Minor |
| 10.11 | Relocation Impact Due to Health and Safety Reason | Negative | Major | Minor |

| Sections | Impacts | Significance of Impacts | | |
|---|---|---|---|---|
| | | **Impact Nature** | **Before Mitigation*** | **With Mitigation**** |
| **Construction and Operation Phase** | | | | |
| 10.12 | Positive Impacts on Local Employment and Community Development | Positive | Positive Impact | |
| 10.13 | Impacts on Indigenous Peoples | Negative | Moderate | Minor |
| 10.14 | Gender Impact Assessment | Negative | Minor | Minor |
| 10.15 | Human Rights Impact Assessment | Negative | Moderate | Minor |

***Note***: *(*) without mitigation measures/management suggested from the ESIA.*
*(**) with mitigation measures/management suggested from the ESIA.*

# 13. UNPLANNED EVENTS

This Chapter presents the probable impacts of unplanned events associated with construction and operation phases of the Project. The unplanned events are considered separately from routine and non-routine activities as they potentially arise from technical failure, human error, or as a results of unexpected natural phenomena.

The assessment of potential impacts arising from unplanned events are based on the environmental baseline data, consultation with China Huadian Engineering Co.,Ltd and judgements based on ERM's professional knowledge, previous experience and good practices. The assessment of unplanned impacts considers the occurring probability of unplanned events and an estimation of the severity of consequences. The assessment of the severity of impacts due to fire and explosion is based on the worst case scenario, where it is assumed that safety devices and associated measures fail to operate properly resulting in the incidents.

## 13.1 Scope of Assessment

This assessment addressed the following unplanned and non-routine events relating to the Wind power project include but not limited to:

- Spillage of fuel, oil, chemicals and hazardous materials
- Traffic including vehicle and vessel accidents
- Fire and explosion, including bushfire and Unexploded Ordnance (UXO)
- Blade throw
- Transmission line snapping, and transmission pylon/tower collapse
- Occupational Health and Safety, and
- Natural hazards.
- This section covers the impact assessment of the above-listed unexpected events by examining the potential and significance of the impacts. Then the set of preventive and mitigation measures are proposed accordingly based on the best practices (as recommended by the IFC EHS guidelines) and relevant national regulations in order to minimise the impact of these arising events during the project's lifecycle.

## 13.2 Relevant Guidelines and Regulatory Requirements

### 13.2.1 Vietnam Regulations

- *Decree No. 02/2019/TT-BCT* regulating Wind Power Development
- *Decision No. 63/2014/QD-TTg* dated 11 November, 2014 on amendments to some articles of the regulation on oil spill response according to the *Decision No. 02/2013/QD-TTg* dated 14 January, 2013
- *Decision No.02/2013/QD-TTg* dated 14 January, 2013 promulgating the regulation on oil spill response
- *Decree No.95/2010/ND-CP* on licensing of and cooperation with foreign search and rescue forces in Vietnam
- *Decree No. 113/2017/ND-CP* dated 09 October, 2017 specifying and providing guidelines for implementation of certain articles of the Law on Chemicals, and
- *Circular No. 32/2017/TT-BCT* dated 28 December, 2017 specifying and providing guidelines for implementation of certain articles of the Law on Chemicals and *Decree No.113/2017/ND-CP* specifying and providing guidelines for implementation of certain articles of the Law on Chemicals.

### 13.2.2 International Standards and Requirements

The International requirements applicable in the Project in terms of unplanned events are applied for this Chapter showed in Table 13.1.

**Table 13.1 Applicable Equator Principles, AIIB ESF, and IFC Performance Standards for Unplanned Events**

| Performance Standard | Requirement |
|---|---|
| ESS1: Environmental and Social Assessment and Management | To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimise, mitigate, offset or compensate for them |
| PS1: Assessment and Management of Environmental and Social Risks and Impacts | Emergency Preparedness and Response<br>Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts the ESMS will establish and maintain an emergency preparedness and response system so that the Client, in collaboration with appropriate and relevant third parties, will be prepared to respond to accidental and emergency situations to prevent and mitigate any harm to people and/or the environment.<br>The preparation will include the identification of area where accidents and emergency situations may occur, communities and individuals that may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially affected communities and periodic training to ensure effective response. The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions. |
| PS4: Community Health, Safety, and Security | Emergency Preparedness and Response<br>The Client will also assist and collaborate with the affected communities, local government agencies, and other relevant parties, in their preparations to respond effectively to emergency situations especially when their participation and collaboration are necessary to respond to such emergency situations. If local government agencies have little or no capacity to respond effectively, the Client will play an active role in preparing for and responding to emergencies associated with the Project. The Client will document its emergency preparedness and response activities, resources, and responsibilities, and will disclose appropriate information to affected communities, relevant government agencies, or other relevant parties. |

## 13.3 Assessment Methodology

The impact assessment methodology is implemented based on the baseline data of sensitive resources and socio-economic conditions as detailed in Chapter 4 of this ESIA. The main purpose of this chapter is to describe the overall approach applied for the assessment process of the impact and how to develop and propose the additional mitigation measures for each unexpected event.

The assessment of significant impact of unplanned events considers the happening probability of event and estimates the consequence severity of the events. Given that unplanned events are often single events that occur irregularly, the assessment also takes into account the frequency and likelihood of the impact.

The mitigation measures prescribed for each of the impacts are based on the international good practices (as recommended under the IFC EHS Guidelines listed above), and national regulatory requirements relevant to unplanned events.

### 13.3.1 Overview

To evaluate potential impacts from unplanned events, a risk-based approach is used to define:

1. The most likely unplanned events leading to environmental, social and/or community health impacts; and
2. Those unplanned events with the most significant potential environmental, social and/or community health impacts overall.

An effective tool namely Risk matrix is used to evaluate the severity of these unplanned events happening during the preparation, construction and operation phases of the project's lifecycle. The assessment principle of the impact significance for these unplanned events is therefore determined by evaluating the combination of the likelihood and consequence factors.

### 13.3.2 Assess the Scale of Consequence (Step 1)

Indicate levels of consequence for potential impacts from unplanned events can be defined for the physical, biological and social environment as provided in Table 13.2.

**Table 13.2 Indicative Level of Consequence for Potential Impacts from Unplanned Events**

| | Incidental (A) | Minor (B) | Moderate (C) | Major (D) | Severe (E) |
|---|---|---|---|---|---|
| **Physical Environment** | Impacts such as localised or short term effects or environmental media, meeting all environmental standards | Impacts such as widespread, short-term impacts to environmental media, meeting all environmental standards | Impacts such as widespread, long-term effects on environmental media, meeting all environmental standards | Impacts such as significant, widespread and persistent changes in environmental media OR<br>Exceedance of environmental standards | Exceedance of environmental standards and fine/ prosecution |
| **Biological Environment** | Impacts such as localised or short term effects on habitat or species | Impacts such as localised, long term degradation of sensitive habitat or widespread, short-term impacts to habitat or species | Impacts such as localised but irreversible habitat loss or widespread, long-term effects on habitat or species | Impacts such as significant, widespread and persistent changes in habitat or species | Impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species. |
| **Social Environment** | Slight, temporary, adverse impact on a few individuals | Temporary (<1 year), adverse impacts on community which are within international health standards | Adverse specific impacts on multiple individuals that can be restored in <1 year<br>OR<br>One or more injuries, not severe. | Adverse long-term, multiple impacts at a community level, but restoration possible. OR<br>One or more severe injuries to a member of the public including permanently disabling injuries. | Adverse long-term, varied and diverse impacts at a community level or higher – restoration unlikely. OR<br>Fatalities of public. |

### 13.3.3 Assess the Likelihood (Step 2)

Regarding the aim of the assessment, the occurrence likelihood of the unintentional events can be classified as five levels shown in Table 13.3 below:

**Table 13.3 Classification of Likelihood**

| Level | Description |
|---|---|
| **Remote (1)** | Not known in the industry |
| **Very unlikely (2)** | Known but unlikely to happen |
| **Unlikely (3)** | May occur one or more time in the Project's lifetime |
| **Likely (4)** | May occur once or twice per year |
| **Expected (5)** | May occur more than twice per year |

### 13.3.4 Assess the Significance (Step 3)

The consequences and likelihood of potential unplanned events are combined to determine the overall impact significance using the risk matrix shown in Table 13.4.

For the potential impacts that are determined to have an impact significance of Moderate or Major, risk reduction measures are identified; these can include measures that reduce the likelihood of the event from occurring, those that reduce the consequences on sensitive receptors/resources if the event were to occur, and those that effect the likelihood and consequence.

**Table 13.4 Risk Matrix for Potential Unplanned Events**

| | | Likelihood of Occurrence | | | | |
|---|---|---|---|---|---|---|
| | | 1 Remote | 2 Very unlikely | 3 Unlikely | 4 Likely | 5 Expected |
| Consequence | Incidental (A) | Negligible | Negligible | Negligible | Negligible | Negligible |
| | Minor (B) | Negligible | Minor | Minor | Minor | Moderate |
| | Moderate (C) | Minor | Minor | Moderate | Moderate | Major |
| | Major (D) | Moderate | Moderate | Major | Major | Major |
| | Severe (E) | Major | Major | Major | Major | Major |

## 13.4 Assessment Potential of Impacts

Based on the Project activities, the potential unexpected events that were considered to have the highest potential environmental and social risks during all phases of the Project were shown in Table 13.5. Noted that for the commissioning and operational phases, only indicative project activities were listed. A more comprehensive evaluation of potential impacts would be conducted once sufficient detailed design information is available.

**Table 13.5 Unplanned Events Leading to Potential Impacts**

| Project Phase | Activity | Potential Receptors Affected |
|---|---|---|
| Site preparation | Small scale leakage and spill incidents from site-preparation / construction activities | Users of surface water and groundwater in Cu Ne and Cu Pong Communes |

| Project Phase | Activity | Potential Receptors Affected |
|---|---|---|
| and construction | Traffic collisions | Users of the public roadways (National Highway 14) utilised by the project and transportation facilities |
| | Fire and explosion | Nearby community: Cu Ne and Cu Pong Communes, Krong Buk District, Dak Lak Province<br>Habitat, flora, and fauna in the vicinity of the site |
| | Occupational Health and Safety | Workers and employees |
| Commissioning and Operation | Small scale leakage and spill incidents from activities on site | Users of groundwater in Cu Ne and Cu Pong Communes |
| | Fire and explosion | Nearby community: Cu Ne and Cu Pong Communes<br>Forest, habitats, flora, and fauna in the vicinity of the site. |
| | Blade ejection failure | Nearby community |
| | Accidental transmission line snapping and tower swaying/collapsing | Nearby community |
| | Natural Hazards – Flooding and landslides | Nearby community & properties<br>Forest, habitats, flora, and fauna in the vicinity of the site. |
| | Occupational Health and Safety | Workers and employees |

Potential impacts from these events were described in detail in the following section. These potential impacts had been classified using the risk-based impact assessment methodology for unplanned events included in Section 4.9. It should be noted that this methodology was different than that applied to potential impacts from planned activities, as the assessment of potential impacts from unplanned events must consider likelihood as well. Because a risk-based assessment methodology had been used, worst-case scenarios had been considered.

A summary of potential Project-related hazards, contributing causes, and consequences for the Project workforce, nearby communities and/or surrounding environment were summarised in Table 13.6. This table also provided a risk ranking for each potential impact pre-implementation of Project embedded controls.

**Table 13.6 Potential Impacts from Unplanned Events and Pre-mitigation Risk Ranking**

| No. | Hazard | Cause | Consequence | Risk Ranking<br>Pre-mitigation |
|---|---|---|---|---|
| **Site Preparation / Construction** | | | | |
| 1 | Small scale leakage and spill incidents from site-preparation / construction activities | Corrosion, dropped objects or other damages to storage oil tanks/mobile gas stations; failure to secure valves; failure to maintain large mobile construction plant. | **Communities** – Based on the liquid fuel storage volumes, the potential exists for exposure to contaminated water or soil and resulting in long-term effects on surrounding communities utilising groundwater resources if a spill was not being contained. | 3C (Moderate) |
| | | | **Environment** – Based on the liquid fuel storage volumes potential for loss of containment of oil/chemicals into the ground of surrounding area, including nearby surface water resources results in localised, potentially long-term, degradation. | 3C (Moderate) |
| 2 | Road traffic transporting personnel or materials involved in a collision | Wet / dark conditions, driver distraction, fatigue, other dangerous drivers, variable road conditions; rural areas with pedestrian road users<br>As above with livestock in the road | **Communities** – Traffic accidents that involved community members, resulting in injury or fatality. Accidents might require use of local medical emergency services in the Project area and could temporarily decrease access to these services for local residents. | 3D (Major) |
| | | | **Properties –** Traffic accident once happening can induce damage to the existing roads, highways, bridges and utility lines (e.g. electricity cable lines) | 3D (Major) |
| 3 | Occupational Health and safety | ■ Working with heavy equipment<br>■ Heavy handling<br>Working at height or confined spaces, toxic atmosphere, oxygen deficiency, electric shock, etc. | **Workers and employees:** - Health and safety risks during construction may result in an accident, injury or fatality. | 4C (Moderate) |
| 4 | Fire and Explosion including Unexploded Ordnance (UXO) | Leakage and spill incidents of flammable materials, malfunctioning equipment and large mobile construction vehicle | **Communities** – Based on the liquid fuel storage volumes the potential exists for exposure to ignited due to malfunctioned equipment and resulting in potentially severe injuries to employees and spread to nearby communities' members | 3D(Major) |

| No. | Hazard | Cause | Consequence | Risk Ranking<br>Pre-mitigation |
|---|---|---|---|---|
| | | | **Environment:** – Based on the liquid fuel storage volumes potential for ignition of leakage or spill of oil/chemicals due to human errors and malfunctioned short-circuit equipment, accidents might lead to uncontrollable wildfire, loss of crops and habitat, causing injury and life-threatening of local community. | 3D (Major) |
| **Commissioning and Operation** | | | | |
| 5 | Small scale spill from activities on-site | Corrosion, dropped objects or other damage to small storage vessels; failure to secure valves; failure to maintain equipment. | **Communities** –Based on the liquid fuel storage volumes the potential exists for exposure to contaminated water or soil and resulting in long-term effects on surrounding communities utilising groundwater resources if a spill is not contained. | 3B (Minor) |
| | | | **Environment** - Based on the liquid fuel storage volumes potential for loss of containment of oil/chemicals into ground of surrounding area, including nearby surface water resources resulting in localised, potentially long-term, degradation. | 3B (Minor) |
| 6 | Fire and explosion | ■ Leakage and spill incidents of flammable materials,<br>■ Damage of transmission line or<br>■ Lightning strike<br>■ Human's activities | **Communities** – A large-scale fire could result in injuries to people in the surrounding communities, or in the worst-case fatalities. Explosions of malfunctioned equipment could result in rapid spread of fire and projectile spread of debris. This could result in injuries to people in the surrounding communities, or in the worst-case fatalities. | 2E (Major) |
| | | | **Environment:** – A large-scale fire could result in damage/death of local flora and fauna. Accidents might lead to uncontrollable wildfire, loss of crops and habitat given the environment settings at the Project area. Explosions could result in rapid spread of fire and projectile spread of debris. This could result in damage/death of local flora and fauna. | 2E (Major) |
| 7 | | Root connection; catastrophic structural buckling or separation; | **Communities** – Blade ejection failure could result in rapid spread of fire and projectile spread of debris given the heights of wind turbines. | 2E (Major) |

| No. | Hazard | Cause | Consequence | Risk Ranking Pre-mitigation |
|---|---|---|---|---|
| | Blade ejection failure / Blade throw | leading edge, trailing edge, or other bond separation; lightening damage; erosion; failure at outboard aerodynamic device; reduction in stiffness of blades (up to 10%); superficial structural or delamination/laminate wrinkling that eventually become permanent damage; and over speeding due to failure of SCADA to rectify the failure or high wind/cyclonic/meteorological conditions | This could result in injuries to surrounding communities, or in the worst-case fatalities | |
| | | | **Environment** – As above with local flora and fauna. | 3C (Moderate) |
| 8 | Accidental transmission line snapping and tower swaying/collapsing | Wind/cyclonic/meteorological conditions, catastrophic structural separation, corrosion | **Communities** – Electrocutions that involved community members, resulting in injury or fatality, livestock leading to death of livestock and loss/reduction in community member's livelihood | 3D (Major) |
| 9 | Natural Hazards<br>Flooding & Landslide | ■ Heavy rainfall occurs that exceeds the capacity of the natural drainage system may cause flash flood event.<br>■ Clearing vegetation for site preparation increases the rate of run-off and flood risks to downstream area.<br>■ Landslide occurs in combination of many causes such as intense rainstorm, steep slopes (over 200) and vegetation removing that weakens soil bearing capacity | **Communities:** Flood and Landslide can result in loss of human life, damage to property, destruction of crops, and loss of livestock that affects to livelihood. Flood and landslide may affects to substation and power components that lead to loss of electricity supply locally.<br>**Environment:** A large-scale flood and landslide could result in damage/death of local flora and fauna.<br>**Properties –** Natural hazards once happening can induce damage to many houses, existing roads, highways, bridges and utility lines (e.g. electricity cable lines) | 3D (Major) |

| No. | Hazard | Cause | Consequence | Risk Ranking<br>Pre-mitigation |
|---|---|---|---|---|
| 10 | Occupational Health and Safety | Occupational health and safety risks during operation, including<br>■ Exposure of workers to electromagnetic field (EMF) while working in proximity to charged electric power lines<br>■ Safety risks due to working at heights<br>■ Electric shock incidents can occur due to use of damaged equipment or improper operation of electric equipment, substation and transformers without protective devices and non-compliance of electric safety policy. | **Workers and employees:** - Health and safety risks during construction may result in an accident, injury or fatality. | 4D (Moderate) |

*Notes:*

*'Communities' refers to all individuals not directly or indirectly employed by the Project but living and/or working in proximity to Project infrastructure or areas of Project activity such that they are at risk of potential impacts from a Project-related unplanned event*

In order to minimise the Project risk from the key potential unexpected events, the standard mitigation hierarchy should be applied. For the purposes of this assessment mitigation measures were discussed in the following sections where the pre-mitigation significance of the unplanned event is greater than minor.

Unlike impacts from planned activities, mitigation of unplanned events should consider both pre-event preventative actions (that reduce the likelihood of the cause of the potential impact) and post-event mitigation that reduces the magnitude of the consequence.

## 13.4.1 During Site Preparation and Construction

### 13.4.1.1 Leakage and Spill Incidents

#### *13.4.1.1.1 Background and Potential Impact*

There would be approximately 37 large mobile plant items that would be powered by diesel oil and would contain relatively small reservoirs of lube oil and hydraulic oil, with the potential for environmental damage if the materials are lost to the ground. Mobile plant will include:

- Cranes
- Pipe-laying cranes and plant
- Excavators
- Heavy goods vehicles
- Fork-lift trucks, and
- Fuel trucks.

During site preparation and the early stages of the construction phase, any accidental release of oils would occur to unpaved areas. Hence, the oil would seep into the ground and potential groundwater causing soil and groundwater contamination if the release was not responded to immediately. As observed during the site visit, there was an oil slick from the van nearby the drilling well (10 – 20 m) supplying water for construction and domestic activities at the concrete batching plant (See Figure 13.1) of the Project.

Additionally, lubricants which are not being expected to be readily biodegradable are also required in wide range of applications of a wind turbines, such as in bearings, couplings and gears and also in hydraulic systems. Once releasing into the environment, there will be a pollution leading to degradation to the soil and water at the affected terrestrial environment and proximities. In addition, improper management and control of hazardous material in general and oil in particular entails a potential risk of leakage and spill into the surrounding environment and its vicinity either from storage areas or throughout the equipment and machinery usage.


Source: ERM, 2021

**Figure 13.1 Oil Slick from the Van at the Concrete Batching Plant**

##### *13.4.1.1.2 Existing Controls*

According to the Feasibility Study Report and EPP, there is an oil conservator tank with capacity of 90 $m^3$ to be constructed at site for the oil loss of containment during the construction phase. This tank is constructed by the cast-in-place reinforced concrete B15 with the foundation's depth of 250 mm and wall's thickness of 200 mm. The cover of the tank is also made of precast reinforced concrete with stone 1×2.

##### *13.4.1.1.3 Significance of Impact (Before Mitigation)*

In terms of likelihood, the small, localized spillages are Likely to occur during the transfer of fuel and general construction activities, maintenance of machinery, improper storage of hazardous materials, malfunction of handling system. However, the consequence of loss of containment event during the preparation and construction phases is not significant as mentioned above which results to the assessed risk rankings of **Moderate** to both community and environment aspects. The significance is also provided in Table 13.6.

##### *13.4.1.1.4 Additional Preventive and Mitigation Measures*

All preventive and mitigation measures proposed to reduce the likelihood and severity of accidental onshore spills are summarised in Table 13.7.

**Table 13.7 Preventive and Mitigation Measures of Leakage and Spills Incidents during Pre-construction and Construction Phase**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Design the site to include good site management practices to ensure that the products are properly stored on site (e.g. secondary containment, double walled tanks, over filling alarm system). | EPC contractor | Before site preparation |
| Preventive measure | The Project will implement the SEP and a robust stakeholder engagement programme on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project's owner | Before site preparation |
| Preventive measure | Ensure good inspection and maintenance procedures for large mobile construction plant to minimise small leaks and spills such as: (i) Hazardous material (such as oil, fuel, etc.) should be stored in proper and designated areas where are hard impermeable surface, flame-proof, accessible only by authorised personnel and locked when not in use (ii) Maintain MSDS present at all times (iii) refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to the ground; (iv) Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused or removed by a local contractor; (v) The Project will restrict storage and handling of hazardous materials and fuels; (vi) Storage containers will be regularly checked and maintained; (vii) Ensure the | EPC contractor | During site preparation and construction |

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| | preparation of spill absorbent (including elite, clay, peat, etc.) and spill kit at hazardous material storage facility. | | |
| Preventive measure | Monitoring and Reporting Requirements:<br>■ Inspection of storage hazardous materials; and<br>■ Report any spillages and measures taken to minimise the impact and prevent from reoccurring in the future. | Project's owner / EPC contractor | During site preparation and construction |
| Mitigation measure | Prepare an Emergency Preparedness and Response Plan to cover accidental and emergency situations. This Plan will detail:<br>■ Planning coordination: including procedures for informing local communities about emergency response, documentation and first aid / medical treatment;<br>■ Emergency equipment: including equipment in the project design and any additional emergency equipment;<br>■ Maintain good housekeeping including containment, cleaning up and disposal of contaminated soil as hazardous waste.<br>■ Training: employees and contractors will be trained in emergency response procedures; and<br>■ Auditing: audit records will be maintained on how the Plan is being implemented. | Project's owner | Planning stage (before commissioning and operations) |
| Mitigation measure | Implement Emergency Preparedness and Response Plan (EPRP) and monitor contractors to ensure consistent implementation. | Project's owner | During commissioning and operations |

### *13.4.1.1.5 Residual Impact*

Regarding the leakage and spill incident, there are four recommended preventive measures are proposed to diminish the likelihood of the unplanned event from occurring. However, in case the event occurred, the consequence of the oil spills could potentially remain unchanged. Two suggested mitigation measures described in Table 13.7 would be applied to minimise these impacts. With both recommended preventive and mitigation measures, the residual impact decreases from moderate to minor level demonstrated in Table 13.8.

**Table 13.8 Pre and Post Risk Ranking**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **3C Moderate** | **3B Minor** |
| Environment | **3C Moderate** | **2B Minor** |

#### *13.4.1.1.6 Monitoring and Auditing*

- Monthly monitoring the implementation of all proposed mitigation measures specified in Emergency Preparedness and Response Plan should be conducted properly;
- Daily inspection of any secondary containment of oil/chemical on site and ensure good maintenance procedures to minimize small leaks and spills.

### 13.4.1.2 Traffic Accidents

#### *13.4.1.2.1 Background and potential impact*

During the planning and construction phases, the project components including wind turbines, substations, and transmission lines manufactured in the domestic factories or imported from oversea are all transported to the project site where they are assembled. Due to big dimensions and weight, wind turbines and their components when being transported pose a challenge to the existing roads and infrastructure in the project area.

The wind turbine components will be transported from Cam Ranh Port in Cam Linh, Cam Ranh, Khanh Hoa Province through a long journey via National Highway No.1 and No. 14 which is nearly 222 km to the project site. Receptors for increased road safety risks during Project site preparation and construction included drivers, passengers, non-motorised travellers and livestock community on public roads. Although road users were likely to be accustomed to existing safety risks associated with existing road conditions, these receptors were unlikely to have experience driving or sharing the road with heavy trucks likely to be used during Project site preparation and especially construction phase.

Site preparation for the Huadian Dak Lak Wind Power Project would require a number of vehicle trips to deliver construction equipment and supplies, as well as daily trips of employee. Based on the estimation of transportation period, equipment and materials need to be delivered to the project site with the average number of vehicles movements including heavy load vehicle and non-heavy load vehicle was predicted maximum 10 trips per day. At the time of the Project's construction, there is no wind power developments under construction sharing the same equipment and material transportation route.

Based on the analysis, it was assumed that road safety risks increase roughly in proportion with increased vehicular traffic congestion. In case this unexpected event is improperly planned and managed, the heavy-load long-haul project components may damage the existing roads, highways, bridges and utility lines (e.g. electricity and cable lines) and could become a potential public safety concern to other vehicles on the road. Moreover, the transportation of large components on road may induce injury to people and damage to materials.

During the first six months in 2021, there were two traffic accidents caused by the transportation of the wind turbine blade and tower in Quang Binh[66] (May 2021) and Dak Lak[67] [68] (July 2021) Provinces. The one that happened in National Highway No. 1A, Bo Trach District, Quang Binh Province as transporting the wind turbine blade to the site caused significant damage to two other vehicles, ten road poles and destroyed one electric pole on the road (See Figure 13.2). The other that occurred in Phuong Hoang Pass (Phoenix Pass), National Highway No.26, M'Dak District, Dak Lak Province during the transportation of Wind Turbine Tower induced major traffic congestion in many hours and damaged the road infrastructure at local area (See Figure 13.3). There was no fatality recorded in two traffic accidents.

[66] https://vov.vn/xa-hoi/lat-xe-cho-canh-quat-dien-gio-sieu-khung-tren-quoc-lo-1a-doan-qua-quang-binh-858818.vov

[67] https://tuoitre.vn/xe-sieu-truong-cho-thiet-bi-dien-gio-lat-giua-deo-phuong-hoang-20210710102356514.htm

[68] https://thanhnien.vn/thoi-su/dak-lak-xe-cho-tru-dien-gio-nga-ngang-duong-phai-mo-loi-thong-tuyen-tren-ql26-1412136.html

**Figure 13.2 Traffic Accident in Quang Binh Province during the Transportation of Wind Turbine Blade (May 2021)**

**Figure 13.3 Traffic Accident in Dak Lak Province during the Transportation of Wind Turbine Tower (July 2021)**

### *13.4.1.2.2 Existing Controls*

There is no existing controls recommended by the Project’s owner.

### *13.4.1.2.3 Significance of Impact (Before Mitigation)*

Taking all of the above into consideration, the anticipated impacts relating to traffic networks are considered of short-term duration (18 months) during the construction phase. Based on the given information, the risk is considered **Major** impact to the local community and properties which is stated in Table 13.6.

### *13.4.1.2.4 Additional Preventive and Mitigation Measures*

Active mitigation measures that would be applied to mitigate potential road safety risks were provided in Table 13.9 below. These measures included development of a Transportation Management Plan that would address scheduling of road activity, monitoring conditions of public roads, and active traffic controls at the Project site entrance.

**Table 13.9 Preventive and Mitigation Measures of Traffic Accident**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Developed and implemented a Traffic and Transportation Management Plan before commencement of any transportation activities. This should include measures such as:<br>▪ Scrutinised analysis and study of the entire route for transportation of the project components from the manufactured area to the project site.<br>▪ Active traffic controls (e.g. flaggers to direct traffic at the Project site entrance); and<br>▪ Schedule construction deliveries and employee shift changes to minimise traffic congestion and delay | EPC contractor | Site preparation and construction |
| Preventive measure | Design an H&S plan and good safety practices for the transportation (e.g. alcohol policy, good driving practice). | EPC contractor | Construction |
| Preventive measure | Strictly abide by the regulations specified in the Transport License granted by the Directorate for Roads of Vietnam for transporting the oversized and over-mass equipment:<br>▪ The transportation only be allowed during 11:00PM – 5:00AM<br>▪ The allowable speed on the road could not exceed 20 km/h, and<br>▪ A competent and certified organisations or authorities to monitor and regulate the traffic flow. | Transportation contractor /<br>Project's owner /<br>Certified organisations and Authorities | Construction |
| Preventive measure | Upgrade the access road systems to the Project site | Project's owner | Site preparation |
| Preventive measure | The Project will implement the SEP and a robust stakeholder engagement programme on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project's owner | Prior site preparation |
| Mitigation measure | Prepare Emergency Response Plan (ERP) and Emergency Management Plan (EMP). | Project's owner | Planning stage (before commissioning and operations) |
| Mitigation measure | Implement ERP and EMP and monitor contractors to ensure consistent implementation | EPC contractor / Project's owner | Prior to site preparation |

#### 13.4.1.2.5 Residual Impact

In terms of traffic accident events, there are five recommended preventive measures are proposed to diminish the likelihood of the unplanned event from occurring. However, in case the event occurred, the consequence of traffic accident could potentially remain significant. In these cases, another two suggested mitigation measures described in Table 13.9 would be applied to minimise these impacts. With both recommended preventive and mitigation measures, the residual impact are demonstrated in Table 13.10 below.

**Table 13.10 Pre and Post Risk Ranking**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **3D Major** | **2D Moderate** |
| Properties | **3D Major** | **2D Moderate** |

#### 13.4.1.2.6 Monitoring and Auditing

- Monthly monitoring the implementation of all proposed mitigation measures specified in the Traffic Management Plan (TMP) should be conducted, and
- Regular road condition monitoring along the transportation route to understand road quality during construction phase.

### 13.4.1.3 Fire and Explosion, Including Unexploded Ordnance (UXO)

#### 13.4.1.3.1 Background and Potential Impact

Given the nature of construction work, the utilisation of reasonably large volumes of hazardous chemicals for machinery and equipment shall be significantly considerable. Many of them are hydrocarbons (e.g. crude oil and refining products) that are also highly flammable. Improper handling and storing fuel can create a risk of loss of containment (i.e. large-scale spill), fires, or in some situations, explosions.

The Unexploded Ordnances (hereinafter as UXOs) is defined as a military ammunition or explosive ordnance that did not explode or function as intended. Some examples of UXO are to be mentioned including unexploded bombs, grenades, and artillery shells, mortars used by the Army or the Air Force which pose a risk of detonation. Explosion of Unexploded Ordnances (UXOs) left behind from the war should also need to be detected and cleared at the project sites before construction phase.

Large scale fires, or worst-case explosions, could potentially release smoke and fumes in the broader area generating health issues associated with inhalation of toxic substances and uncontrollable wildfire that would contribute to a loss of crops and habitats and impacts on the economics of the area (e.g. community and workers jobs and incomes).

The potential source of impacts associated with fire and explosion would occur as a result of the following events:

- Damage of the WTGs, transmission lines, insulators or other supporting parts
- Electrical arcs or flashovers
- Lightning strike
- Bushfire
- Plant and equipment failure, and

- Explosion of Unexploded Ordnance (UXOs) left behind from the war.

The potential impacts from large scale fires include the release of smoke and fumes in the broader area generating health issues associated with inhalation of toxic substances and uncontrollable wildfire that would contribute to a loss of crops and habitats and impact on the economics of the area (e.g. community and workers' jobs and incomes).

#### 13.4.1.3.2 Existing Controls

The Project's owner did incorporate and signed the contract with 319.7 Enterprise under the 319 Corporation Ministry of National Defence to conduct the survey on UXO identification, clearance and elimination for all four Projects (KB1, KB2, CN1, and CN2) in Cu Ne, Cu Pong Communes, Dak Lak Province. The mission had been completed by the 319 Corporation Ministry of National Defence for four Projects KB1, KB2, CN1, and CN2 and no UXO had been found in the survey area of the Project. The commitment documents of UXO clearance with detailed information are presented in Table 13.11. The location map of UXO clearance points in the Projects's area can be refered to Appendix N.

**Table 13.11 Evidence of UXO Detection and Clearance Completion**

| No. | Document No. | Project Name | Date | Areas |
|---|---|---|---|---|
| 1 | ■ 01/CKAT-KB1 | Krong Buk 1 (KB1) | 26 July 2021 | ■ Total areas of UXO detection: 41.95 ha<br>■ Detection area from the depth of 3m: 34.82 ha<br>■ Detection area from the depth of 5m: 7.13 ha |
| 2 | ■ 01/CKAT-KB2 | Krong Buk 2 (KB2) | | ■ Total areas of UXO detection: 49.17 ha<br>■ Detection area from the depth of 3m: 41.29 ha<br>■ Detection area from the depth of 5m: 7.88 ha |
| 3 | ■ 01/CKAT-CN1 | Cu Ne 1 (CN1) | | ■ Total areas of UXO detection: 51.68 ha<br>■ Detection area from the depth of 3m: 40.14 ha<br>■ Detection area from the depth of 5m: 11.54 ha |
| 4 | ■ 01/CKAT-CN1 | Cu Ne 2 (CN2) | | ■ Total areas of UXO detection: 32.76 ha<br>■ Detection area from the depth of 3m: 24.5 ha<br>Detection area from the depth of 5m: 8.26 ha |

Source: The Project's owner, 2021.

#### 13.4.1.3.3 Significance of Impact (Before Mitigation)

The risk ranking assessment presented in Table 13.6 for the fire and explosion event caused by the above reasons is based on the two dominant factors including consequence and the likelihood of occurrence. The risk caused by UXO is considered Minor; However, taking fire-caused wind turbine failure as an representative of the unplanned event, based on the statistical data which stated that only 0.3 – 0.5 fire incidents happened per 1000 power stations[69] (for both onshore and offshore industries per year) the Likelihood of the occurrence is considered very unlikely while the event outcome causing loss of life and properties is remain severe. Therefore, the risk ranking of this event becomes **Major** for both community and environment aspects.

[69] https://www.firesafetysearch.com/fire-risk-in-wind-turbines/

#### *13.4.1.3.4 Additional Preventive and Mitigation Measures*

All preventive and mitigation measures proposed to reduce the likelihood and severity of accidental fire and explosion are summarised in Table 13.12 below.

**Table 13.12 Preventive and Mitigation Measures of Fire and Explosion during the Pre-Construction and Construction Phase**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Install firefighting equipment (such as fire extinguishers, proper communication equipment), especially at area with high risks of fire and explosion, such as warehouses of chemical and transformer stations | Project's owner / EPC contractor | Site preparation |
| Preventive measure | Prepare the Fire prevention and Fighting Plan that ensure compliance with Decree No. 79/2014/ND-CP guiding the Law on Fire Prevention and Fighting | Project's owner / EPC contractor | Site preparation and construction |
| Preventive measure | Conduct firefighting training to the emergency support team, contractors and workers on site and camping areas | Project's owner / EPC contractor | Site preparation and construction |
| Preventive measure | Store flammable materials away from ignition sources and oxidising materials | Project's owner / EPC contractor | Site preparation and construction |
| Preventive measure | Conduct regular inspections and maintenance to eliminate potential risks | Project's owner / EPC contractor | Site preparation and construction |
| Preventive measure | The Project will implement the SEP and a robust stakeholder engagement programme/plan on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project's owner | Site preparation and construction |
| Preventive measure | Implement routine inspection and maintenance procedures (in line with international best practice) for large storage vessels. | EPC contractor | Site preparation and construction |
| Mitigation measure | Develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation. The Emergency response plan should include:<br>■ Immediately pull the nearest fire alarm if a fire occurs, report the event to shift supervisor or foreman immediately for emergency response; | Project's owner / EPC contractor | Site preparation |

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| | ■ When the emergency alarm sounds, all employees shall stop all activities and move to emergency assembly places immediately;<br>■ Limit the fire areas by utilizing the appropriate firefighting equipment, if the fire is small and controllable; and<br>■ Follow the procedure included in the Emergency Response and Evacuation Plan to take actions | | |
| Mitigation measure | Implement an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation | EPC contractor | During construction |

### *13.4.1.3.5 Residual Impact*

In regards to the unintentional event of fire and explosion, there are totally seven recommended preventive measures should be applied to diminish the likelihood of the unplanned event from occurring. However, in case the event occurred, the consequence of fire and explosion could potentially remain significant. In these cases, another two suggested mitigation measures described in Table 13.12 would be applied to minimise these impacts. With both recommended preventive and mitigation measures, the residual impact are minimise from major to minor for both community and environment aspects which is shown in Table 13.13 below.

**Table 13.13 Pre and Post Risk Ranking**

| Aspects \ Impact Significance | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **3D Major** | **2D Moderate** |
| Environment | **3D Major** | **2C Minor** |

### *13.4.1.3.6 Monitoring and Auditing*

A monthly audit program shall be established to check the implementation of emergency response and evacuation plan, staff training, equipment inspection, and firefighting drills.

## 13.4.1.4 Occupational Health and Safety Accident

### *13.4.1.4.1 Background and Potential Impact*

The nature of the Project presents occupational health and safety risks, which can result in direct impacts on worker’s health and safety. Construction will involve a range of activities such as construction of WTGs, transmission line pylons and upgrading access road that could contribute to or present an occupational health and safety risk, resulting in an accident, injury (physical injuries such as muscle strain and ligament tear may occur as loading/unloading activities), of even fatality, including:

- The misuse of large mobile equipment, such as backhoes, bulldozers, graders and mobile cranes, which could, if not managed correctly, lead to an accident or injury, and

- Safety risks due to wrong handling of construction machinery, working at heights or confined spaces, falling objects, crushing, slip, trip and fall (slippery road during rainy season), occupational stress and severe working conditions (hot weather during dry season).

#### *13.4.1.4.2 Existing Controls*

The Safety and Civilized Construction Plan had been developed by the Project's Owner which requires the implementation of both EPC contractor and the Project's owner during the construction and operation phases.

#### *13.4.1.4.3 Significance of Impact (Before Mitigation)*

Occupational accidents are considered Likely to happen (may happen once or twice a year). The consequence can range widely from Incidental to Severe in case of major injury and fatality of construction workers. However, under the strict and proper compliance of the Safety and Civilized Construction Plan developed by the Project's owner, the consequence can be Moderate and the overall significance of impact is considered Moderate where strategic management and mitigation measures are still required.

#### *13.4.1.4.4 Additional Preventive and Mitigation Measures*

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental fire and explosion are summarised in Table 13.14 below.

**Table 13.14 Preventive and Mitigation Measures of Occupational Health and Safety**

| Type of Control (i.e. Prevent/ Mitigate) | Management Control | Responsibility - Organisation | Timing |
|---|---|---|---|
| Preventive measures | All workers (including any subcontractors) should be provided with trainings on the Health and Safety policy in place, safe working practices, provided with PPE and informed regarding any Emergency Response Plans or first-aid kits provided on-site. | EPC Contractor | Before site construction |
| Preventive measures | Establish a grievance redressed mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities. | EPC Contractor | Before site construction |
| Preventive measures | Assigning supervisors to supervise the activities on site to ensure all safety regulations and practices are followed and the risks will be minimised | EPC Contractor | During construction phase |
| Preventive measures | Appropriate work equipment/methods must be used in case of working at height, hot areas, work in confined spaces etc. | EPC Contractor | During construction phase |
| Preventive measures | Ensuring that workers (including contractors) complete a Job Hazard Analysis (JHA) prior to undertaking construction activities, and also conduct daily toolbox discussions to ensure hazards are identified and management measures are implemented | EPC Contractor | During construction phase |
| Mitigation measures | Suitable exclusion zones should be established and maintained underneath any working at height activities, where possible, to protect workers from falling objects; | EPC Contractor | During construction phase. |

| Type of Control (i.e. Prevent/ Mitigate) | Management Control | Responsibility - Organisation | Timing |
|---|---|---|---|
| Mitigation measures | Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk of lightning strikes | EPC Contractor/ Project's owner | During construction phase. |
| Mitigation measures | An emergency rescue plan detailing the methods should be in place to rescue workers who are stranded or incapacitated while working at height | EPC Contractor/ Project's owner | During construction phase. |

##### *13.4.1.4.5 Residual Impact*

The mitigation measures, if implemented effectively, can reduce both the likelihood of occurrence of traffic accidents and the severity of consequence in case of actual happening. On that basis, the impact significance can be reduced to Minor (2C). The residual impact is presented in Table 13.15.

**Table 13.15 Pre and Post Risk Ranking of Occupational Accident**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Workers and employees | **4C Moderate** | **2C Minor** |

##### *13.4.1.4.6 Monitoring and Auditing*

Random audits to the project areas with high risk activities will be conducted on a monthly basis to ensure proper implementation of the mitigation measures and other internal safety procedures. Any found deviations will be followed up until resolved.

## 13.4.2 During Commissioning and Operation

### 13.4.2.1 Leakage and Spill Incidents

##### *13.4.2.1.1 Background and Potential Impact*

There would be widespread use of chemicals, including hydrocarbons, across the site during both phases of the Project for operation & maintenance (O&M) services. As a result, there was a risk that small volumes of chemicals could be spilled on-site. The risk of these spills reaching the environment would be minimal in paved areas. As most chemical usage would be in paved areas, the potential environmental and social impact of releases of oils during operation was likely to be low.

##### *13.4.2.1.2 Existing Controls*

There is no existing controls recommended by the Project owner.

##### *13.4.2.1.3 Significance of Impact (Before Mitigation)*

Accidental contaminant spills from operational activities, such as diesel or oil leaking from machinery, have the potential to impact the soil, freshwater and/or groundwater quality. The main concern associated with accidental contaminant spills relates to the potential impact on human health from exposure to contaminated soils or contaminated groundwater. It is noted that the impact of accidental spills depends on the location and extent of spills and the contaminant properties. Unintended contamination spills may also occur during the operation of the wind power and substation, and the impacts are likely to be similar to those described in the construction phase section. The significance of impact caused by leakage and spill incidents is considered Moderate to both the communities the Environment.

#### *13.4.2.1.4 Additional Preventive and Mitigation Measures*

All preventive and mitigation measures proposed to reduce the likelihood and severity of accidental onshore spills are summarised in Table 13.16 below:

**Table 13.16 Preventive and Mitigation Measure of Leakage and Spill during Commission and Operation Phase**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Implement good site management practices to ensure that the products are properly stored on site and in areas where spills will not easily release out to the environment (e.g. in paved areas with secondary containment). | O&M Contractor / Project's owner | Prior to commissioning |
| Preventive measure | The Project will implement the SEP and a robust stakeholder engagement programme on emergency response. | Project's owner | During commissioning and operation |
| Mitigation measure | Prepare an Emergency Preparedness and Response Plan to cover accidental and emergency situations. This Plan will detail:<br>▪ Planning coordination: including procedures for informing local communities about emergency response, documentation and first aid / medical treatment;<br>▪ Emergency equipment: including equipment in the project design and any additional emergency equipment;<br>▪ Training: employees and contractors will be trained in emergency response procedures; and<br>▪ Auditing: audit records will be maintained on how the Plan is being implemented. | O&M Contractor / Project's owner | Before commissioning and operation |
| Mitigation measure | Implement Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation. | Project's owner | During commissioning and operation |

#### *13.4.2.1.5 Residual Impact*

Because the majority of the mitigation presented was preventative, the primary goal of these measures was to reduce the likelihood of the unplanned event from occurring. However, in case the event occurred, the consequence of the hydrocarbon spills could potentially remain as severe. In these cases, the post-event measures described in the previous section would apply to minimise impacts. With the application of two preventive measures and two mitigation measures, the residual impact is considered to be minimised to minor level and detailed in Table 13.17.

**Table 13.17 Pre and Post Risk Ranking**

| Aspects / Impact Significance | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **3B Minor** | **2C Minor** |
| Environment | **3B Minor** | **2C Minor** |

##### *13.4.2.1.6 Monitoring and Auditing*

- Monthly monitoring the implementation of all proposed mitigation measures specified in Emergency Preparedness and Response Plan should be conducted properly;
- Daily inspection of any secondary containment of oil/chemical on site and ensure good maintenance procedures to minimize small leaks and spills.

#### 13.4.2.2 Fire and Explosion

##### *13.4.2.2.1 Background and Potential Impact*

Damage of the wind turbine generators (WTGs) and their ancillary components, transmission line due to lighting strikes, electrical arcs or flashovers and malfunctioned equipment which resulting fires and even explosions as WTGs materials were informatively construed as flammable materials.

During the commissioning and operation phase, the potential impact associated with fire and explosion would happen as a result of the following events:

- Fuel storage
- Worker’s living activities (cooking or smoking), or
- Electrical incidents during the operation.

Large scale fires, or worst-case explosions, could potentially release smoke and fumes in the broader area inducing health issues associated with inhalation of toxic substances and uncontrollable wildfire that would contribute to a loss of crops and habitats and impacts on the economics of the area (e.g. community and workers jobs and wellbeing). When happened, the disaster can bring about the loss of local houses, crops and vegetation and also affect the plant’s operation.

##### *13.4.2.2.2 Existing Controls*

There is no existing controls recommended by the Project owner.

##### *13.4.2.2.3 Significance of Impact (Before Mitigation)*

Regarding the consequence it may cause serious injuries or even fatalities to human, the significance evaluation should be put for this fire and explosion unexpected event is **Major**. The reference of the significance is provided in Table 13.6.

##### *13.4.2.2.4 Additional Preventive and Mitigation Measures*

All preventive and mitigation measures proposed to reduce the likelihood and severity of accidental fire and explosion are summarised in Table 13.18 below:

**Table 13.18 Preventive and Mitigation Measures of Fire and Explosion during the Commission and Operation Phase**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | The Project will implement the SEP and a robust stakeholder engagement programme on emergency response. | Project's owner | During commissioning and operation |
| Preventive measure | Implement routine inspection and maintenance procedures (in line with international best practice) for any Unplanned Events substances' storage vessels and WTGs. | EPC contractor / Project's owner | During commissioning and operation |
| Preventive measure | Install warning system, signal boards, lighting protection system where risks of fire and explosion exposed | Project's owner | During commissioning |
| Mitigation measure | Implement Emergency Preparedness and Response Plan with forest fire protection and monitor contractors to ensure consistent implementation<br>Provide regularly safety and fire prevention & fighting drills. | Project's owner | During commissioning and operation |

### *13.4.2.2.5 Residual Impact*

Regarding the unintentional event of fire and explosion, there are totally three recommended preventive measures should be applied to diminish the likelihood of the unplanned event from occurring. However, in case the event occurred, the consequence of this could potentially remain severe. In this case, one more suggested mitigation measure detailed in Table 13.18 would be applied to minimise these impacts. With both recommended preventive and mitigation measures, the residual impact are minimise from major to minor level for both community and environment which is shown in Table 13.19 below.

**Table 13.19 Pre and Post Risk Ranking**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **2E Major** | **2C Minor** |
| Environment | **2E Major** | **2C Minor** |

### *13.4.2.2.6 Monitoring and Auditing*

An audit program shall be established to check the implementation of emergency response and evacuation plan, staff training, equipment inspection, and firefighting drills.

## 13.4.2.3 Occupational Health and Safety Accident

### *13.4.2.3.1 Background and Potential Impact*

The operation and maintenance activities that could contribute to or present an occupational health and safety risk, resulting in an accident, injury, of even fatality, including:

- Exposure of workers to electromagnetic field (EMF) while working in proximity to charged electric power lines
- Safety risks due to working at heights, and
- Electric shock incidents can occur due to use of damaged equipment or improper operation of electric equipment, substation and transformers without protective devices and non-compliance of electric safety policy.

#### 13.4.2.3.2 Existing Controls

The Safety and Civilized Construction Plan had been developed by the Project's Owner which requires the implementation of both EPC contractor and the Project's owner during the construction and operation phases.

#### 13.4.2.3.3 Significance of Impact (Before Mitigation)

Similar to the construction phase, occupational accidents during the operation phase are considered Likely to happen (may happen once or twice a year). The consequence can range widely from Incidental to Severe in case of major injury and fatality of construction workers. However, under the strict and proper compliance of the Safety and Civilized Construction Plan developed by the Project's owner, the consequence can be Moderate and the overall significance of impact is considered Moderate where strategic management and mitigation measures are still required.

#### 13.4.2.3.4 Additional Preventive and Mitigation Measures

During operation phase, similar preventive and mitigation measures as mentioned in the construction phase.

#### 13.4.2.3.5 Residual Impact

The mitigation measures, if implemented effectively, can reduce both the likelihood of occurrence of traffic accidents and the severity of consequence in case of actual happening. On that basis, the impact significance can be reduced to Minor. The residual impact is presented in Table 13.20.

**Table 13.20 Pre and Post Risk Ranking of Occupational Health and Safety Accident**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Staffs and Workers | **4C Moderate** | **2C Minor** |

#### 13.4.2.3.6 Monitoring and Auditing

Random audits to the areas with high risk activities will be conducted on a monthly basis to ensure proper implementation of the mitigation measures and other internal safety procedures. Any found deviations will be followed up until resolved.

### 13.4.2.4 Blade Ejection Failure / Blade throw

#### 13.4.2.4.1 Background

Due to the installation and operation of wind turbine towers in the proximity of build-up areas, there is an emerging safety concern relating to the throwing of full or partial blade caused by rotor failure or normally known as "blade thrown" event. That unintentional event can endanger people living/working or just crossing by close to the wind farm. Assessment of reports and case studies in the open domain had revealed an increasing trend to determine the distance at which a rotor blade could be thrown.

Therefore, it became strictly necessary to define setback distances and/or buffer zones to minimise the risk of damage or injury from components failure.

#### *13.4.2.4.1.1 National and International Existing Standards*

Blade throw/ ejection incidents have been classified as the following modelling studies conducted by various research groups and blade test practices based on the IEC 61400-23 technical specifications. They have been classified as

(a) Root connection failure

(b) Catastrophic structural buckling or separation

(c) Leading edge, trailing edge, or other bond separation

(d) Lightening damage

(e) Erosion

(f) Failure at outboard aerodynamic device

(g) Reduction in stiffness of blades (up to 10%)

(h) Superficial structural or delamination/ laminate wrinkling that eventually becomes permanent, leading to damage, and

(h) Over speeding due to failure of supervisory control and data acquisition (SCADA) to rectify the failure or high wind/ cyclonic/ meteorological conditions.

Considering all of the above, it is difficult to attribute blade throw failure to a single attribute or a combination of attributes that result in these incidents occurring. Therefore, national regulations or recommendations are in place in some countries to define setback distances and/or buffer zones surrounding WTGs to minimise the risk of damage or injury from component failure.

In the current Vietnamese context, there exist no regulations regarding setback distances required to ensure safety of nearby settlements. However, the IFC EHS Guidelines on Wind Energy, 2015 has recommended a setback distance, based on a review of existing literature in this domain, (encompassing the rationale that WTG models have varying dimensions) which is 1.5 × turbine height (tower + rotor radius), although modelling suggests that the theoretical blade throw distance can vary with the size, shape, weight, and speed of the blades, and the height of the turbine. It is therefore recommended that the minimum setback distances required to meet noise and shadow flicker limits be maintained with respect to sensitive residential receptors to provide further protection.

#### *13.4.2.4.1.2 Qualitative Blade Failure Assessment*

The qualitative blade failure (BF) assessment encompassed the rationale that had been proposed by the IFC pertaining to setback distances which is 1.5 × turbine height (tower + rotor radius).

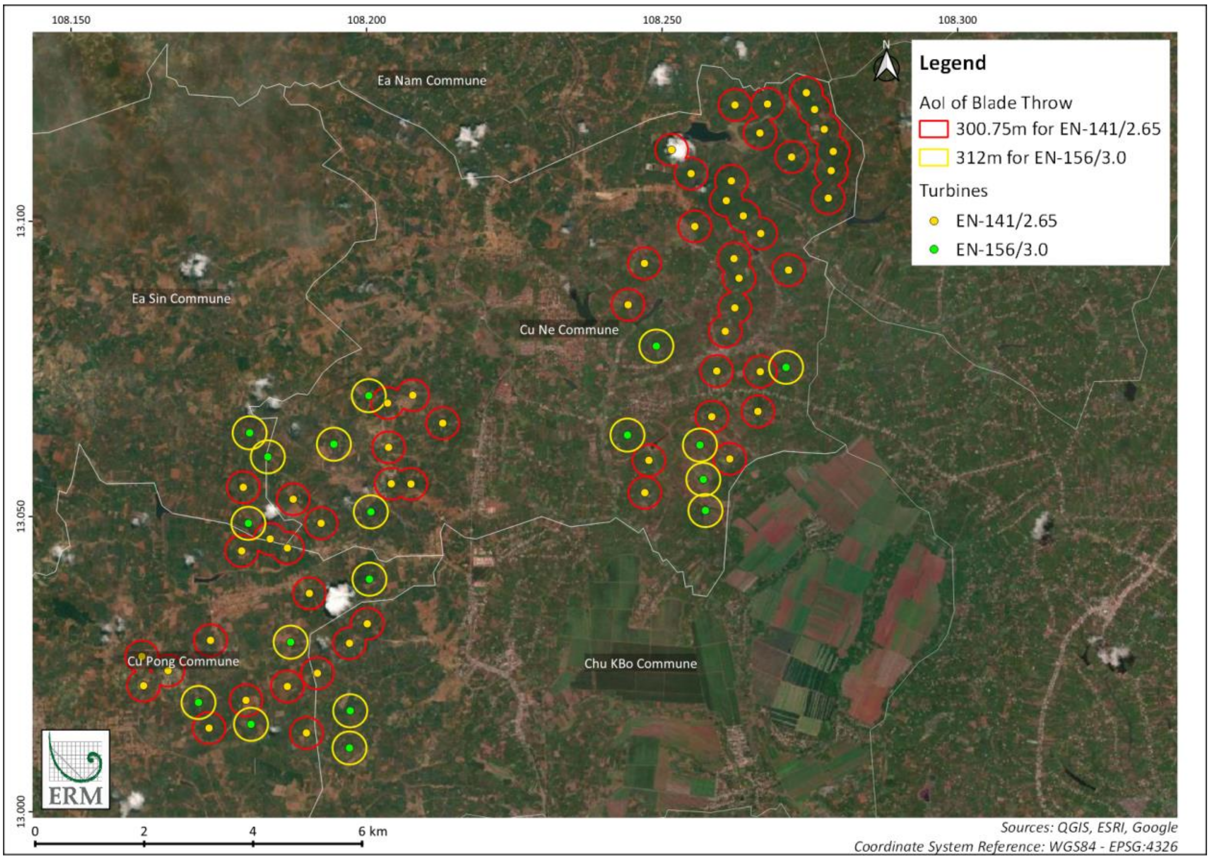
The Huadian Dak Lak Wind Power Projects comprises total 73 wind turbines. The blade throw/blade ejection (BT/BE) assessment was carried out considering the wind turbine specifications as proposed to be used in this Project. Wind turbines considered in BT/BE assessment are *Envision EN-141/2.65* and *Envision EN-156/3.0*.

The theoretical setback distances and impact zone of theoretical blade throw of the WTGs as per IFC wind guidelines have been presented in Table 13.21 and Figure 13.4. This information was used to independently assess the setback distances of the receptors that were identified using the latest satellite imagery of the Project area.

**Table 13.21 Setback Distances Adopted for Wind Turbines as per IFC Wind EHS Guidelines**

| WTG Model | Project | Tower height (hub height) | Rotor Radius | Calculated setback distances in meters as per IFC Wind EHS guidelines |
|---|---|---|---|---|
| *EN-141/2.65* | Huadian Dak Lak Wind power plants | 130 | 70.5 | = 1.5 × (hub height + rotor radius)<br>= 1.5 × (130 + 70.5) = 300.75 m |
| *EN-156/3.0* | | | 78 | = 1.5 × (hub height + rotor radius)<br>= 1.5 × (130 + 78) = 312 m |

Source: EHS guidelines for wind energy, IFC, August 7, 2015

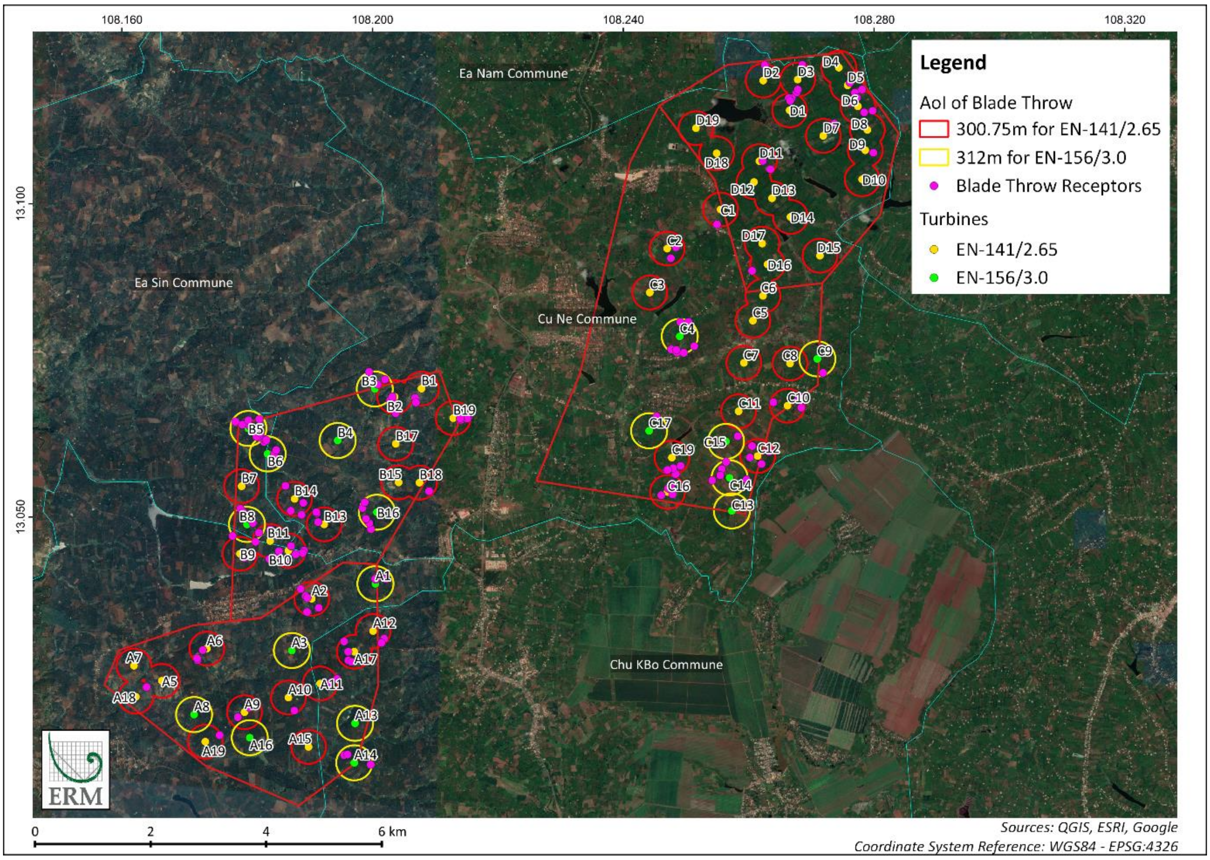



Source: QGIS, ESRI, Google, July 2021

**Figure 13.4 Impact Zone of Theoretical Blade Throw**

## *13.4.2.4.2 Potential Impacts*

The most severe failure of the “blade throw” generated from splintering of motor blades and detachment of debris from blade fragments could travel over long distance and damage people and properties. It could result in rapid spread of fire and projectile in some cases or spread of debris given the heights of wind turbines. Within the impact zone of Blade Throw, there are approximately 147 SRs (103 SRs in 300.75m of wind turbine EN-141/2.65 and 44 SRs in 312m of wind turbine EN-156/3.0) living near the Project’s site (See Figure 13.5). Once happening, this unplanned event could result in injuries at surrounding communities, or in the worst-case fatalities, and damage to local flora and fauna.




Source: QGIS, ESRI, Google, July 2021

**Figure 13.5 Blade Throw Sensitive Receptors**

Source: Hamid Sarlak, Jens N.Sorensen. Characterization of blade thrown from a 2.3MW horizontal axis wind turbine upon failure. AIAA Scitech, 5-9 January 2015, Kissimmee, Florida. 53rd AIAA Aerospace Sciences Meeting

**Figure 13.6 Examples of Wind Turbine Blade Failure. Black Circles in the Middle Photograph Show a Trace of Flying Objects, Thrown from the Turbine to the Left, While Burning**

### *13.4.2.4.3 Existing Controls*

There is no existing controls recommended by the Project's owner.

#### 13.4.2.4.4 Significance of Impact (Before Mitigation)

Based on the statistical data, the likelihood of occurrence of the unexpected event "blade throw" is relatively rare; however, upon happening, full blade or blade fragments throwing caused by motor failure can produce catastrophic consequences which bring about major and moderate effect to the community and the environment, respectively. The significance of this unplanned event is assessed as **Major**.

#### 13.4.2.4.5 Additional Preventive and Mitigation Measures

All preventive and mitigation measures proposed to reduce the likelihood and severity of accidental blade throw are summarised in Table 13.22 below:

**Table 13.22 Preventive and Mitigation Measures of Blade Ejection Failure during Commission and Operation Phase**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Establish safety zone at least 312 m away from the WTGs with warning signals if possible. It was recommended that the minimum setback distances required to meet noise and shadow flicker limits be maintained with respect to sensitive residential receptors to provide further protection | Project's owner | Prior operation |
| Preventive measure | A validation survey of Blade Throw safety zone should be conducted to verified precise number of sensitive receptors within the safety zone and release the appropriate mitigation measures | Project's owner | Prior operation |
| Preventive measure | Implement the SEP and a robust stakeholder engagement programme on emergency response. | Project's owner | During the operation |
| Preventive measure | Implement periodic routine inspection and maintenance procedures (in line with international best practice). | O&M contractor/ Project's owner | During the operation |
| Preventive measure | Install warning system, signal boards, lighting prevention system around the 312 m radius of danger zone where the WTGs located. Equipped vibration sensors for the warning of any imbalances in rotor blades. | O&M contractor/ Project's owner | Prior operation |
| Mitigation measure | Develop an Emergency Preparedness Response Plan (EPRP) and monitor contractors to ensure consistent implementation. | O&M contractor/ Project's owner | Prior operation |
| Mitigation measure | Implement an Emergency Preparedness Response Plan and monitor contractors to ensure consistent implementation | O&M contractor/ Project's owner | During the operation |

#### 13.4.2.4.6 Residual Impact

Because the majority of the mitigation presented was preventative, the primary goal of these measures was to reduce the likelihood of the unplanned event from occurring. However, given the likelihood of the event is well-known in the industry and have been occurring sporadically, hence, the possibility of such incident still remains Major to the communities and Moderate to the Environment, respectively. In these cases, the mitigation measures described in the previous section would be applied to minimise the severity on communities and surrounding environment. With four recommended preventive measures and two mitigation measures applied, the risk of the "blade throw" event minimise from major and moderate to minor raking to the community and environment aspects, respectively.

**Table 13.23 Pre and Post Risk Ranking**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | 2E Major | 2C Minor |
| Environment | 3C Moderate | 2B Minor |

### *13.4.2.4.7 Monitoring and Auditing*

A quarterly audit program shall be established to check the implementation of regular technical inspection of the WTGs and blades' safety. Any identify gaps or areas of opportunity will be followed up after the inspection until resolved. The auditing records will be kept onsite for future review and supervision.

## 13.4.2.5 Transmission Line Snapping and Transmission Pylon Collapse

### *13.4.2.5.1 Background and Potential Impact*

During the operation, there was a possibility of lines or transmission towers/parts snapping/swaying due to the tower failing and resulting in injuries and/or fatalities. The risk was mainly triggered by the poor foundation quality, tower member theft, material corrosion due to poor coating and poor quality or damaged fittings exposing the system to failure. Another reason brings about the collapse of transmission line is an impact by strong wind load recorded at a velocity of 25 m/s, according to a research by scientists in China. The collapse accident of transmission line in China became a case study and the related paper was published in 2016[70]. Figure 13.7 demonstrates for the transmission pylon collapse event.

70 https://www.jvejournals.com/article/17921

Source: https://www.jvejournals.com/article/17921

**Figure 13.7 The Collapse Accident of Transmission Line in China in 2012**

Once happening, this unintentional event can cause significant health and safety impact to the communities and surrounding environment. The receptor sensitivity was considered high as there were households and livelihood activities within the transmission line RoWs in the Project area. Impacts on community health and wellbeing could lead in injuries or even fatalities. Additionally, any contacts (both intentional and unintentional) with the exposing snapped transmission line can result in electrocution.

### *13.4.2.5.2 Existing Controls*

There is no existing controls recommended by the Project owner.

### *13.4.2.5.3 Significance of Impact (Before Mitigation)*

Remarkably, there are many households locating in the Project's site and the transmission line traverses the arable land of coffee and fruits of local people in Cu Ne Commune, Krong Buk District, Dak Lak Province. Although the likelihood of occurrence is Unlikely to happen, the potential consequence can be Major as taking place. Therefore, the significance is considered Major to the Communities the Environment which is provided in Table 13.6.

### *13.4.2.5.4 Additional Preventive and Mitigation Measures*

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental transmission line snapping and transmission pylon collapse are summarised in Table 13.24 below.

**Table 13.24 Preventive and Mitigation Measures of Transmission Line Snapping and Transmission Pylon Collapse**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Establish a good practice and should comply with electricity safety related regulation or international standard, whichever, more stringent, in the design and installation of transmission line and transmission pylons | O&M Contractor / Project's owner | Prior operation |
| Preventive measure | Implement the SEP and a robust stakeholder engagement programme on emergency response. | Project owner | During the operation |
| Preventive measure | Implement periodic routine inspection and maintenance procedures (in line with the international best practice) | O&M Contractor / Project's owner | During the operation |
| Preventive measure | Install warning system, signal boards, lighting prevention system, and anti-climbing devices on the tower. | O&M Contractor / Project's owner | Prior operation |
| Mitigation measure | Develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation. | O&M Contractor / Project's owner | Prior operation |
| Mitigation measure | Implement an Emergency Preparedness Response Plan and monitor contractors to ensure consistent implementation | O&M Contractor / Project's owner | During the operation |

### *13.4.2.5.5 Residual Impact*

Because the majority of the mitigation presented as preventative, the primary goal of these measures was to reduce the likelihood of the unplanned event from occurring. However, if the event occurred, the consequence of the transmission line snapping and transmission pylon collapse events could potentially remain severe. In these cases, the post-event measures described in the previous section would apply to minimise the impacts. With four recommended preventive measures and two mitigation measures proposed, the risk of transmission line snapping and transmission pylon collapse can be diminished to moderate ranking. The evaluation of pre and post risk ranking of this unplanned event is detailed in Table 13.25*.*

**Table 13.25 Pre and Post Risk Ranking**

| Impact Significance / Aspects | Pre risk ranking (Without Mitigation Measures) | Post risk ranking (With mitigation measures) |
|---|---|---|
| Communities | **3D Major** | **2D Moderate** |
| Environment | **3D Major** | **2D Moderate** |

#### 13.4.2.5.6 *Monitoring and Auditing*

A quarterly audit program shall be established to check the implementation of regular technical inspection of the transmission lines and transmission pylons' safety.

### 13.4.2.6 Natural Hazards

#### 13.4.2.6.1 *Background and Potential Impact*

According to Chapter 7, Dak Lak Province has been yearly encountered many natural disasters including storm and tropical depressions, fog, thunderstorm, flooding, landslide and drought. Once happening, these natural hazards can cause significant effect and damage on human's life, livestock, and property.

#### 13.4.2.6.2 *Existing Controls*

Regarding the document namely "Safe and Civilized Construction Plan" provided by the Project's owner, in order to prevent and reduce the natural hazards, the Project department did:

- Establish the geological disaster emergency plan, set up the corresponding emergency leading and working agencies, and clarify the job responsibilities
- Organise geological inspection prior to the commencement of the Project to find out the parts of areas that may be prone to landslide and try to avoid setting up camps, building facilities and carrying out the operations in high-risk areas of geological disasters,
- Provide publicity and education on natural disasters to improve awareness of all personnel participating the Project on preventing geological disasters
- Periodically carry out geological monitoring in the areas with high risk of geological disasters and give timely warning if abnormal conditions are found during the construction process, and
- Conduct the preventive and control measures for the inevitable disasters.

#### 13.4.2.6.3 *Significance of Impact (Before Mitigation)*

According to the Environmental baseline, these kinds of natural disaster can likely happen and the consequence caused can be significant to the people, livestock and property; therefore, the significance of impact is considered as Major.

#### 13.4.2.6.4 *Additional Preventive and Mitigation Measures*

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental natural unplanned events are summarised in Table 13.26 below.

**Table 13.26 Preventive and Mitigation Measures of Natural Hazards**

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Incorporation of siting and safety engineering criteria to prevent failures due to natural disasters. | O&M contractor / Project's owner | Prior commissioning |
| Preventive measure | Strengthen the weather forecasting system to notify the potential floods for the basin | Require more support from Meteorological stations at the region | Commissioning and operation phases |

| Type of Control (i.e. Prevent / Mitigate) | Management Control | Responsibility – Organization | Timing |
|---|---|---|---|
| Preventive measure | Implement the SEP and a robust stakeholder engagement programme on emergency response. | Project's owner | During commissioning and operation |
| Preventive measure | Implement periodic routine inspection and maintenance procedures (in line with international best practice) | O&M contractor / Project's owner | During commissioning and operation |
| Preventive measure | Install warning system, signal boards, flood prevention systems. | O&M contractor / Project's owner | Prior commissioning |
| Mitigation measure | Develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation. | O&M contractor / Project's owner | Prior commissioning |
| Mitigation measure | Implement an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation | O&M contractor / Project's owner | During commissioning and operation |

#### *13.4.2.6.5 Residual Impact*

It is noted that the likelihood of occurrence of natural hazards will not be increased by the project. The project should ensure that the introduction of hard surface areas does not increase the potential for flash flood etc. where possible. The project could also provide mitigation measures to minimise impacts and severe damage caused by the natural disasters.

**Table 13.27 Pre and Post Risk Ranking**

| Aspects / Impact Significance | Without Mitigation Measures | With mitigation measures |
|---|---|---|
| Communities | **4D Major** | **4C Moderate** |
| Environment | **4D Major** | **4C Moderate** |
| Properties | **4D Major** | **4C Moderate** |

#### *13.4.2.6.6 Monitoring and Auditing*

The monitoring and auditing program is similar to the construction stage.

## 13.5 Summary

In brief, this section covers all unplanned events arising during the project's lifetime consisting of the preparation, construction, and operation phases and the pre and post risk ranking based on the magnitude of likelihood of occurrence and the potential consequence. The key findings of this chapter are summarised in Table 13.28.

**Table 13.28 Summarised the Impact Ranking of the Potential Unplanned Events during the Preparation, Construction and Operation Phases**

| No. | Unplanned Events | Phase | Influent aspects | Impact significance | |
|---|---|---|---|---|---|
| | | | | Pre-mitigation | Post-Mitigation |
| 1 | Leakage and spill incidents | Construction phase | Communities | 3C Moderate | 3B Minor |
| | | | Environment | 3C Moderate | 2B Minor |
| | | Operation phase | Communities | 3B Minor | 2C Minor |
| | | | Environment | 3B Minor | 2C Minor |
| 2 | Traffic accidents | Construction phase | Communities | 3D Major | 2D Moderate |
| | | | Properties | 3D Major | 2D Moderate |
| 3 | Fire and explosion | Construction phase | Communities | 3D Major | 2D Moderate |
| | | | Environment | 3D Major | 2C Minor |
| | | Operation phase | Communities | 2E Major | 2C Minor |
| | | | Environment | 2E Major | 2C Minor |
| 4 | Occupational Health and Safety | Construction phase | Workers and employees | 4C Moderate | 2C Minor |
| | | Operation phase | | | |
| 5 | Blade ejection failure / Blade throw | Operation phase | Communities | 2E Major | 2C Minor |
| | | | Environment | 3C Moderate | 2B Minor |
| 6 | Transmission line snapping and tower swaying/collapsing | Operation phase | Communities | 3D Major | 2D Moderate |
| | | | Environment | 3D Major | 2D Moderate |
| 7 | Natural Hazards Flooding & Landslide | Operation phase | Communities | 4D Major | 4C Moderate |
| | | | Environment | 4D Major | 4C Moderate |
| | | | Properties | 4D Major | 4C Moderate |

# 14. CUMMULATIVE IMPACT ASSESSMENT

## 14.1 Introduction

While the impacts of an individual project may be judged to be acceptable, there is also a need to consider the potential project's impacts to interact with impact associated with other developments – so called "cumulative" impacts.

The IFC Performance Standard (PS) 1 defines cumulative impacts as: "Impacts that result from incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities".

IFC PS 1 requires that an environmental assessment should also address cumulative impacts. The objective of the Cumulative Impact Assessment (CIA) is to identify those environmental, social or health aspects that may not on their own constitute a significant impact but when combined with impacts from past, present or reasonably foreseeable future Project activities or other projects/activities may result in a larger and more significant impact.

In order to gain an understanding of the Project's overall contribution to impacts within Krong Buk Commune and other communes in Huong Hoa District, a cumulative impact assessment (CIA) is required to be undertaken. Whilst total cumulative impacts due to multiple projects within a given area should be identified within government led spatial planning efforts (generally as part of a Strategic Environmental Assessment), the Project owner needs to determine the degree to which it is contributing to these overall cumulative impacts on Valued Environmental and Social Components (VEC). In this regards, the objectives of the CIA are:

- Use the outcomes of the preceding chapters of this ESIA to determine spatial and temporal boundaries, identify VEC's and all development and external natural and social stressors affecting them
- Recognise and identify how the Project, along with other existing and future projects may contribute to cumulative impacts on the predicted future condition of the identified VEC's, and
- Develop measures to ensure these are avoided and/or minimised to the greatest extent if possible.

To achieve these objectives and gain an understanding of the complexities of cumulative impacts, this chapter presents a Rapid Cumulative Impact Assessment (RCIA), which has been undertaken largely in accordance with the IFC's Good Practice Handbook: Cumulative Impact Assessment and Management Guidance for Private Sector in Emerging Markets (the "IFC Handbook").

## 14.2 Relevant Guidelines and Criteria

- To achieve these objectives and gain an understanding of the complexities of cumulative impacts, this Chapter presents a Rapid Cumulative Impact Assessment (RCIA), which has been undertaken largely in accordance with international best practice guidance documents, such as:
- The European Union's "Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions" (1999)
- The Canadian Environmental Assessment Agency's "Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act" (2012)
- The IFC's "Good Practice Handbook: Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets" (2013), and
- Scottish Natural Heritage (SNH), "Assessing the cumulative impact of onshore wind energy developments." (2012).

## 14.3 Methodology

The IFC's "Good Practice Handbook: Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets" proposes as a useful preliminary approach to conduct a Rapid Cumulative Impact Assessment (RCIA). The RCIA provides a desk that, review in consultation with the affected communities and other stakeholders, enable the developer to determine whether its activities are likely to significantly affect the viability or sustainability of selected Valued Environmental and Social Components (VECs).

Regarding the definition in the IFC Good practice Handbook on the RCIA logical framework, Figure 14.1 illustrates an iterative six-step process: scoping (step 1 and step 2), VECs baseline determination (step 3), assessment of the contribution of the development under valuation to the predicted cumulative impacts (step 4), evaluation of significance of predicted cumulative impacts to the viability or sustainability of the effected VECs (step 5), and design implementation of mitigation measures to manage the development's contribution to the cumulative impacts and risks (step 6).

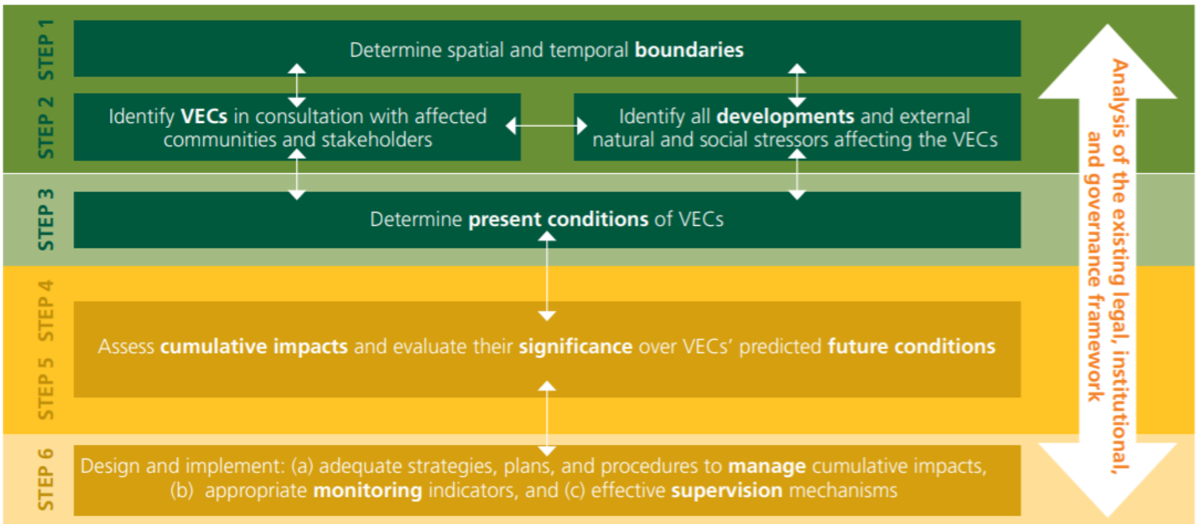



**Figure 14.1 Rapid Cumulative Impact Assessment Six-Step Approach**

### 14.3.1 Scoping Phase I – VECs, Spatial and Temporal Boundaries

Step 1 of the CIA involves identifying VECs and determining the spatial and temporal boundaries of the CIA. Based on the Handbook, the key objectives of this step include:

- Identify and agree on VECs in consultation with stakeholders
- Determine the time frame for the analysis, and
- Establish the geographic scope of the analysis.

### 14.3.2 Scoping Phase II – Other Activities and Environmental Drives

Based on the Handbook, the key objectives of this step include:

- Identify other past, existing, or planned activities within the analytical boundaries, and
- Assess the potential presence of natural and social external influences and stressors (e.g., droughts, other extreme climatic events).

### 14.3.3 Establish Information on Baseline Status of VECs

The key objectives include:

- Define the existing condition of VECs

- Understand its potential reaction to stress, its resilience, and its recovery time, and
- Assess trends.

### 14.3.4 Assess Cumulative Impacts on VECs

The key objectives include:

- Identify potential environmental and social impacts and risks
- Assess expected impacts as the potential change in condition of the VECs (i.e., viability, sustainability), and
- Identify any potential additive, countervailing, masking, and/or synergistic effects

### 14.3.5 Assess Significance of Predicted Cumulative Impacts

Based on the Handbook, the key objectives of this step include:

- Define appropriate “thresholds” and indicators
- Determine impact and risk magnitude and significance in the context of past, present, and future actions, and
- Identify trade-offs.

### 14.3.6 Management of Cumulative Impacts – Design and Implementation

Based on the Handbook, the key objectives of this step include:

- Use the mitigation hierarchy
- Design management strategies to address significant cumulative impacts on selected VECs
- Engage other parties needed for effective collaboration or coordination
- Propose mitigation and monitoring programs, and
- Manage uncertainties with informed adaptive management.

## 14.4 Scoping and Assessment

### 14.4.1 Identification of VECs

The ESIA has identified the existing conditions of a range of Sensitive Receptors, defined as VECs for the purposes of this RCIA, including:

- Noise receptors in close proximity to the Project site (within 2 km radius of the Project’s site)
- Biodiversity values and particularly bird and bats which are at risk from blade strike, and to a lesser extent habitat loss
- Terrestrial habitat
- Landscape and Visual Amenity, and
- Socio-economic and community.

### 14.4.2 Spatial Boundaries

According to the IFC Good Practice Handbook on Cumulative Impact Assessment, spatial and temporal boundaries of the Project includes the area that will be directly affected by the Project or activities – the Project’s footprint and the proximities contributing to significant impacts outside the Project’s footprint (e.g. transportation). The Area of Influences (AoI) was guided by information taken from similar projects in Vietnam and abroad. This allows a decision to be made as to whether there is a potential for overlap with the Project and other development's impacts.

**Table 14.1 Area of Influence (AoI)**

| VECs | Potential Impact | AoI (km) |
|---|---|---|
| Physical features | Elevated noise from wind farm | 2[71] |
| Ecological system | Collision of birds and bats with the turbines | 50 (ADB, SPS, IFC PS6) |
| Landscape and Visual Amenity | Elevated visual nuisance from a cluster of wind farm | 35[72] |
| Socio-economic and community | Impacts generally recognised as important on the basis of scientific concerns and/or concern from affected and wider communities | Areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments[73] |

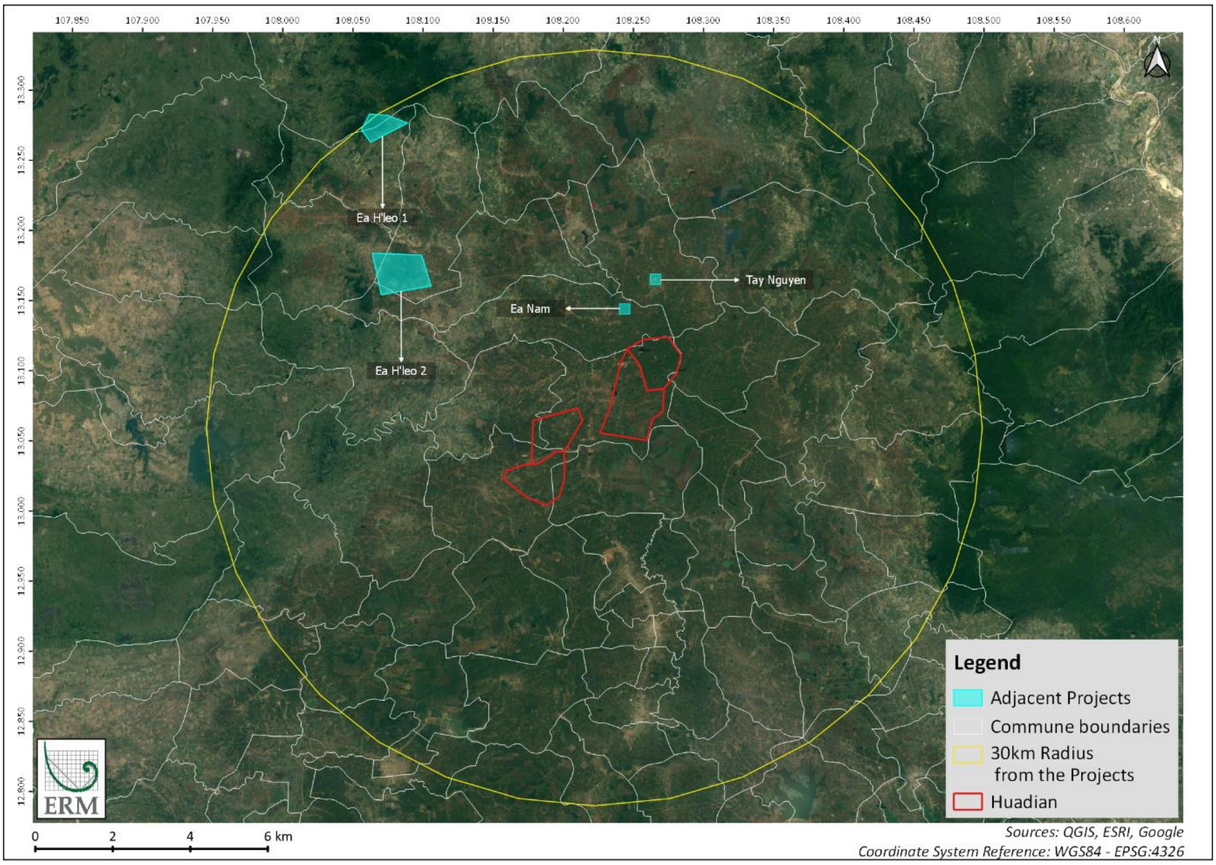
### 14.4.3 Identification of Relevant Developments, External Natural and Social Stressors

According to Decision No. 234/QD-BCT dated 18 January 2018 by the Ministry of Industry and Trade on the approval of master plan of windfarm projects in Dak Lak Province until 2020, with a vision to 2030, the Province was approved for wind power development within seven areas, including:

- Zone 1: including Ea H'leo, Ea Wy, Cu Mot Communes, Ea H'leo District with total studied area of 1748.86 hectares (Expected capacity of 58.30 MW)
- Zone 2: including Cu Amung, Cu Mot, Ea Khal, Ea Wy Communes, Ea H'leo District with total studied area of 3780.49 hectares (Expected capacity of 126.02 MW)
- Zone 3: including Ea Sol, Dlie Yang, Ea Hiao, Ea Tal Communes, Ea H'leo District with total studied area of 5094.34 hectares (Expected capacity of 169.812 MW)
- Zone 4: including Ea Hiao Commune, Ea H'leo District (Total studied area: 1588.70 hectares, Expected capacity: 151.76 MW) and Dlie Ya, Cu Klong Communes, Krong Nang District with total studied area of 4552.84 hectares, Expected capacity of 151.76 MW)
- Zone 5: including Ea Tan Commune, Krong Nang District (Total studied area: 3174.46 hectares, Expected capacity: 105.82 MW), and Cu Ne, Chu Kbo, Cu Pong, Ea Sin Communes, Krong Buk District (Total studied area: 7631.58 hectares, Expected capacity: 254.47 MW)
- Zone 6: including Cu Dlie M'nong, Ea Tar Communes, Cu M'gar District (Total studied area: 4340.47 hectares, Expected capacity: 144.68 MW), Ea Ngai Commune, Krong Buk District (Total studied area: 1344.64 hectares, Expected capacity: 44.82 MW), and Doan Ket, An Binh, Dat Hieu Villages, Buon Ho Town (Total studied area: 3174.46 hectares, Expected capacity: 105.82 MW), and
- Zone 7: including Ea Tul, Ea Drong Communes, Cu M'gar District (Total studied area: 2053.63 hectares, Expected capacity: 68.45 MW), and Cu Bao, Binh Thuan Communes, Binh Tan, Binh Thuan Wards, Buon Ho Town (Total studied area: 4462.20 hectares, Expected capacity: 148.74 MW)

[71] EHS Guidelines for Wind Energy by World Bank Group
[72] Scottish Natural Heritage (SNH), "Assessing the cumulative impact of onshore wind energy developments" (2012)
[73] IFC PS1

Table 14.2 summarizes existing and proposed windfarm projects in proximity to the Project.




Source: QGIS, ESRI, Google, August 2021

**Figure 14.2 Existing and Planned Wind Power Developments in the Immediate Region**[74]

[74] The information relating to the specific locations of other vicinity developments is unavailable for being visualised in the map at the time of developing this ESIA.

**Table 14.2 Key Developers in the Immediate Region at the time of ESIA development**

| No. | Project | Location | Planned Capacity (MW) | Land Area (ha) | Development Status at the time of CIA | Tentative schedule for operation | Distance to the Project (km) |
|---|---|---|---|---|---|---|---|
| 1 | Tay Nguyen Wind Power Project | Village No.4, Dlie Yang Commune, Ea H'leo District | 28 | N/A | Implementation | 2022 | 4.6 |
| 2 | Ea H'leo 1 Wind Power Project | Ea Wy and Ea H'leo Communes, Ea H'leo District | 57 | N/A | Implementation | N/A | 24.6 |
| 3 | Ea H'leo 2 Wind Power Project | Cu Amung, Cu Mot, and Ea Khal Communes, Ea H'leo District | | N/A | Implementation | N/A | 15.9 |
| 4 | Ea H'leo 3 Wind Power Project | Ea Sol Commune, Ea H'leo District | 10 | N/A | Planning | N/A | N/A |
| 5 | Ea H'leo 4 Wind Power Project | Ea Hiao, and Dlie Yang Communes, Ea H'leo District | 10 | N/A | Planning | N/A | N/A |
| 6 | Cu M'gar 2 Wind Power Project | Ea Tul Commune, Cu M'gar District | 10 | N/A | Planning | N/A | N/A |
| 7 | Buon Ho 1 Wind Power Project | Dat Hieu, An Binh, Doan Ket Villages, Ea Ngai Commune, Krong Buk District | 20 | N/A | Planning | N/A | N/A |
| 8 | Buon Ho 2 Wind Power Project | Thong Nhat, Binh Tan, Villages and Cu Bao Commune, Krong Buk District | 20 | N/A | Planning | N/A | N/A |
| 9 | Buon Ho 3 Wind Power Project | Binh Tan Village, Binh Thuan Commune, Krong Buk District | 10 | N/A | Planning | N/A | N/A |
| 10 | Ea Nam Wind Power Project | Ea Nam, Ea Khal, Dlie Yang Commune, Ea H'leo District | 400 | 6,000 | Completed | 2021 | 2.7 |
| **11** | **Krong Buk 1 Wind Power Project** | **Cu Pong, and Chu Kbo Communes, Krong Buk District** | **50** | **18** | **Implementation** | **2021** | **0** |
| **12** | **Krong Buk 2 Wind Power Project** | **Cu Pong, Chu Kbo, and Ea Sin Communes, Krong Buk District** | **50** | **16.96** | **Implementation** | **2021** | **0** |
| **13** | **Cu Ne 1 Wind Power Project** | **Cu Ne Commune, Krong Buk District** | **50** | **10.78** | **Implementation** | **2021** | **0** |
| **14** | **Cu Ne 2 Wind Power Project** | **Cu Ne Commune, Krong Buk District** | **50** | **14.29** | **Implementation** | **2021** | **0** |

| No. | Project | Location | Planned Capacity (MW) | Land Area (ha) | Development Status at the time of CIA | Tentative schedule for operation | Distance to the Project (km) |
|---|---|---|---|---|---|---|---|
| 15 | Beta Wind Power Project | Dat Hieu, An BInh, Doan Ket, Thong Nhat, Binh Tan Villages, Cu Bao Commune, Buon Ho Town, Ea Ngai Commune (Krong Buk District), and Ea Tul Commune (Cu M'Gar District) | 50 | 10.9 | Planning | 2023 | N/A |
| 16 | Alpha Wind Power Project | Ea Sol, Dlie Yang, Ea Hiao Communes, Ea H'leo District | 20 | 6.5 | Planning | 2023 | N/A |

Sources: Letter No. 795/TTg-CN dated 25 June 2020 by Prime Minister on supplementing the Wind Power Projects in EDP VII; and Dak Lak Department of Industry and Trade[75]

**Table 14.3 Scoping Matrix**

| Impact Type | VEC's Likely to be Impacted | Existing Assessment in ESIA | CIA Scope |
|---|---|---|---|
| **Noise** | Local communities in Cu Pong, Cu Ne, Chu Kbo and Ea Sin communes and other nearby communes in Krong Buk District | Section 10.2 provides an assessment of noise impacts for the Project. Based on the assessed compliance of the individual operation of the Project and the cumulative operation of the nearby windfarms, predicted cumulative noise levels from these windfarms are not significant and therefore, achieves compliance at all receptors. | Given no windfarms will be developed within the radius of 2 km in the Project's vicinity, no further CIA is proposed. |
| **Bird and bat strike and habitat loss.** | Species of conservation significance known to habitat the local area (Section 8.2 ) | A detailed assessment of biodiversity impacts is provided in Chapter 11 and identifies impacts associated with the four Wind Farms' development only. | Cumulative assessment to be conducted using the findings from the assessment for the Project as guidance on the extent and likely significance of impacts. |

75 Dak Lak Department of Industry and Trade. Feb 2018. Announcement of the wind development planning of Dak Lak province in the period to 2020, with a vision to 2030. Available at: https://socongthuong.daklak.gov.vn/vi/news/hoat-dong-nganh-cong-thuong/cong-bo-quy-hoach-phat-trien-gio-tinh-dak-lak-giai-doan-den-2020-co-xet-den-nam-2030-402.html (Accessed on 6 Sep 2021)

| Impact Type | VEC's Likely to be Impacted | Existing Assessment in ESIA | CIA Scope |
|---|---|---|---|
| **Visual Impacts** | Local communities living in Krong Buk District | A visual assessment is provided at Section 10.8 which indicated that the impact of the Project on visual aesthetics is assessed as Minor. Furthermore, despite the fact that the closest wind farm is located about less than one kilometre away from the Project, impacts on visual aesthetics from these projects are not considered cumulatively due to a small number of visitors with interest in their surroundings as well as viewers with a passing interest not specifically focussed on the landscape e.g. workers, commuters. | No further CIA is proposed. |
| **Shadow Flickering Impacts** | Local communities living in Cu Pong, Cu Ne, Chu Kbo and Ea Sin Communes. | Given that the AoI of shadow flickering issues is only within 10 times WTG's rotor diameter (1,410 m for EN141 and 1,560 m for EN156), residents who live in Cu Pong, Cu Ne, Chu Kbo and Ea Sin Communes are likely to experience shadow flickering periods during the day and throughout the year. As the surrounding wind power developments are still in planning and/ or specific turbine layouts have not yet been finalised, modelling for cumulative impact on Shadow Flicker could not be undertaken. However, according to representative points of those surrounding wind farms from desktop study and site visit survey, the distance from the representative locations of surrounding developments to identified receptors is greater than the theoretical radius of influence (See Section 10.7). Thus, cumulative impact assessment on shadow flicker for receptors which were considered in Section 10.7 Shadow Flicker cumulative effect is scoped out of the report. | No further CIA is proposed. |
| **Waste** | No VEC's are likely to be impacted by waste. | Waste is not considered for the CIA as the ESMP has proposed appropriate management and mitigation measures. It is expected that any future developments will comply with Vietnamese waste storage and management regulations (as a minimum). | No further assessment required |
| **Socio-Economic: Community Health and Safety** | The VECs likely to be impacted are those people residing in Krong Buk District. | Section 12.6 presents a detailed assessment of impacts relating to community health and safety during Construction and Operation Phases. | A qualitative cumulative impact assessment will be undertaken, focusing on identification of ways in which cumulative |

| Impact Type | VEC's Likely to be Impacted | Existing Assessment in ESIA | CIA Scope |
|---|---|---|---|
| | | | impacts may occur to VECs, and develop appropriate mitigation strategies. |
| **Socio-Economic: Economy and Employment** | The VECs likely to be impacted are those people residing in Krong Buk District. | Social impacts of the Project, including impacts to employment and economy during both the Construction and Operation Phases, were assessed as part of Section 12.8 | A qualitative assessment will be undertaken, focusing on identification of ways in which cumulative impacts may occur to VECs, and develop appropriate mitigation strategies to ensure that positive impacts are maximised. |
| **Socio-Economic: Traffic** | The VECs likely to be impacted are those people residing in Krong Buk District. | Section 12.6 presents a detailed assessment of impacts relating to traffic during Construction phase. | A qualitative assessment will be undertaken, focusing on identification of ways in which cumulative impacts may occur to VECs, and develop appropriate mitigation strategies. |
| **Socio-Economic: Infrastructure and Public Services** | The VECs likely to be impacted are those people residing in Krong Buk District. | Section 12.7 presents a detailed assessment of impacts relating to infrastructure and public services during Construction phase. | A qualitative assessment will be undertaken, focusing on identification of ways in which cumulative impacts may occur to VECs, and develop appropriate mitigation strategies. |
| **Socio-Economic: Indigenous Peoples within the Project' area and wider Ethnic Minority groups** | The VECs likely to be impacted are those people residing in Krong Buk District. | Section 12.11 presents a detailed assessment of impacts relating to infrastructure and public services during Construction phase. | A qualitative assessment will be undertaken, focusing on identification of ways in which cumulative impacts may occur to VECs, and develop appropriate mitigation strategies. |

## 14.5 Cumulative Impacts on Biodiversity

### 14.5.1 Habitat Loss

According to satellite imagery analysis, the existing and planned CIA Projects (see Figure 14.2) are likely to occupy modified habitats. Although modified habitats are prevalent in the region, especially plantations, wetlands and water bodies that are important habitats for the endangered Smooth-coated Otter, as well as other endangered reptiles species were found during field surveys. Therefore, cumulative habitat loss in both direct and indirect forms may lead to incurred costs of searching for new foraging and roosting habitats for these species, and increased human-animals conflicts and hunting resulting in increased fauna mortalities.

#### 14.5.1.1 Mitigation Measures

To mitigate the effect of cumulative habitat loss, a collaborative program between these wind farms are recommended to facilitate revegetation not only on temporary Projects' footprint, but also to create more greenery within the affected modified habitats to attract more artificial-habitat tolerant species.

- The Project is recommended to facilitate a Cumulative Impact Assessment (CIA) association with other projects and government representation (such as Dak Lak Provincial People Committee) to govern a system for managing cumulative impacts. This system should seek guidance from Vietnam regulations (such as Vietnam Data Red Book) and Vietnam commitments to international treaties such as Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Sharing of best practices in avoidance of forest loss through active monitoring during land clerance in construction phase (e.g. mark a defined boundary of clerance) and forest rehabilitation.
- Promote a fauna conservation program to raise awareness for local people about the protected status of endangered species under the laws of Vietnam. Violations could lead to sanctions and imprisonment.

### 14.5.2 Barriers on Migratory Flyways

Multiple windfarms and network of transmission lines aligning on the flyways of birds may create a cumulative barrier effects that cause birds to adjust their trajectories, resulting in increased energy expenditures to avoid the windfarms. Although effects of extra distances taken to detour around the barriers are poorly-understood, the cumulative barrier effects are likely to be insignificant. A study by Masden et al. (2009) suggested an equivalence of 100 Nysted wind farms[76] (16,600 MW, compared to total 835 MW of CIA Projects as from Table 14.2) will only bring about a reduction of 1% body mass of a bird to detour around them.

According to an unpublished report written for ERM by Dr. Neil Furey[77], bat migratory behaviour in Southeast Asia is much less studied than in temperate regions. The effects of wind farms as barriers to bats is poorly researched, although as bats show much less avoidance behaviour than birds, barrier effects would appear to be unlikely.

For non-volant mammals, their diversity, abundances and activities are likely to be low for the CIA Projects which are located mostly in heavily-modified habitats. The additional barriers created by Project components are considered to be negligible considering that non-volant fauna movements are already low.

76 Nysted windfarm is a Danish offshore windfarm built in 2003, with 72 turbines and a total capacity of 166 MW, and was the largest in the world until 2007. In 2010, a 207 MW extension for the windfarm was conducted and finished in end of 2011.

77 Conservation biologist specializes in Southeast Asian bats, who has worked in Southeast Asia since 1997 (resident since 1999), spending a decade in Vietnam. Much of his recent work has focused on strengthening national capacity for conservation science in Cambodia through his leadership and contributions to the Royal University of Phnom Penh.

#### 14.5.2.1 Mitigation Measures

There are no additional mitigation measures proposed for this impact.

### 14.5.3 Bird and Bat Strike

The location of the Project is within close proximity to other windfarms that are existing, currently under construction or will be constructed in the future (see Table 14.2 and Figure 14.2). Of concern is the potential for cumulative impacts to biodiversity, as a result of increases in bird flight risk throughout the Rotor Swept Zone of these additional farms. A summary of studies by NWCC (2010) in North America anticipated a median of 4 bird fatalities and 15 bat fatalities per MW per year. The total capacity of nine developers identified in Table 14.2 is 835 MW, which means cumulative bird and bat deaths could be 3,340 and 1,728,450 per year respectively. However, given the differences in species composition, species behaviour, weather to name a few influencing factors, the guidance given by NWCC (2010) only provides a rough estimation of the scale of cumulative impacts.

As a proportion of the overall number of birds that may pass through the Project site, the estimated number of bird fatalities is generally low and unlikely to have population level effects (except for the Germain's swiftlet that is exceptionally abundant within the Project area). The abundances of birds, especially migratory birds should be reflected better after the third survey to inform cumulative impacts on bird strikes.

The number of predicted bat casualties, particularly given the slow reproductive ecology of bats, demonstrates the value of considering cumulative impacts. There is potential for this level of casualties to have an effect on common (LC) species, at least at a local level. Impacts will vary considerably between wind farms based primarily on location in relation to roosting and foraging areas. However, an awareness of the cumulative impact on bat populations will be a consideration when setting limits of acceptable change in the Adaptive Management Plan.

#### 14.5.3.1 Mitigation Measures

The mitigation measures for cumulative bird and bat impacts are recommended for this Project are as followed:

- The Project is recommended to facilitate a Cumulative Impact Assessment (CIA) in association with other projects and government representation (such as Dak Lak Provincial People Committee) to govern a system for managing cumulative impacts. This system should be based on Vietnam regulations (such as Vietnam Data Red Book) and Vietnam commitments to international treaties such as Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Encourage CIA Projects to implement *Wildlife Shepherding Protocol* and *Injured Wildlife Management Protocol* across all projects;
- Sharing of best practices in bird transmission line designs and bird diverter deployment (designs for diverters, spacing and location along sensitive areas); and
- Sharing of post-contruction monitoring results, which would be very valuable to help understand the cumulative bird and bat mortatlities.

## 14.6 Cumulative Impact on Economy and Employment

In terms of economy and employment, the cumulative impact will be **Positive** and this positive impact will be assessed at national, provincial and local level through analysing tax revenue, economic development and employment opportunities, respectively. As indicated Table 14.4, the cumulative impacts will occur during both the Construction and Operation Phases of the Project. Benefits arising will come from the local employment and procurement activities of the Project as well as other local developments, both directly to the projects and indirectly via their subcontractors and suppliers. Based on ERM's firm knowledge and deep experience in many wind farm projects, each project requires an average of approximately 100 workers for construction phase and 40 workers for the operation's activities. Although not all of these workers will be recruited from the local area based on the requirements of experience and professional skills, some will be employed from the local communities for unskilled and semi-skilled jobs. Additionally, needs of other types of business and service development including accommodation (e.g. hotels, guest houses), food and beverage and commercial areas will arise leading to the growth of local economy and increase of local recruitment.

**Table 14.4 Cumulative Impact Scoping for Economy and Employment**

| | Project | Economy and Employment |
|---|---|---|
| **Proposed developments** | | |
| 1 | Tay Nguyen Wind Power Project | CO |
| 2 | Ea H'leo 1 Wind Power Project | CO |
| 3 | Ea H'leo 2 Wind Power Project | CO |
| 4 | Ea H'leo 3 Wind Power Project | CO |
| 5 | Ea H'leo 4 Wind Power Project | CO |
| 6 | Cu M'gar 2 Wind Power Project | CO |
| 7 | Buon Ho 1 Wind Power Project | CO |
| 8 | Buon Ho 2 Wind Power Project | CO |
| 9 | Buon Ho 3 Wind Power Project | CO |
| 10 | Ea Nam Wind Power Project | O |
| 11 | **Krong Buk 1 Wind Power Project** | CO |
| 12 | **Krong Buk 2 Wind Power Project** | CO |
| 13 | **Cu Ne 1 Wind Power Project** | CO |
| 14 | **Cu Ne 2 Wind Power Project** | CO |
| 15 | Beta Wind Power Project | CO |
| 16 | Alpha Wind Power Project | CO |

*C Pre and Construction phase*
*O Operation phase*
*D Decommissioning phase*
*N Negligible / Managed risk*
*Large scale negative*
*Small scale negative*
*Positive*

## 14.7 Cumulative Impacts on Community Health and Safety

The cumulative impacts on community health and safety are assessed for both labour influx and non-influx related issues during construction and operation of the Project, simultaneously with other developments in Krong Buk District and its surroundings will be **Minor**, as shown in Table 14.5. As indicated in the scoping matrix (see Table 14.2), most of the cumulative impacts on community health and safety will mainly be from the Project's construction activities interacting with the construction of the nearby wind farm projects.

**Table 14.5 Cumulative Impact Scoping for Community Health and Safety**

| | Project | Community Health and Safety |
|---|---|---|
| **Proposed developments** | | |
| 1 | Tay Nguyen Wind Power Project | C |

| | Project | Community Health and Safety |
|---|---|---|
| 2 | Ea H'leo 1 Wind Power Project | C |
| 3 | Ea H'leo 2 Wind Power Project | C |
| 4 | Ea H'leo 3 Wind Power Project | C |
| 5 | Ea H'leo 4 Wind Power Project | C |
| 6 | Cu M'gar 2 Wind Power Project | C |
| 7 | Buon Ho 1 Wind Power Project | C |
| 8 | Buon Ho 2 Wind Power Project | C |
| 9 | Buon Ho 3 Wind Power Project | C |
| 10 | Ea Nam Wind Power Project | O |
| 11 | **Krong Buk 1 Wind Power Project** | C |
| 12 | **Krong Buk 2 Wind Power Project** | C |
| 13 | **Cu Ne 1 Wind Power Project** | C |
| 14 | **Cu Ne 2 Wind Power Project** | C |
| 15 | Beta Wind Power Project | C |
| 16 | Alpha Wind Power Project | C |

| | |
|---|---|
| *C* | *Pre and Construction phase* |
| *O* | *Operation phase* |
| *D* | *Decommissioning phase* |
| *N* | *Negligible / Managed risk* |
| | *Large scale negative* |
| | *Small scale negative* |
| | *Positive* |

Key cumulative impacts include increased risk of infectious disease, potential for increased crime, security, and cultural impacts such as the degradation of traditional values and changes in social networks due to the influx of migrant workers and non-local people who come to the Project's site in Krong Buk District, Dak Lak Province. Other potential impacts caused by the construction and operation activities (non-influx issues) of these developments comprise of noise, dust, waste, and traffic safety issues.

In addition to the mitigation measures proposed in Sections 12.6, the CHEC should adopt a collaborative approach and work with other local projects' owners and the local authorities as part of the Project's SEP. In particular, the Project should implement its ESMP to manage labour influx and environmental issues and to share best practices with other local project owners.

The Project's owner also should collect periodic reports from local clinics at commune and district levels to understand the community health and safety status in the area prior to and during the Project development. There should be a monitoring mechanism for ESMP implementation to identify its effectiveness and to allocate responsibility to certain developers in the instance where any issue arises. Where necessary, propose and conduct corrective actions in a timely manner.

## 14.8 Cumulative Impact on Traffic

Impacts on traffic comprise of potential traffic congestion and increased traffic safety risk in the areas along the transportation routes of projects. The interactions causing these cumulative impacts occur mostly during projects' simultaneous construction phase; a phase that requires a high frequency and volume of transportation activities. Taking into account the construction activities of Huadian Dak Lak Wind Power Project will happen simultaneously with construction activities of neighbouring projects (Tay Nguyen and Ea Nam) and transportation routes of those developments are the same route. Therefore, cumulative impacts on traffic will be **Major**.

**Table 14.6 Cumulative Impact Scoping for Traffic**

| | Project | Traffic |
|---|---|---|
| **Proposed developments** | | |
| 1 | Tay Nguyen Wind Power Project | C |
| 2 | Ea H'leo 1 Wind Power Project | C |
| 3 | Ea H'leo 2 Wind Power Project | C |
| 4 | Ea H'leo 3 Wind Power Project | C |
| 5 | Ea H'leo 4 Wind Power Project | C |
| 6 | Cu M'gar 2 Wind Power Project | C |
| 7 | Buon Ho 1 Wind Power Project | C |
| 8 | Buon Ho 2 Wind Power Project | C |
| 9 | Buon Ho 3 Wind Power Project | C |
| 10 | Ea Nam Wind Power Project | N |
| 11 | **Krong Buk 1 Wind Power Project** | C |
| 12 | **Krong Buk 2 Wind Power Project** | C |
| 13 | **Cu Ne 1 Wind Power Project** | C |
| 14 | **Cu Ne 2 Wind Power Project** | C |
| 15 | Beta Wind Power Project | C |
| 16 | Alpha Wind Power Project | C |

*C* *Pre and Construction phase*
*O* *Operation phase*
*D* *Decommissioning phase*
*N* *Negligible / Managed risk*
*Large scale negative*
*Small scale negative*
*Positive*

In addition to the mitigation measures proposed in Section 10.9, CHEC should take a collaborative approach to working with the local authorities (e.g. Krong Buk district PC), relevant provincial authorities and organisations (e.g. Dak Lak provincial PC, Department of Transportation, Department of Traffic Police) and the owners of other developments, as part of the Project's SEP to upgrade the local roads for heavy delivery vehicles movements to support many developments in the Project's surrounding area.

## 14.9 Cumulative Impacts on Local Community Livelihood

Based on the Social Baseline data analysis, the local community in Cu Pong, Cu Ne, Chu Kbo and Ea Sin communes mainly earn their living by agricultural cultivation activities. Land at the Project site areas are largely utilized for agricultural production of high value perennial crops (e.g. coffee, acacia). The proposed Project sites are located in proximity to several wind power developments, which are currently under construction. It is anticipated that land acquisition for the development of these projects has put impacts on local communities' livelihood due to their reliance on land-based production. However, in comparison to total land area described in Land Use Plan 2020 of Krong Buk District approved under Decision No. 540/QD-UBND of Dak Lak PPC, dated 16 March 2020, the acquired land for these wind power developments account for a relative small percentage. As such, it is noted that a certain recovery from loss of asset and income from agriculture production is obtainable.

Given the social survey results of neighbouring wind power project have been shared, the interview of the Projects' affected households revealed that fair compensation from land acquisition process may allow them to further invest in other type of livelihood such as animal husbandry, which may considered as positive impact. As such, with the existing controls measures, the significance of cumulative impact could be considered **Minor**.

**Table 14.7 Cumulative Impacts Scoping for Local Community Livelihood**

| | Project | Local Community Livelihood |
|---|---|---|
| **Proposed developments** | | |
| 1 | Tay Nguyen Wind Power Project | CO |
| 2 | Ea H'leo 1 Wind Power Project | CO |
| 3 | Ea H'leo 2 Wind Power Project | CO |
| 4 | Ea H'leo 3 Wind Power Project | CO |
| 5 | Ea H'leo 4 Wind Power Project | CO |
| 6 | Cu M'gar 2 Wind Power Project | CO |
| 7 | Buon Ho 1 Wind Power Project | CO |
| 8 | Buon Ho 2 Wind Power Project | CO |
| 9 | Buon Ho 3 Wind Power Project | CO |
| 10 | Ea Nam Wind Power Project | O |
| 11 | **Krong Buk 1 Wind Power Project** | CO |
| 12 | **Krong Buk 2 Wind Power Project** | CO |
| 13 | **Cu Ne 1 Wind Power Project** | CO |
| 14 | **Cu Ne 2 Wind Power Project** | CO |
| 15 | Beta Wind Power Project | CO |
| 16 | Alpha Wind Power Project | CO |

*C* *Pre and Construction phase*
*O* *Operation phase*
*D* *Decommissioning phase*
*N* *Negligible / Managed risk*
*Large scale negative*
*Small scale negative*
*Positive*

## 14.10 Cumulative Impacts on Infrastructure and Public Services

It is noted that the scoping matrix (see Table 14.8) illustrates the cumulative impacts on infrastructure and public services in both negative and positive aspects. Negative impacts are mostly associated with the additional strain on district-level services (e.g. local markets, inter-village roads, electricity), rising prices for commodities and food. Meanwhile, positive impacts include improvements to infrastructure and public services via the CDP developed by these developments, such as road renovation, health facilities and health care service support, and the increase and stabilisation of electricity supply, which becomes significant during the Operation Phase when projects begin generating revenue.

**Table 14.8 Cumulative Impacts Scoping for Infrastructure and Public Services**

| | Project | Infrastructure and Public Services | |
|---|---|---|---|
| **Proposed developments** | | **Negative impact** | **Possitive impact** |
| 1 | Tay Nguyen Wind Power Project | O | O |
| 2 | Ea H'leo 1 Wind Power Project | CO | CO |
| 3 | Ea H'leo 2 Wind Power Project | CO | CO |

| | Project | Infrastructure and Public Services | |
|---|---|---|---|
| 4 | Ea H'leo 3 Wind Power Project | CO | CO |
| 5 | Ea H'leo 4 Wind Power Project | CO | CO |
| 6 | Cu M'gar 2 Wind Power Project | CO | CO |
| 7 | Buon Ho 1 Wind Power Project | CO | CO |
| 8 | Buon Ho 2 Wind Power Project | CO | CO |
| 9 | Buon Ho 3 Wind Power Project | CO | CO |
| 10 | Ea Nam Wind Power Project | CO | CO |
| 11 | **Krong Buk 1 Wind Power Project** | CO | CO |
| 12 | **Krong Buk 2 Wind Power Project** | CO | CO |
| 13 | **Cu Ne 1 Wind Power Project** | CO | CO |
| 14 | **Cu Ne 2 Wind Power Project** | CO | CO |
| 15 | Beta Wind Power Project | CO | CO |
| 16 | Alpha Wind Power Project | CO | CO |

*C* *Pre and Construction phase*
*O* *Operation phase*
*D* *Decommissioning phase*
*N* *Negligible / Managed risk*
*Large scale negative*
*Small scale negative*
*Positive*

In addition to mitigation measures proposed in Section 12.7, the Project Owners should seek a collaborative approach with local authorities and owners of other developments within Krong Buk district as part of the Project's SEP. In particular, the Project Owners should implement its ESMP to manage impacts on infrastructure and public services as well as to share good practices with other development owners, to develop and implement an infrastructure improvement project via its CDP programs.

## 14.11 Cumulative Impacts on Indigenous Peoples within the Project' area and wider Ethnic Minority groups

The assessment on the IP in this project, is provided in the socio-economic baseline and social impact assessment sections. In addition to those impacts, social/ cultural tension might be taken place to the wider ethnic minority**.**

**Table 14.9 Cumulative Impact Scoping for Ethnic Minority**

| No | Project | Ethnic Minority | | |
|---|---|---|---|---|
| | | **Land Acquisition and Livelihoods** | **Health and Safety** | **Community Development** |
| 1 | Tay Nguyen Wind Power Project | CO | CO | CO |
| 2 | Ea H'leo 1 Wind Power Project | CO | CO | CO |
| 3 | Ea H'leo 2 Wind Power Project | CO | CO | CO |
| 4 | Ea H'leo 3 Wind Power Project | CO | CO | CO |
| 5 | Ea H'leo 4 Wind Power Project | CO | CO | CO |
| 6 | Cu M'gar 2 Wind Power Project | CO | CO | CO |
| 7 | Buon Ho 1 Wind Power Project | O | O | O |

| No | Project | Ethnic Minority | | |
|---|---|---|---|---|
| | | Land Acquisition and Livelihoods | Health and Safety | Community Development |
| 8 | Buon Ho 2 Wind Power Project | CO | CO | CO |
| 9 | Buon Ho 3 Wind Power Project | CO | CO | CO |
| 10 | Ea Nam Wind Power Project | O | O | O |
| 11 | **Krong Buk 1 Wind Power Project** | CO | CO | CO |
| 12 | **Krong Buk 2 Wind Power Project** | CO | CO | CO |
| 13 | **Cu Ne 1 Wind Power Project** | CO | CO | CO |
| 14 | **Cu Ne 2 Wind Power Project** | CO | CO | CO |
| 15 | Beta Wind Power Project | CO | CO | CO |
| 16 | Alpha Wind Power Project | CO | CO | CO |

| | |
|---|---|
| *C* | *Pre and Construction phase* |
| *O* | *Operation phase* |
| *D* | *Decommissioning phase* |
| *N* | *Negligible / Managed risk* |
| | *Large scale negative* |
| | *Small scale negative* |
| | *Positive* |

Except for mitigation measures proposed in Section 12.11, the Project Owners should consider taking a collaborative approach with representatives of IPs communities, local authorities, owners of other developments within Krong Buk District, and NGOs working in the region as part of the Project's SEP, particularly in the Project's disclosure and consultation with IPs. The Project Owners should develop and implement Indigenous Peoples Plans for the Project as well as to share good practices with other development owners.

# 15. GRIEVANCE REDRESSAL MECHANISM

Grievance redressal is another critical component of effective stakeholder engagement. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel or one channel through which their queries will be channelled and will ensure timely responses to each query. This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest. The GRM will be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM will be communicated to all relevant stakeholders.

As stated earlier, a grievance is a concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations, and may be filed in the same manner and handled with the same procedure. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts or perceived impacts. Based on the understanding of the project area and the stakeholders, an indicative list of the types of grievances have been identified for the project, as can be seen below:

- External Grievances: Grievance from all related stakeholders in general and community grievances in particular;
- Internal Grievances: Grievances from Employees (including both direct and indirect employees, including local workers and migrant workers through contractors); and
- AIIB's Project-affected People's Mechanism (PPM).

It is noted the Project Owner has developed the Stakeholder Engagement Plan (SEP) including Community and Worker Grievance Mechanisms. The below sections present summarised procedures while SEP describes the detailed mechanisms, monitoring, and reporting.

## 15.1 Community Grievance Mechanism

To allow grievances to be incorporated into project decision-making and to allow key messages to be accurately communicated, all community grievances will be recorded in the issues/ grievances register as a means of maintaining transparency throughout any action taken relating to a grievance.

Community grievances can be submitted to the Project through different channels such as: grievance boxes which can be allocated in the office of the affected commune People's Committee; at the site office of the Project Owner; directly via a telephone hotline to the grievance team of the Project; or directly submitted to a person in charge of community liaison (e.g. Community and Social Relations Specialist) of the Project.

The community grievance mechanism is generally designed for different levels of redress, corresponding to the scale and seriousness of the complaint. Therefore, classification of the complaint is an important step.

The Project should appropriately recruit and allocate human resources to manage the procedure. A team of Community and Social Relations (CSR) Specialists should be established under the management of CSR Manager. Ideally, persons with social and community management background should be recruited and assigned as a CSR Specialist and this could include members of the local community who have the requisite skill set.

Details of each step in a community grievance mechanism are illustrated in Figure 15.1 and the following text.

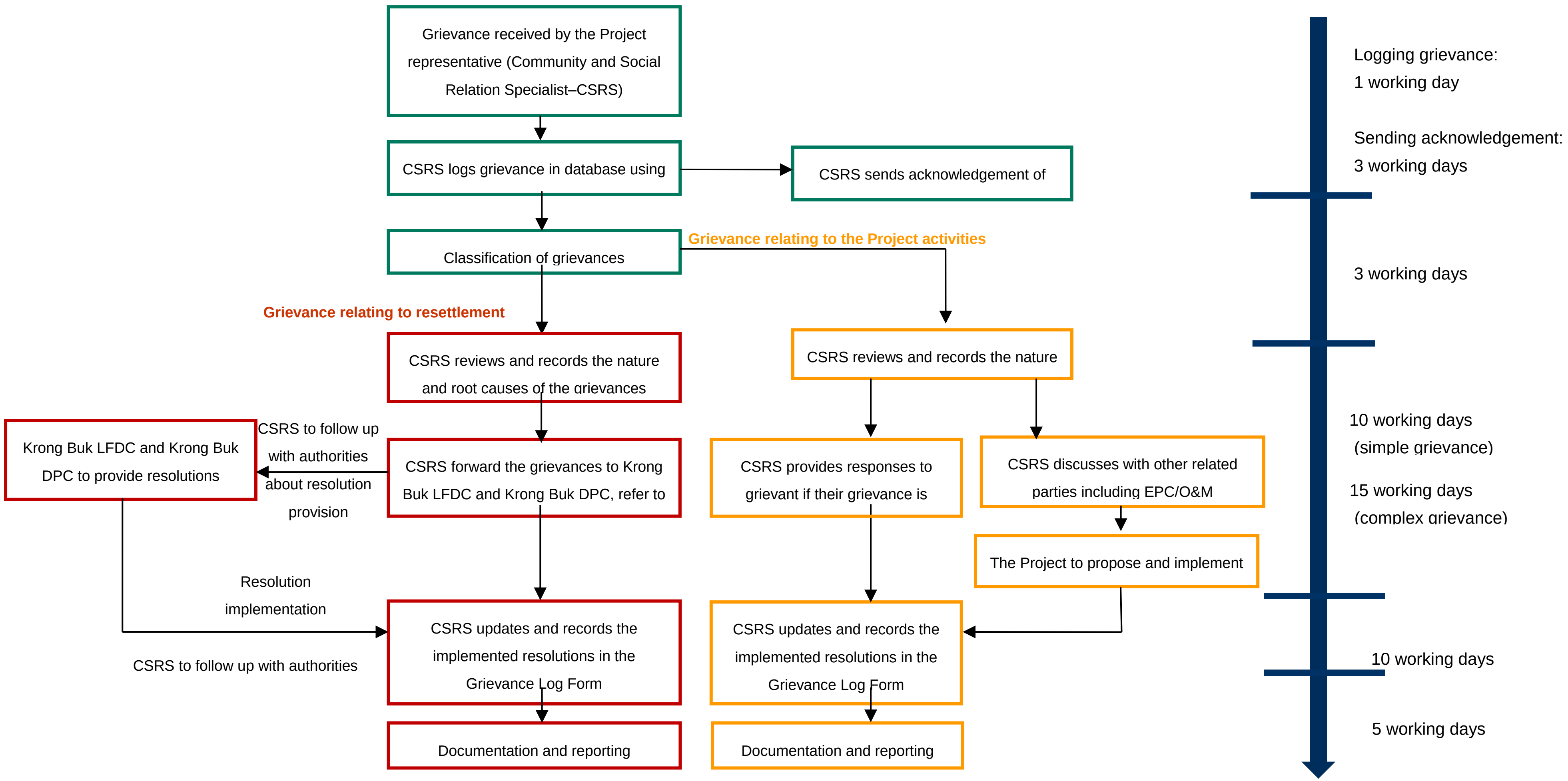



**Figure 15.1 Suggested Community Grievance Mechanism for the Projects**

**Step 1**: Receive and log grievance (1 working day)

- The grievance should be collected by the Project representative. Ideally a member of a communication or community relations function (e.g. Community and Social Responsibility - CSR Specialist) should be responsible for this.
- The grievance may be reached to the CSRs from the following sources:
  - Informing/ reporting to the CSRs by the grievant;
  - Submitting in the grievance boxes located at the offices of CPC/ WPC. These boxes will be checked weekly;
  - Informing/ reporting to the CSRs by the local authorities or Head of Villages during the project's engagements with local authorities and communities;
  - Informing/ reporting to the Project via the hotline; and
  - Informal engagement with local communities.
- The CSR logs the grievance using the Grievance Form and ensures that it is captured in a Grievance Log in order to monitor actions taken in resolving the grievance.

**Step 2**: Acknowledge grievance (approximately 3 working days)

- The CSR should communicate and it should be documented in writing, with the grievant acknowledging receipt of the grievance and providing information on the proposed steps and the anticipated timeframes for resolving the grievance.
- The date of receiving the grievance shall be record in the Grievance Form.

**Step 3**: Classification of grievance and forward to relevant department (approximately 3 working days)

The CSR should review and classify the grievances based on its nature.

- Grievances relating to resettlement: will be forwarded to the Land Fund Development Centre (LFDC) of Krong Buk District who is in charge of the implementation of the compensation, support and resettlement process for the Project for their resolution. Before forwarding such type of grievance, the CSR should record the nature and root causes of the grievances for the grievance following up and monitoring.
- Grievances relating to the Project activities: can be classified into two level of its complexity, which are:
  - *Simple grievances*: for one-off grievance, and the grievances are considered local (family to small area level) in nature and do not attract attention of media; or
  - *Complex grievances*: for the grievances that are either recurring and/or potentially affect the community (large group to village or commune level) and/or attract attention of media.

**Step 4**: Investigate and resolve grievances relating to the Project activities (approximately 15 working days)

- In the event that the grievances are assessed simple such as asking for further information about the Project and Project related procedure, direct interaction between the CSR and the grievant(s) shall be conducted. Solutions can then be developed and implemented.
- In the event that the grievances are considered as complex, immediate intervention of related parties such as senior managers, subcontractor, and/or village head, local authorities to seek their advice and then propose a resolution which is agreed by the parties in the discussion. The Project should assign resources to set up a Grievance Committee. Members of this Committee typically include Project Director, EHSS Manager and other related managers, if needed and are managed by CSR Manager. During the construction phase, managers of the subcontractor shall be involved to discuss and resolve the issues relating to their activities.

It is noted that any grievance that needs involvement of third party (e.g. technical expert, authority), the Project Owner needs to contact the relevant third party for their advice or resolution responsibilities.

- Depending on the complexity of the grievance, the CSRs may need to seek approval of:
  - If the solutions are not accepted by the grievant(s), the CSRs should conduct consultation with the grievant(s) to obtain further detailed clarification on the issues and to try and agree upon a mutual solution. Minutes of consultation session shall be kept in the Grievance Log. If a mutual solution cannot be obtained through consultation, third parties could be asked to be involved. The third-party can provide advice or facilitation in a way that is acceptable to all parties
  - In addition, where mediation is desired, academic or other local institutions may be sought out to play an “honest broker” role in mediating between the Project and stakeholder groups.

**Step 5**: Follow up on grievance (approximately 10 working day)

- *Grievances relating to resettlement*: the CSRs should work closely with the Authority to follow up with the resolution process of this type of grievance from the grievance review, resolution to the implementation of the proposed resolution to ensure no grievances will be left unsolved or pending too long.
- *For all grievances*: The CSRs is responsible for seeking the grievant(s) responses/feedback on the implementation of the resolutions. The implemented resolutions shall also be recorded in the Grievance Form and kept in place as required. These activities are considered as follow up actions. *In case that the grievant did not receive any feedback after 15 working days since the submitted the grievance or did not agree with the resolutions, the grievant may submit another grievance to higher local authorities or higher level of the Project’s management.*

**Step 6**: Documentation and reporting (approximately 5 working days)

- All follow-up actions shall be tracked in the Grievance Log of the Project.
- The CSR is responsible for maintaining all records in the Grievance Log.

The CSR is responsible for preparing periodical reports to the CSR Manager about the resolution of each grievance processed by the CSR team.

### Note for Grievances Raised by Indigenous Peoples

As stated in AIIB ESS3, design the mechanism to address Indigenous Peoples’ concerns and complaints promptly, using an understandable and transparent process that is gender-sensitive, culturally appropriate and readily accessible to all affected Indigenous Peoples. The grievance mechanism may utilize existing formal or informal grievance mechanisms, provided that they are properly designed and implemented, and determined by the AIIB to be suitable for the Project; these may be supplemented, as needed, with Project-specific arrangements. Include provisions to protect complainants from retaliation and to remain anonymous, if requested.

Generally, the suggested community grievance mechanism is applied to the IPs grievant. During the socio-economic baseline survey of ESIA development, the literacy of Ede IPs are good and able to log in the grievances. Most of them can use both languages (i.e. Kinh/ Vietnamese and Ede). Nevertheless, there are some suggested points that need the Project Owner to make sure it is appropriate and accessible.

- “Pre-consult” with indigenous communities through their representative institutions (e.g. village head, village patriarch, IP influencer) to determine the issues in advance;
- Should be put into writing, publicised, and disclosed the community grievance mechanism at each affected IP village with the participation of diverse attendees (e.g. village head, village patriarch, IP influencer, woman, elderly, and youth) in a mean which can be accessible by all the impacted community and in cultural appropriateness;

- Should be provided in a format and language readily understandable (e.g. bilingual languages including Vietnamese and Ede) to the Ede IPs and/or communicated orally in areas where literacy levels are low;
- Village head, village patriarch, IP influencer should may be sought out to play an "honest broker" role in mediating between the company and IP groups. In certain circumstances, it can be good practice for a company to provide funding for such third-party advice or facilitation in a way that is acceptable to all parties and doesn't compromise the integrity of the process.

## 15.2 Worker Grievance Mechanism

Worker grievance process is comprised of five steps and each step is described as follows.

### 15.2.1 Step 1: Disclosure of Worker Grievance Mechanism

The disclosure, training and communication of the worker grievance mechanism will begin early in a project lifecycle and continue on an on-going basis as grievances arise. It will be disclosed in a culturally appropriate manner in the local language and format that is understandable to all the workers. The following information will be disclosed:

- To what extent the mechanism is capable of delivering;
- Who can raise complaints;
- Where, when, and how workers can lodge complaints. If the use of telephone or conventional communication infrastructure (phone, mail, Internet) is appropriate for receiving grievances, "hotline" telephone numbers, email addresses, and Web sites should be widely publicized through brochures, at meetings, via posters on a gate, and so on;
- Who is responsible for receiving and responding to complaints;
- What type of responses from grievances can be expected from the Project, including timing of responses;
- Commitment from the Project Owner to not threaten workers that place griveances; and
- The benefits that the grievant can receive from using the grievance mechanism.

Communication methods to be used are proposed in table below.

**Table 15.1 Methods of Disclosing the Worker Grievance Mechanism**

| Methods | Benefits |
|---|---|
| One-to-one | Personal and effective form of communication |
| Email | Efficient for large teams or getting/ sharing information to the whole team |
| Meeting | Effective for teams/ groups to ask questions, get response and share plan |
| Instant messages | Efficient to questions or comments that need more immediate responses |
| Training | Appropriate for induction and/or refresh training to a large team/ group |
| Bulletin board | Applied to large-group communication |

### 15.2.2 Step 2: Receiving and Keeping Track of Worker Grievance

The HR Specialist will receive and/or collect grievance submitted by the workers of the Projects as well as subcontractors through identified channels (e.g., grievance boxes, telephone hotlines, HR Specialist) and estimate the nature of the grievance. Upon receipt of grievance, the HR Specialist within two (02) working days shall evaluate and register the received grievance in the grievance logbook, with which their subsequent decisions and actions will be tracked and recorded. The grievance logbook will be kept in the HR office and managed by HR Specialist or CSRs.

### 15.2.3 Step 3: Reviewing and Investigate Worker Grievance

The HR Specialist shall review, investigate and consult with affected person(s) as well as relevant personnel (e.g. Trade Union or Workers Representative, if any) to understand clearly and fully about the situation of the grievance. If required, a meeting can be organized for collection of detailed information, clarification, discussion, consultation and advice. Minutes of the meeting shall be kept in the grievance log. For anonymous grievance, HR Specialist may investigate and disclose the resolution in the bulletin board or public area. The reviewing and investigating process shall be conducted and finished within five (05) working days upon the grievance registration.

Status of the resolution process of all grievance cases will be followed up by HR Specialist and notified to the relevant parties including the grievant as well as relevant personnel and departments (if required).

### 15.2.4 Step 4: Worker Grievance Settlement

After the investigation of grievance, the HR Specialist will co-operate with related departments and personnel to propose appropriate resolution options and resolve the grievance under the instruction and advice of the Site Management Team. Timeframe for resolving a grievance shall be 3 - 5 working days depending on the complication of the grievance.

#### 15.2.4.1 Resolution Options

Based on the results of the investigation, resolution options shall be suggested by concerned departments and personnel. Resolution options can be developed taking into consideration worker preferences, company policy, past experience, current issues and potential outcomes. It may be helpful to establish a “menu” of possible options (e.g. altering or halting harmful activities, providing apology, providing compensations, replacing lost property) appropriate for different types of grievances that company personnel can apply once a grievance is raised.

- If the grievant agrees with the proposed option(s), the solutions will be implemented accordingly within the 20 working days timeframe;
- If the option(s) are not accepted by the grievant(s), the HR Specialist should conduct consultation with the grievant(s) and relevant personnel to obtain further detailed clarification on the issues and to try and agree upon a mutual solution. Minutes of consultation session shall be kept in the grievance log; and
- If a mutual solution cannot be obtained through consultation, third parties (e.g. trade union, local authorities) could be asked to be involved. The third-party can provide advice or facilitation in a way that is acceptable to all parties.

#### 15.2.4.2 Response

The HR Specialist will ensure that the grievant(s) is provided with updated information of the implementation of the resolution.

The HR Specialist is responsible for seeking the grievant(s) feedback on the implementation of grievance resolutions. Personnel responsible for investigating and resolving grievance should be diplomatic when engaging with workers, use detailed and respectful explanation, together with compelling evidence to ensure all grievances are satisfactorily resolved.

All engagement shall also be recorded in the grievance form and kept in place as required.

#### 15.2.4.3 Close-out

Should the grievant(s) agree and accept the provided resolution, HR Specialist will record the agreement in a grievance resolution minute, update in the database and store all documentary evidence (e.g. photos, meeting minutes, and records with signature) in one central place as required.

If resolution option is rejected, all negotiation evidence, efforts and corrective actions should be documented for grievance tracking and for further reference, whether the Projects use other grievance mechanism outside the Project or inform the grievant(s) of no further action.

Should the grievant(s) want to seek for a legal grievance mechanism, Site Management Team should ensure that it is able to provide, where necessary, all documents relating to such grievance to authorities to prove that the grievance has been acted upon in compliance with this mechanism.

Figure 15.2 below shows the development of resolution options, response and close-out.

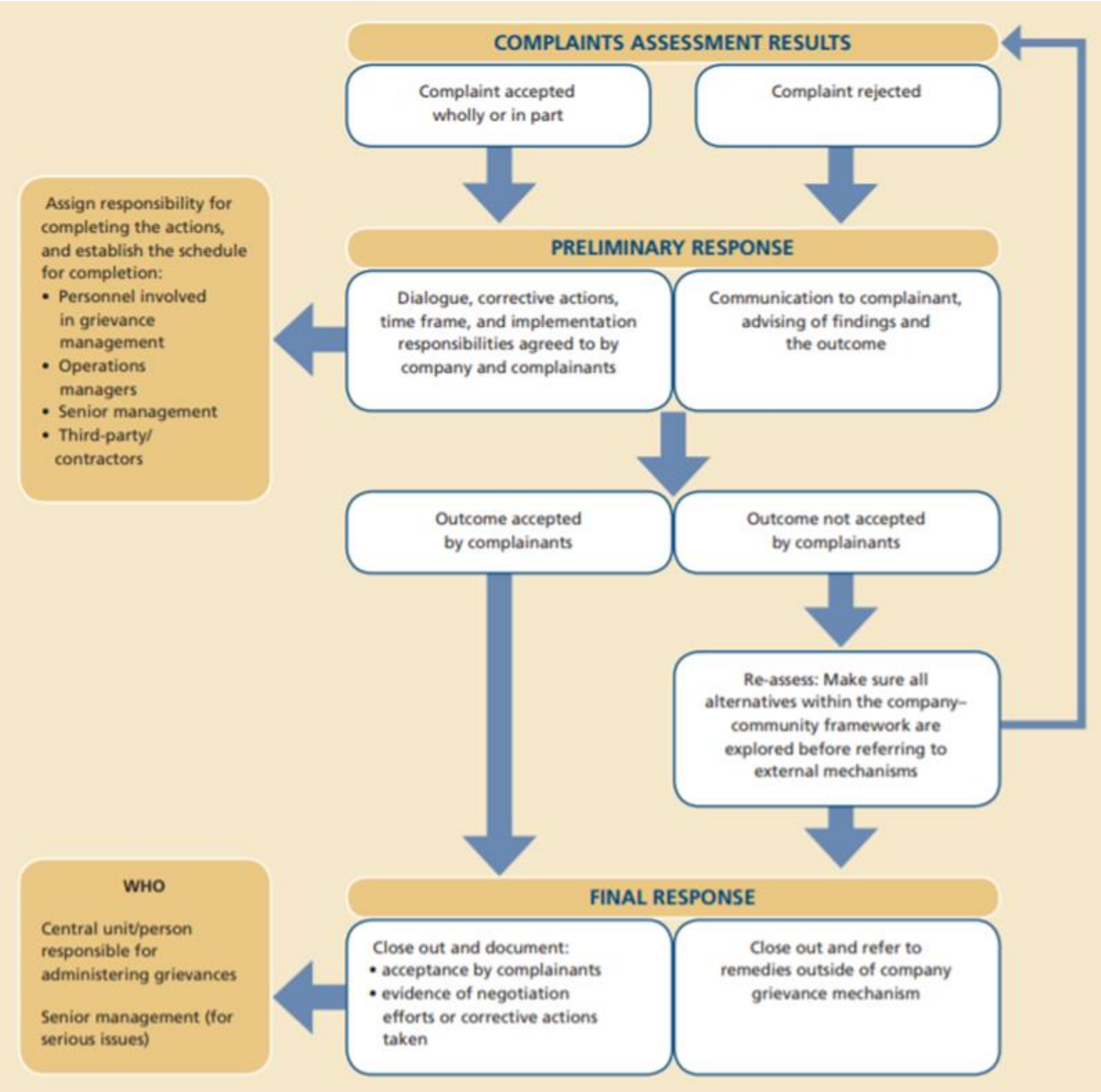



**Figure 15.2 Developing Resolution Options, Response and Close-out**

### 15.2.5 Step 5: Monitoring and Reporting in the Resolving Process

The HR Specialist shall monitor the execution of the agreed resolution between parties.

The HR Specialist shall prepare and submit quarterly report on status of grievance resolution to the Site Management Team for review and advice on corrective actions (if required).

## 15.3 AIIB's Project-affected People's Mechanism (PPM)

The Project-affected People's Mechanism (PPM) provides an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by the failure of the Asian Infrastructure Investment Bank (AIIB) to implement its Environmental and Social Policy (ESP) when their concerns cannot be addressed satisfactorily through Project-level grievance redress mechanisms or AIIB Management's processes. The PPM is guided by the Policy on the PPM (PPM Policy) and Rules of Procedure of the PPM (PPM Rules of Procedure). The Complaints-resolution, Evaluation and Integrity Unit (CEIU) is responsible for the functioning of the PPM. It reports directly to the Bank's Board of Directors and is independent of AIIB's management.

Two or more Project-affected people (Requestors) may file a submission. They may authorize an in-country representative (Authorized Representative) to file a submission on their behalf. In exceptional situations, when in-country representation is unavailable, the Requestors may designate an individual or organization outside of the country as their Authorized Representative to file a submission.

The PPM's three submission-handling functions are summarized below.

### 15.3.1 Project Processing Queries

A Project Processing Query (PPQ) is designed to enable Project-affected people to obtain rapid resolution of their concerns about simple matters that arise during AIIB's environmental and social due diligence of a Project and do not require dispute resolution (see below). The due diligence includes screening, categorization and assessment of the environmental or social impacts of the Project. Examples of concerns that may be suitable for a PPQ include inquiries about the consultation process related to a Project or requests to address environmental nuisances such as dust, noise or mobility restrictions experienced during Project preparation.

### 15.3.2 Requests for Dispute Resolution

Requests for Dispute Resolution (RDR) allow the PPM to seek to facilitate and coordinate the resolution of a dispute that has arisen over measures required to mitigate known and quantifiable, potential or actual material adverse environment and social impacts that arise during AIIB's due diligence of a Project or during Project implementation. The parties to the dispute typically include the Client and the Requestors, but they may also involve Management and/or contractors or other parties involved in the Project processing or implementation. The aim of this process is to reach a time-bound and monitorable dispute resolution agreement between the parties concerned on actions to mitigate these impacts. Under this process, the PPM explores with the concerned parties mutually acceptable dispute resolution methods. This process may include consultative dialogue, information sharing, joint-fact finding, creation of a mediation mechanism or other methods.

### 15.3.3 Requests for Compliance Review

The process under a Request for Compliance Review (RCR) involves an investigation by the PPM of allegations by Project-affected people that AIIB has failed to comply with its obligations under the ESP in its environmental and social due diligence of a Project during Project preparation or its oversight of the Project during implementation, thereby causing or being likely to cause material adverse environmental or social impacts on the Project-affected people. If the allegations are substantiated, the process includes a review of any action plan proposed by Management to address these impacts.

Unlike the PPQ and RDR processes, an RCR requires that the PPM assess whether AIIB is in compliance with its ESP. The PPM reviews whether:

- The facts alleged in the RCR are substantiated;

- A direct causal link exists between the adverse impact and alleged AIIB non-compliance with the ESP;
- The alleged adverse impact is material;
- Management has adequately explained its actions pursuant to the ESP;
- The actions proposed by Management to resolve the issues raised in the submission are appropriate.

If the PPM determines that there has been noncompliance with the ESP, AIIB Management prepares a Management Action Plan (MAP) to address the PPM's findings of noncompliance. The PPM submits its findings to AIIB's Board of Directors. The MAP is subject to approval by AIIB's Board of Directors. The PPM also submits to AIIB's Board of Directors its review of monitoring reports prepared by AIIB's Management on implementation of the MAP.

The submission shall identify the Requestors making the submission. The Requestors shall be encouraged but not required to indicate under which PPM function they propose their submission to be reviewed. Other information to be included in the submission shall be detailed in the sample submission form to be set out in the Rules of Procedure for the PPM.

The submission may be written in English or in any official or national language of the Requestors' country. The PPM's acknowledgment of submission receipt shall be in English and in the language of the submission, if such language is not English. Thereafter, PPM's communications with the Requestors shall be in English. The PPM shall also translate the substantive part of these communications into the submission language, if such language is not English. However, the English language version of AIIB's communications shall prevail in the case of a discrepancy between the English and translated version.

The PPM shall acknowledge receipt of a submission to the Requestors and recommend the most suitable processing option based on submission content, timing and eligibility criteria, taking the Requestors' proposal, if any, into account. The PPM shall determine whether the submission meets the eligibility criteria. If the submission meets such eligibility criteria, it shall be registered in the PPM registry.

The PPM may, unless the Member in which the Project is located objects, undertake site visits to the Project area at any time after a submission has been filed, in order to better understand submission issues and possible ways to address them. If the Member rejects a site visit request, the PPM will inform the Board of Directors and shall conduct its review on the basis of the available evidence. In the spirit of AIIB's partnership with its Members assistance from Members in facilitating timely PPM site visits is anticipated.

Once the submission has been registered in the PPM registry, the PPM shall provide a copy of it to Management. Management shall provide its response to the submission. The PPM shall facilitate constructive dialogue between Management, the Client, the Requestors and any other relevant parties to identify solutions to address the concerns raised. The Project Processing Queries shall be handled as promptly as possible in order to facilitate resolution of concerns during Project preparation.

# 16. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

## 16.1 Introduction and Objectives

The ESIA identified a number of environmental and social impacts that may potentially result from the construction and operation of the Project. In order to manage and mitigate these impacts, a range of measures has been developed to reduce the overall residual impacts to As low As Reasonably Practicable (ALARP). This Environmental and Social Management Plan (ESMP) provides a summary of the outcomes of the ESIA and helps the Project Owner track their requirements during the implementation phase. The key objectives of this ESMP are to:

- Collate the various mitigation and management measures developed throughout the local regulatory EPP and ESIA into a single source;
- Define monitoring requirements to determine the efficacy of all mitigation and management measures;
- Define the responsibilities for implementation and monitoring; and
- Provide clarity to all stakeholders as to what impacts have been identified, how they will be mitigated and managed, and through what means.

## 16.2 Scope of this ESMP

The scope of this ESMP covers the construction and operational aspects that have the potential to affect, positively or negatively, the environment and communities in which the Project Owner or its contractors will operate. As required by this ESMP, a range of detailed management plans will be developed and implemented for each specific phase of the Project. The responsibility for the implementation of these plans will lay variously with Project Owner, contractors and sub-contractors.

## 16.3 Responsibility for ESMP Implementation

The Contractor will be responsible for the implementation of most of the mitigation measures during the preparation and construction phases. Where the Contractor engages subcontractors to undertake all or part of the work scope, the Contractor should ensure that these parties implement the mitigation measures. If the Project Owner directly engages other contractors (other than the Contractor), the Project Owner should ensure that the mitigation measures are implemented by these parties. All parties involved in the construction process should follow the mitigation measures. Once the Project approaches its operation phase, the Project Owner will generally take sole responsibility.

### 16.3.1 Construction Phase

Figure 16.1 shows structures of Project Owner management at site level and subcontractors during construction phase. Role and responsibilities of each position in environmental and social management are presenting in sections below.

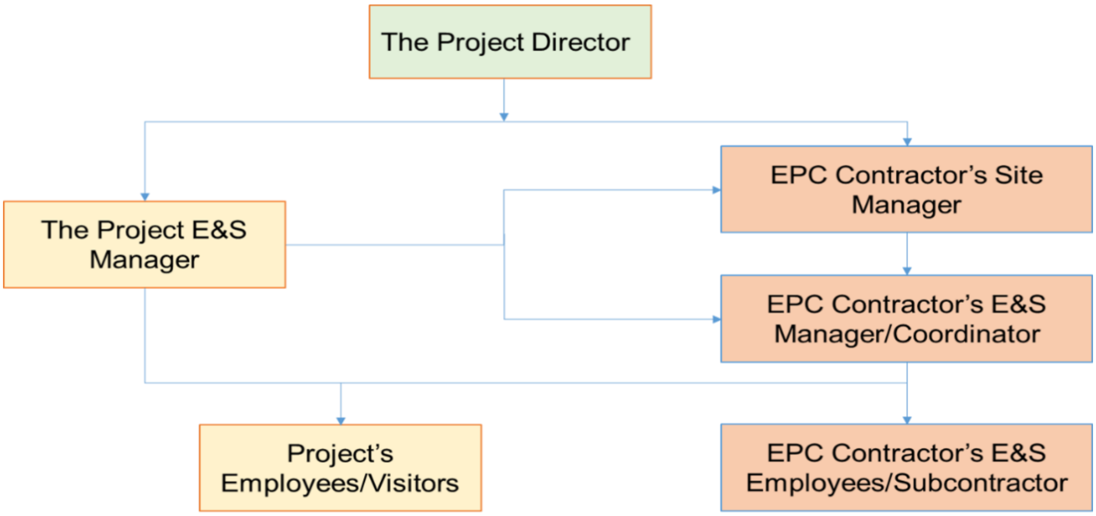



**Figure 16.1 E&S Management Structure during the Construction Phase**

**Table 16.1 Role and Responsibilities for Environmental and Social Management during the Construction Phase**

| Roles | Responsibilities |
|---|---|
| Project Director | ▪ Actively promoting and participating in the Project's EHSS Plan;<br>▪ Ensuring that the ESMP, procedures and work practices are implemented across the Project;<br>▪ Ensuring that the ESMP reflects the requirements of the Project in terms of resources and budget;<br>▪ Ensuring that all legislative and company requirements are complied with;<br>▪ Ensuring that all scopes of work are defined in accordance with the Project's ESMP rules and regulations, work practices and procedures, as detailed in this ESMP and other associated documentation (e.g. the EPP);<br>▪ Ensuring that all contractors are made aware of their roles and responsibilities with regard to EHSS management;<br>▪ Ensuring that EHSS is regularly discussed and reported on i.e. in the weekly contractor progress meeting;<br>▪ Ensuring that all contractors are evaluated throughout the duration of the Project, as to their capabilities and performance; and<br>▪ Ensuring implementation of EHSS audit recommendations for non-compliance issues. |
| Project HSE Department | ▪ Communicating E&S policy to relevant Project's stakeholders;<br>▪ Developing and proposing E&S objectives and targets for the Projects; |

| Roles | Responsibilities |
|---|---|
| | ■ Obtaining and maintaining all regulatory E&S permits and approvals;<br>■ Developing and communicating E&S legal register to relevant parties of the Projects;<br>■ Coordinating for E&S risk assessment;<br>■ Developing and implementing the specific E&S management programs, plans and procedures for the construction phase;<br>■ Logging and resolving employees' and stakeholders' grievances and complaints;<br>■ Reviewing of the contractors' E&S procedures to ensure their alignment with the Projects' requirements;<br>■ Developing and implementing an E&S training program in collaboration with the EPC contractor;<br>■ Managing necessary resources for responding to emergency events, including manpower and facilities and equipment and ensure the implementation of the Projects' Emergency Preparedness and Response Plan (EPRP);<br>■ Cooperating with EPC contractor to implement the ESMP during the construction phase;<br>■ Leading E&S accident/incident investigations and reporting and lessons learned;<br>■ Ensuring appropriate corrective actions are implemented, tracked and completed in a timely manner;<br>■ Leading regular E&S meeting with contractors;<br>■ Monitoring and reporting the implementation of the Projects' E&S Management Plans to the relevant stakeholder in a timely manner; and<br>■ Manage, review and develop the Social Program to ensure that it fulfils Project requirements, including measures observed in this ESMP and monitor its implementation. |
| Community Relations Department | ■ Coordinating and evaluating the effectiveness of all social management plans;<br>■ Managing the implementation of stakeholder relations and grievance management to ensure that all social-related requirements of this ESMP are implemented;<br>■ Managing the implementation of the community health program, including coordination with the HSE Department on OHS measures associated with the management of impacts to community health;<br>■ Coordinating with HSE Department on implementation of the Project's vehicle safety measures associated with management of impacts to community safety;<br>■ Coordinating with Human Resources to ensure implementation of labour-related measures required in this ESMP;<br>■ Consulting with community and liaising with relevant stakeholders in implementing the required stakeholder and grievance management measures, including liaising with related government bodies as necessary;<br>■ Leading collaboration efforts to establish and implement the Project's Grievance Mechanism during Construction Phase, and supervise contractor's social performance as required in this ESMP; and |

| Roles | Responsibilities |
|---|---|
| | ■ Managing social monitoring and reporting the results to the Project Manager. |
| EPC Contractor's Site Manager | ■ Cooperating with the Project E&S Manager and subcontractors to ensure that the Environmental and Social Management Plan and E&S procedures are developed and implemented during the construction phase;<br>■ Managing the subcontractors to ensure their compliance with E&S requirements of the Project;<br>■ Assigning competent E&S manager/coordinator who responsible for implementation of Environmental and Social Management Plan and E&S procedures at the Project site;<br>■ Ensuring all EPC contractor's employees and subcontractors are trained on E&S requirements;<br>■ Ensuring the compliance with the Projects' requirements on inspection, auditing, monitoring and reporting;<br>■ Participating to the emergency response, incident and accident investigation;<br>■ Ensuring action plans for the Projects is reviewed and updated timely; and<br>■ Participating regular E&S meeting organized by the Project E&S Manager. |
| EPC Contractor's E&S Manager/Coordinator | ■ Developing and implementing E&S procedures at the Projects' site during construction phase;<br>■ Conducting E&S trainings to EPC contractor's and subcontractors' employees;<br>■ Committing to report accident and incident and emergency cases within time frame;<br>■ Participate in emergency response, accident/incident investigation and reporting process;<br>■ Participating in the regular E&S inspection and audits;<br>■ Implementing corrective action plans; and<br>■ Participating the E&S monthly meeting. |
| Project's Employees, EPC Contractor's and Subcontractors' Employee | ■ Committing to full compliance with the Projects' E&S policies, standards and procedures;<br>■ Attending the E&S induction training prior to starting their field work and any specific trainings, when required;<br>■ Adhering to the Projects' rules and specific requirements;<br>■ Being accompanied at all times by a visitor's host; and<br>■ Notifying respective Projects representative, such as engineers or E&S personnel of any unsafe acts or conditions. |

### 16.3.2 Operation Phase

Figure 16.2 provides the E&S management structure during the operation phase with the role and responsibilities mentioning in sections below.

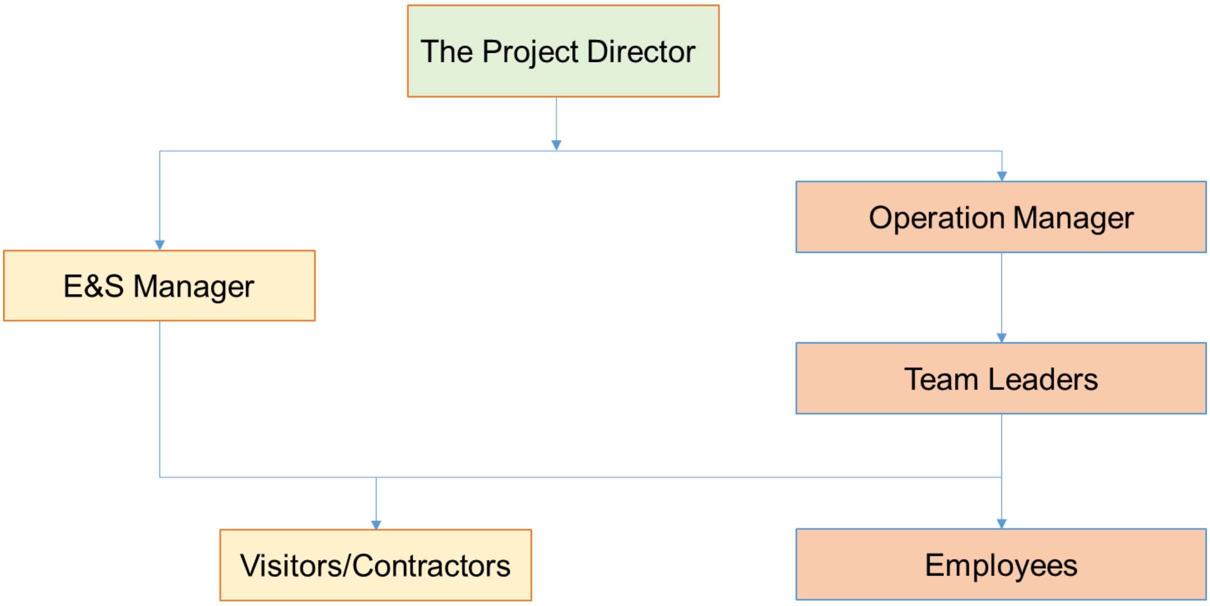



**Figure 16.2 E&S Management Structure during the Operation Phase**

**Table 16.2 Role and Responsibilities for Environmental and Social Management during the Operation phase**

| Roles | Responsibilities |
|---|---|
| Project Director | ■ Ensuring the implementation of the ESMP, its overall development and periodic monitoring in order to provide continuous improvement during the execution of the Projects' operation phase;<br>■ Providing adequate resources for the ESMP implementation;<br>■ Assigning a competent E&S personnel onsite;<br>■ Ensuring all incidents, accident, emergency cases are investigated and reporting and the action plan are implemented in a timely manner;<br>■ Conducting management reviews for ESMP and approve monitoring/ audit reports; and<br>■ Communicating and reporting to the relevant stakeholders on the Projects' E&S performance. |
| E&S Manager | ■ Implementing the ESMP and E&S management plans, programs and procedures at the Projects;<br>■ Ensuring that all E&S activities are being carried out in compliance with the Projects' E&S policy, the approved E&S plans/ procedures and Applicable Standards;<br>■ Identifying and updating the Applicable Standards of the Projects;<br>■ Conducting E&S risks and impacts identification and assessment and proposing and coordinating the implementation of mitigation measures;<br>■ Cooperating with Operation Manager to develop and implement E&S training plan; |

| Roles | Responsibilities |
|---|---|
| | ■ Collecting and resolving employees' and stakeholders' grievance and complaints;<br>■ Managing personal protective equipment, first aid and emergency response facilities and equipment;<br>■ Managing contractors involved into the Projects' operation phase and ensuring their E&S performance in compliance with the Projects' requirements;<br>■ Leading incident, accident investigation and reporting;<br>■ Coordinating emergency response;<br>■ Engaging a third party to conduct the E&S monitoring plan;<br>■ Monitoring E&S performance of the Projects in accordance with the ESMP requirements;<br>■ Conducting E&S inspection, audit and implementing corrective action plan (when needed);<br>■ Prepare and submit E&S reports to the local authority, as legally required;<br>■ Coordinating with Operation Manager to collect E&S data and preparing and submitting E&S reports to the Project Director, as required; and<br>■ Organising Management Review regularly. |
| Operation Manager | ■ Supporting E&S Manager on implementation of ESMP and E&S documentations at the Projects;<br>■ Supporting E&S Manager on development and implementation of E&S trainings;<br>■ Ensuring the Projects' employees comply with E&S requirements;<br>■ Participating in incident, accident investigation and emergency response;<br>■ Supporting E&S Manager on implementation of corrective action plans; and<br>■ Participating in the Management Review and contributing to the improvement of the Projects' E&S performance. |
| Team Leaders | ■ Ensuring their staff are adequately trained and understanding the safe working procedures;<br>■ Reporting to the Operation Manager and the E&S Manager as required in the ESMP and the E&S procedures;<br>■ Monitoring health and safety performance and implementing improvements where required;<br>■ Identifying E&S objectives and targets for their divisions and provide such objectives and targets to the E&S Manager to integrate into the overall Project's E&S objectives and target;<br>■ Participating in E&S hazard identification and risk assessments;<br>■ Participating in regular E&S inspection, and audit;<br>■ Supporting E&S Manager on proposal and implementation of corrective action plans;<br>■ Ensuring that any accidents, incidents or emergency case that occurs within their areas of responsibility are reported to the E&S Manager and the Operation Manager; and<br>■ Providing feedback and idea to improve the E&S performance of the Projects. |

| Roles | Responsibilities |
|---|---|
| All Employees | ■ Attending all mandatory E&S trainings, understanding and complying with the E&S requirements of the Projects;<br>■ Notifying Team Leaders or E&S team of any perceived problems or deviations associated with E&S issues and ESMP;<br>■ Working safely, in accordance with procedures and work instructions, and training;<br>■ Only carrying out work for which they are adequately trained (unless under supervised training conditions);<br>■ Participating in accident investigations and emergency response when required; and<br>■ Taking corrective or preventive actions required by management. |
| Visitors and Contractors | ■ Contractors need to follow the contractor management procedure;<br>■ Attending the E&S induction training prior to starting their field work, and any specific trainings when required;<br>■ Adhering to the site rules and specific requirements of the Projects;<br>■ Being accompanied at all times by visitor's host; and<br>■ Notifying respective employees, engineers or Team Leaders of any unsafe acts or conditions. |

## 16.4 Training, Awareness and Competency

It is expected that the Project would implement a training and awareness program covering EHSS expectations of the Project. As a minimum, this should be implemented during induction for all employees and contractors engaged in the Project's construction, with further training given depending on the level of responsibility for implementing HSE and social expectations and exposure to environmental and safety risks.

The Project should ensure that all personnel responsible for the implementation of this ESMP are competent on the basis of education, training and experience. All personnel shall be provided with environmental and social training appropriate to their scope of work and level of responsibility.

## 16.5 Monitoring, Review, Audit and Reporting

It would be expected that a monitoring, review and auditing program would be implemented during construction and operation phases to monitor implementation of the Project's HSE requirements and environment and social commitments. The inspections and audits will be done by the project identified HSE staff in coordination with O&M contractors and other external agencies identified. The entire process of monitoring and audits should being documented.

The project owner will develop and implement a programme of reporting through all stages of the project cycle. Delegated personnel shall require to fully complying with the reporting program in terms of both timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental checklist, incident record register, environmental and social performance reports (weekly, monthly, and quarterly, half yearly, yearly)

## 16.6 Project Environmental and Social Management Plan

The development of an ESMP is considered to be good management practice for any project or activity with the potential to impact upon the physical, chemical, biological, social and health environment. In this instance, it provides guidance and a framework for ensuring that the commitments of the Client, made both within this ESIA and within the Project's EPP, are upheld and that the HSE impacts of the Project are managed to an acceptable level and in accordance with the requirements of the Project's ESIA.

Specifically, this ESMP pulls together the mitigation and management measures identified within the ESIA as necessary during the Construction and Operation Phases of the Project.

The mitigation and management measures occur throughout the Project's lifetime, from pre-construction through to construction, operation and decommissioning. In addition, there are common mitigation and monitoring requirements that apply to all phases of the Project, e.g., vehicle use/operation.

The mitigation and monitoring measures specific to the impact assessment conducted for this Project's ESIA are together with information on:

- Relevant phase and activity;
- Impact summary and receptor impacted;
- Mitigation measures, responsibility and timing;
- Monitoring requirements, responsibility and timing; and
- Reporting requirements.

Where specific mitigation measures cannot be adequately defined due to lack of Project information or uncertainty regarding the environmental or social baseline, recommendations for the development of specific management plans or procedures or follow-up actions have been made.

## 16.7 ESMP Links to Other HSE Management Plans

Other types of plans are required to facilitate the practical implementation of the ESMP's commitments, for example, an Operational Environmental Management Plan, Social Management Plan or certain Safety Plans. These plans or studies are not substitutes for the overall ESMP, but serve to describe how the commitments will be implemented in detail (and likely at a later stage in Project development) than in the ESMP.

This ESMP will form part of future construction and operational activities, and plans for these Project phases will confirm how these commitments will be incorporated into the relevant EHSS management systems. Their implementation will fall under the responsibility of the Client. This ESMP is a live document and will be updated periodically, depending on Project progress and performance.

## 16.8 Plans, Policies and Procedures

The following plans and follow-up actions are identified as necessary for managing identified risks or for further understanding of potential environmental and social impacts. The Project Owner will develop these plans to manage specific risks or issues and to align the Project with the expectations of the IFC PS and EHS Guidelines.

**Table 16.3 Specific Management Plans and Policies**

| Management Plan | Description |
|---|---|
| Resettlement and Livelihood Restoration Plan (RLRP) | The RLRP will comprise an assessment of involuntary land acquisition impacts and development of measures to address the impacts of the Project as per IFC PS. The RLRP also include compensation and entitlement for affected households. |
| Community Development Plan (CDP) | The CDP will be developed to contribute to addressing Project negative impacts to wider communities identified within the ESIA report for KrongBuk Wind Power Project. The CDP sets out how the Project will positively contribute to the wider communities affected by the projects, above and |

| Management Plan | Description |
|---|---|
| | beyond the positive impacts identified in the ESIA. As such, the key aim of the CDP is to ensure that long term social development for wider communities in the project area can be derived from the Project. |
| Occupational Health and Safety (OHS) Management Plan | An OHS Management Plan includes the mitigation measures proposed in this ESMP to manage OHS impacts to workers (e.g., compulsory medical examinations for Project workers). |
| Stakeholder Engagement Plan (SEP) (pre-construction and throughout the project), including Grievance Mechanism Procedure) | The SEP documents stakeholder engagement undertaken during the regulatory EPP and ESIA stages. The SEP is also an initial guide to future engagement and will need to be updated periodically to ensure on-going stakeholder engagement through various stages of the Project life cycle from construction to operation and decommissioning. |
| Traffic Management Plan (TMP) | The TMP provides measures to minimise traffic impacts that may occur during construction phase and provides a program to monitor and report on the effectiveness of these measures. |
| Community Health and Safety Management Plan (CHSMP) | The CHSMP prepared potential community health, safety and security risks. The CHSMP provides commitments, programs, procedures and guidance that respond to and mitigate the identified risks; provides monitoring and training program. |
| Biodiversity Management Plan (BMP) | The BMP describes (i) further details about the policies and monitoring programs outlined in the ESIA of the Project, and (ii) the approach how mitigation measures should be conducted following the hierarchy outlined in IFC Performance Standard Guide Note 6. |
| Influx Management Plan | The Influx Management Plan includes influx management measures to mitigate the adverse impacts of both planned and unplanned population influx during construction. |
| Construction Environmental and Social Management Program | This document outlines the key elements of an Environmental and Social Management Plan (ESMP) capturing the typical Environmental and Social (E&S) impacts and associated mitigation measures. The E&S impacts relating to physical environment factors (Water & wastewater, Soil compaction, erosion and pollution, Solid waste, and hazardous waste materials) and social aspects (cultural heritage) and associated mitigation measures need to be considered at minimum in the context of construction activities |
| Noise Management Plan | The Noise Management Plan sets out responsibilities and the management practices associated with the management of noise management during construction and operation of the Project. The Plan includes actions to control noise hazards. It also defines action to mitigate, prevent or avoid to the extent practical noise nuisance to site personnel and nearby community. |
| Security Management Plan (SMP) | The SMP is intended to set out responsibilities and the management practices associated with the management of security during construction of the Project. This SMP is developed to: (i) Ensure that the Project comply with applicable environmental, health and safety, and social (E&S) requirements; (ii) Ensure that all personnel involved in the construction of the Project, including the Site Management Team and subcontractors fully understand Project Owner's expectations on security management; and (iii) |

| Management Plan | Description |
|---|---|
| | Implement applicable Good International Industry Practices (GIIPs) to manage security related issues in an appropriate manner. |
| Emergency Preparedness and Response Plan | The EPRP is intended for use to response emergency elements such as identification of potential emergency scenarios, emergency incident classification, emergency response organization and responsibilities; emergency alarms and communication systems; specific emergency response plans; evacuation procedures; emergency response equipment; emergency preparedness, monitoring and training. |
| Shadow Flicker Management Plan (SFMP) | The SFMP is to manage hazards and risks from shadow flicker effect that could potentially affect community health and safety during the operation phase of the Projects. This Management Plan is developed to ensure that the Project complies with applicable environmental, health and safety, and social (E&S) requirements, anticipate, and avoid adverse impacts on the health and safety of the affected community from the Project activities during the operation phase. |
| Chance Find Procedure (CFP) | The CFP is a project-specific procedure that outlines what will need to be considered if previously unknown heritage resources, particularly archaeological resources, are encountered during project implementation. This procedure is developed for the construction phase of the Project to: (i) Protect tangible cultural heritage from adverse impacts of the Project activities; and (ii) Promote awareness of and appreciation for tangible cultural heritage and support its preservation |
| Corrective Action Plan (CAP) for LAA | For more details of CAP, please refer to standalone Land Acquisition Audit Report. |

## 16.9 Construction and Operation Environment and Social Management Plan

This section outlines the construction and operation ESMP, which will be developed for the Project. The ESMP is based on the Project's EPP, the Feasibility Study (FS) Report, the Safe & Civilized Construction Plan and the outcomes of the ESIA.

### 16.9.1 Air Quality Management

**Table 16.4 Air Quality Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated Cost |
|---|---|---|---|---|---|---|---|---|
| **Pre-construction and Construction Phases** | | | | | | | | |
| ■ Land preparation and civil works such as land clearance, demolition, earthworks<br>■ Transmission line, access road, internal road, laydown area construction<br>■ Operation of ancillary facilities such as the concrete batching plant, diesel generator for power supply<br>■ Transportation of equipment and materials, workers daily movement. | ■ Increased dust and particulate matter emission (TSP, PM2.5, and PM10) from the earthworks, site preparation activities (land clearing, levelling, excavation, concrete batching plant, etc.) and construction activities of project components such as wind turbine foundation, transmission towers, internal roads, and transportation of equipment and materials<br>■ Elevated gaseous pollutants from fuel combustion by | ■ EPP<br>■ FS Report<br>■ Safe & Civilized Construction Plan | Certify all transportation vehicles, machinery and equipment used for the construction activities by the Vietnam Registry Department. Avoid using old fashion vehicles or equipment which can induce high level of emission<br><br>Apply National Regulation *TCVN 6438 – 2001* to evaluate the concentration of some air pollutants such as CO and hydrocarbons emitted by the transportation vehicles and construction equipment. Grant all equipment with the Emission Certification issued by the National Certification Authority of Vietnam in accordance to the *Decision No. 35/2005/QD-BGTVT*<br><br>Wash construction vehicles before leaving the construction site to minimize dust being produced in the outside roads and nearby residential areas<br><br>Enhance water sprinkling as transportation, excavation, levelling, and compaction during drying season (2 times/day). Avoid overloaded transportation, | ■ Project owner<br>■ EPC Contractor | ■ Temperature, humidity, wind speed, noise, dust, CO, $NO_x$, $SO_2$<br>■ Monitoring locations: 3 locations<br>– Wind turbine construction site<br>– 220 kV substation, and<br>– Transmission line. | Every 6 months | Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated Cost |
|---|---|---|---|---|---|---|---|---|
| | equipment and machines<br>■ Exhaust emissions from construction machinery and other heavy equipment such as bulldozers, excavators, compactors, and diesel generator<br>■ Exhaust emission (SO2, CO, NO2, NH3) from road transport of equipment and material<br>n Smoke from burning vegetation clearance, should this occur, and<br>■ Strengthening and maintenance of access roads. | | and travelling during night time and peak hour | | | | | |
| | | | Use a canvas to cover the truck compartment while travelling to avoid construction material (sand, stone, cement, and brick) spillage to the roads | | | | | |
| | | | Store machine and equipment in a covered storage to avoid flying dust caused by strong wind during the construction phase | | | | | |
| | | | Prohibit incineration of waste or construction materials (plastic bags) inside the construction site | | | | | |
| | | | Fence and isolate substation location to the surrounding areas to avoid dust and debris released to the environment. | | | | | |
| | | ESIA 10.1.4.1 | Prioritize materials to be supplied by local suppliers | | | | | |
| | | | Apply water sprays at land preparation area, access roads and any other exposed surfaces which could be source of dust are to be watered | | | | | |
| | | | Control the speed limit of trucks and other vehicles not to exceed 20 km/h within the Project boundary | | | | | |
| | | | Designate areas of construction, stockpile areas and other exposed soils as such in order to minimize vehicle movements over these to the minimum amount possible | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated Cost |
|---|---|---|---|---|---|---|---|---|
| | | | No cleared vegetation to be burnt. Cleared vegetation will either be composed or reused for stabilization purposes | | | | | |
| | | | Ensure valid inspection certification for transport vehicles and construction machines | | | | | |
| | | | Cover construction material deliveries or loads entering and leaving the construction site by an appropriate cover for the purpose of preventing materials and dust spillage | | | | | |
| | | | Control vehicles transporting materials inside or outside the construction site not to be overloaded | | | | | |
| | | | Properly maintain vehicle engines to ensure minimization in vehicular emissions | | | | | |
| | | | Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, taking into account intensity of use and operating environment) | | | | | |
| | | | Minimize stockpiling by coordinating excavations, spreading, and regrading and compaction activities | | | | | |
| | | | Avoid excavation, handling and transport of erodible materials under high wind conditions where | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated Cost |
|---|---|---|---|---|---|---|---|---|
| | | | practicable. Where not feasible, transported erodible materials shall be covered | | | | | |
| | | | Where possible, any soil stockpiles should be located in sheltered areas where they are not exposed to wind. If not feasible, securely cover stock piles of soil (or other erodible materials) | | | | | |
| | | | Rehabilitate or replant opened up areas that will no longer be used during the operation phase of the project. | | | | | |
| **Operation Phase** | | | | | | | | |
| ■ Maintenance activities<br>■ Inspection activities | Negligible | ESIA 10.1.4.5 | No further mitigation measures. | – | – | – | – | – |

### 16.9.2 Noise Management

**Table 16.5 Noise Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| ■ Equipment and material transport and supply<br>■ Land preparation and civil works such as land clearance, demolition, earthworks Transmission line and laydown area construction<br>■ Operation of associated facilities such as the concrete batching plant<br>■ Transportation of equipment, workers and materials<br>■ Foundation construction and Installation work of the WTGs | Short-term increase in noise levels (only 18 months of construction phase) | ■ FS Report<br>■ Safe & Civilized Construction Plan | Arrange reasonably operation time for large noise sources such as concrete batching plant, motors and equipment, and place them at least 200 meters away from the residential areas. | ■ Project owner<br>■ EPC Contractor | ■ $L_{Aeq}$ in accordance to *QCVN 26:2010/BTNMT – National Technical Regulation on Noise* and *IFC EHS Guidelines*<br>■ Monitoring locations: same locations of the baseline monitoring survey and the starting point of Project access road from National Road No.14 | Monthly | Monitoring report | Part of construction cost |
| | | | Abide any traffics passing through the national roads, provincial roads and trails by regulations of National Technical Standard *TCVN 5949-1998*. The speed and transportation time (only after 20:00) shall be in accordance to the regulated limitation (20km/h) | | | | | |
| | | | Perform functional operation inspection of all motor vehicles, heavy trucks, and construction equipment used in the Project regularly for noise and vibration. | | | | | |
| | | | Avoid nighttime construction works from 22:00 to 6:00AM in the next day. | | | | | |
| | | | Provide adequate PPEs (earplugs) for workers as working in noisy areas. | | | | | |
| | | ESIA 10.2.3.2 | Implement community engagement as follows:<br>■ Engage with the community at the earliest to get their consent on some noisy activities and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | negotiate the best time to conduct some noisy work as the residents are not at home<br>■ Arrange the respite period for the noisy activities (5 – 10 minutes break every working hour), and<br>■ Alleviate community concern as construction noise is short-term and day time only. The noisiest is only at the place where the construction activities occur. | | | | | |
| | | | Avoid unnecessary noise due to idling diesel engines and fast engine speeds when lower speeds are sufficient. | | | | | |
| | | | Ensure all machines used on the site are in good condition with limited number of allowed equipment at one location, with particular emphasis on exhaust silencers, covers on engines and transmissions and squeaking or rattling components. Excessively noisy machines should be repaired or removed from the site, and/or | | | | | |
| | | | Ensure that all plant, equipment and vehicles movements are optimized in a forward direction to avoid triggering motion alarms that are typically required when these items are used in reverse. | | | | | |
| | | | Limit high noise generating construction works and activities to the daytime period (7:00 to 22:00), | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | and avoid work on Sundays or public holidays if possible. | | | | | |
| | | | Justify any works that are required during the nighttime period (22:00 to 7:00) and implement task-specific noise mitigation and management measures to reduce noise impacts to the acceptable levels. These additional measures should consider the potential for sleep disturbance impacts that could occur during the nighttime period due to "peak" or "maximum" noise level events e.g. metal on metal contact, or general clangs and bangs. | | | | | |
| | | | Implement task-specific noise mitigation and management measures to reduce noise impacts to acceptable levels, when works associated with transmission line and access road construction often require activities in closer proximity to receptors that are not affected by construction works at wind turbines, or permanent facilities | | | | | |
| | | | Limit construction road traffic and heavy vehicle movements have the potential to generate high "peak" or "maximum" noise level events during the night-time period, and avoid them if possible. Where possible, limit significant noise generating vehicle movements to the daytime period. Where it is not possible for this to occur drivers should be instructed to arrive and depart as quietly as possible. Whilst on-site and in close proximity to receptors, instruct the drivers to implement | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | good-practice noise management measures to reduce peak noise levels and minimize any impacts as far as reasonably practicable. During the works, instruct drivers to travel directly to site and avoid any extended periods of engine idling at or near residential areas, especially at night. | | | | | |
| | | | Identify and evaluate the problem source and any potential noise reducing measures for implementation during the works if any validated noise complaints and grievances are received. If the noise complaint cannot be validated, no further mitigation or management measures are required. | | | | | |
| | | | Limit unauthorized local people or any person coming near the construction site in order to reduce the unnecessary physical and mental health-related impact during the construction time. | | | | | |
| **Operation Phase** | | | | | | | | |
| Operation of the WTGs | Long-term increase in noise levels | ESIA 10.2.3.2 | Conduct routine maintenance of wind turbines, with specific attention to equipment degradation that may cause further noise impacts. Evaluate and repair any equipment that is abnormally noisy as necessary to return emissions to typical operating performance | Project owner | ■ $L_{A90}$ and $L_{Aeq}$ in accordance to QCVN 26: 2010/BTNMT – National Technical Regulation on Noise<br>■ Monitoring locations: representative | Quarterly | Monitoring report | Part of operation cost |
| | | | Apply community grievance mechanism. It is recommended that if any repeated/validated noise | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | complaints are received then compliance monitoring should be undertaken at the most affected receptors to confirm predicted noise levels. Where noise monitoring occurs, the work should be scoped and then conducted by a suitably experienced person. The purpose of the monitoring is to understand in-situ levels and to provide a comparison to predicted levels such that any additional controls be identified and then implemented if feasible, reasonable and practical to do so. If this is required:<br>■ Measure all project/ site noise levels in the absence of any influential source not associated with the Project<br>■ Not require controls if the measured site noise levels are below the predicted values and comply with the applicable thresholds, limits or criteria identified for each noise aspect.<br>■ Consider further noise control if the measured site noise levels are above the predicted noise levels or the applicable thresholds, limits or criteria identified for each noise aspect. | | areas of Noise sensitive receptors during the operation phase | | | |
| | | | Collaborate closely with local authorities to ensure local people are well aware of the predicted noise exceedance areas and notify the potential impacts to local residents | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | in case of new houses are proposed within those areas | | | | | |
| | | | Communicate and monitor closely other receptors within the buffer safety area of 300 m on the rest WTGs the noise impact level from wind turbine operation via different communication channels (village heads, Project's grievance mechanism, and local authorities) | | | | | |
| | | | Other receptors (183 receptors) outside of the buffer safety area of WTGs receiving a noise level at the increment of more than 5dBA shall also be closely communicated and monitored the noise impact level from wind turbine operation via different communication channels (village heads, Project's grievance mechanism, and local authorities). | | | | | |
| | | | Operational curtailment: In certain jurisdictions, may require to shut down wind turbines in some periods during the specific meteorological conditions to meet the regulated noise emission at nearby dwellings | | | | | |
| | | | Consider to replace these WTGs (WTG A17, WTG B9 and WTG D5 associated with NSR2, NSR3 and NSR9 which generated high noise level exceeding 12-13 dBA more than the standard) with the quieter motors or if better, relocate these set to less sensitive areas to take advantage of distance and shielding. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Worst case scenario, consider carefully the replacement or relocation of wind turbines which is failed to minimise the generated high noise level, the removal of wind turbines (WTG A17, WTG B9, and WTG D5) | | | | | |
| | | | Relocation of potential sensitive receptors, particularly identified households living within the buffer safety area of 300 m of eight WTGs including WTG A17 (4 sensitive receptors – SRs), WTG A18 (1 SR), WTG B2 (6SRs), WTG B9 (3SRs), WTG B19 (8SRs), WTG C1 (1SR), WTG C16 (5SRs), and WTG D5 (4SRs), who are predicted to be significantly affected by noise impact, is highly recommended, nevertheless a validation survey is recommended which includes additional survey to perform a census of the exact affected households and uses. Activities like agriculture, are not restricted in safety buffer areas according to national and international applicable standards. In this case, the relocation plan shall be developed and managed by the Project's owner. These 32 receptors out of 147 receptors located within the WTGs' safety zones are identified as severely impact by the noise more than others | | | | | |

### 16.9.3 Water Resource Management

**Table 16.6 Water Resource Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| ■ Land preparation and civil works Construction of transmission line, access road, wind turbine foundation, and laydown area<br>■ Operation of temporary facilities such as the concrete batching plant<br>■ Water consumption for worker's activities - groundwater.<br>■ Waste and wastewater management from construction activities and worker's activities<br>■ Hazardous waste storage and handling | ■ Increase turbidity due to the sediment and suspended solid (SS) from excavated soil and construction materials washed into freshwater water bodies consisting of lakes and another natural streams<br>■ Increase contaminants (construction debris, fuel, oil, etc.) washed/seep into water bodies due to run-off during rainy months | EPP | Wastewater and run-off water:<br>■ Arrange all working staffs at the construction site to stay in the rented local houses and utilize the in-situ toilets at place<br>■ Equip for the contractors working for the Project with 5 – 10 portable toilets enclosed with 3-compartment septic tanks (V=20m3) and domestic bins serving the worker's demand at the Project's locations including clearing, levelling, and backfilling areas<br>■ Utilize water efficiently for construction activities to avoid unnecessary loss of containment to the environment<br>■ Store equipment in indoor areas to avoid leakage of oil and lubricant to the environment<br>■ Conduct the repairing and maintenance of transportation vehicles at the garage in order to not release the oil and grease and wastewater from car washing to the surrounding environment | ■ Project owner<br>■ EPC Contractor | ■ pH, DO, $BOD_5$, TSS, COD, $NO_3^-$, $PO_4^{3-}$, Oil & grease<br>■ Monitoring locations: surface water bodies and groundwater sources within the Project's area | Every 6 months | Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | ■ Waste discharged from construction activities and worker's activities<br>■ Spillage of oil, chemicals, hazardous chemical from the use of vehicles and construction machines during the construction phase, and<br>■ Reduction in downstream water availability and groundwater resources that may cause conflicts of water demand of local community. | | ■ Construct the drainage systems in the construction areas. Collect run-off water (mainly rain water) by internal drainage system and then release into the environment by the inclination of the terrain. Regularly check and clean the drainage system to avoid blockage of soil, debris, and spoil, and<br>■ Conduct main construction activities during dry season to avoid contaminated run-off water into the environment in rainy season. | | | | | |
| | | | Construction spoil:<br>■ Store construction waste at temporarily designated area to avoid being waterlogged and polluted to the surrounding environment<br>■ Collect, classify and transport construction waste materials for proper treatment by licenced agency in accordance to Article 5, 6, and 7 of Circular No. 08/2017/TT-BXD on Construction Solid Waste Management dated 16 May 2017 by the Ministry of Construction.<br>■ Reuse and recycle construction materials such as plank or timber pillar to compact or strengthen the low terrain, and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | ■ Manage properly spoil materials such as soil, stone, brick, etc. to avoid being invaded to agricultural land of local people; otherwise, the Project's owner shall be responsible for compensation and support local people for remediation. | | | | | |
| | | | Domestic waste:<br>■ Collect and bury sanitarily in-situ a small amount of domestic waste generated from the location of wind turbine foundation<br>■ Collect and store domestic waste generated from substation's location in 120-litter dustbin with lid, then being transported by licensed agency for proper treatment<br>■ Prepare the waste management plan (inventory, dustbin, and cleaning schedule) by the subcontractor during the pre-construction stage<br>■ Provide trainings and drills on sanitary, security, and environmental protection regulations for workers and personnel working on site<br>■ Prohibit littering while working on site, and<br>■ Reduce, reuse, and recycle of spoil materials for ground levelling. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Hazardous waste:<br>■ Collect, store properly hazardous waste materials such as oily rag, welding rod, and paint shall be in bins with lid at temporarily designated area before being transported by licenced agency for proper treatment, and<br>■ Regular conduct inspection and maintenance of material and equipment vehicles travelling to the site to avoid leakage of oil and fuel to the environment. | | | | | |
| | | ESIA 10.3.4.1 | Develop Construction E&S Management Program including:<br>■ Waste and wastewater Management Plan which will cover the management and mitigation measures to minimize the impacts on nearby water bodies and surrounding communities)<br>■ Soil and Erosion Management Plan. The Plan should include some specific action but not limited to as follows:<br>– Any soil stock piles (excavated materials) should be located in sheltered areas where they are not exposed to wind and at a location approved by local authorities, and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | – Stock piles of soil (or other erodible materials) should be securely covered. | | | | | |
| | | | Construct bunds or silt fences instead of canvas on the stockpiling areas to prevent wash away of sediment load to the water bodies | | | | | |
| | | | Install oil separation tank and sedimentation tank to capture and detain construction site runoff and oil and grease from vehicles and equipment. Where applicable, install sediment control along major drainage lines where construction activity is taking place within 100 m of these line | | | | | |
| | | | Where practicable, maintain downstream vegetation in good condition during the construction process. Vegetation located down-slope of the work site assists in filtering out sediment. | | | | | |
| | | | Collect and store in accordance with applicable regulations, all solid waste including domestic waste, hazardous waste, oil and grease from the maintenance, reparation and operation activities of equipment during the construction phase. Then, transport solid waste out of the Project's site in separated containers and treated properly by functional units in accordance to *Circular No. 36/2015/TT-BTNMT* | | | | | |
| | | | Dispose properly all water and liquid wastes arising from the construction activities and they will not be | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | discharged into any water bodies/streams course without adequate treatment. Domestic wastewater will be collected and processed by the septic tanks. | | | | | |
| | | | Establish internal rules and activities for environmental protection, including littering and disposal of wastes | | | | | |
| | | | Establish rain water / storm water drainage system that connects to oil-water separators to collect and remove oil prior to discharge into receiving bodies (at the operation house and the substation area). | | | | | |
| | | | Collect domestic solid waste weekly. The Project's owner will sign an agreement with functional units for transporting and handling respective wastes. | | | | | |
| | | | Store the construction materials, debris and backfill away from water bodies or waterways and only at the designed sites along the construction zones. | | | | | |
| | | | Store separately and collect periodically construction waste by an authorized treatment and storage facility. | | | | | |
| | | | Collect and store hazardous waste by the Project owner and those waste will be handled by the official hazardous disposal organization. | | | | | |
| | | | Prohibit discharging of waste and wastewater directly into fresh water bodies. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Supervise implementation of proposed mitigation measures by the Contractors. | | | | | |
| **Operation Phase** | | | | | | | | |
| Domestic wastewater and waste discharge Leaks and spills of oil, lubricants or fuel from the operation equipment | Negligible | ESIA 10.3.4.2 | No further mitigation measures | Project owner | – | – | – | – |

### 16.9.4 Soil Environment Management

**Table 16.7 Soil Environment Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| ■ Groundworks and construction activities:<br>■ Land and vegetation clearance in areas designated for WTG foundation, transmission line pylon<br>■ Excavation for WTG foundations and electrical poles<br>■ Construction of internal road system<br>■ Accidental leaks/spills of fuel, oil and hazardous materials/waste from machine during construction phase | ■ Loss of soil stabilising vegetation<br>■ Soil erosion<br>■ Soil compaction would lead to impact on the physical properties of soil such as reduction in pore spaces, water infiltration rate and soil strength. | ■ EPP<br>■ FS Report<br>■ Safe & Civilized Construction Plan | Ensure that excavation, filling and construction works shall be complied with the current regulations | ■ Project owner<br>■ EPC Contractor | <u>Soil Compaction and Erosion:</u> | | Monitoring report | Part of construction cost |
| | | | Construct dykes along the construction works to avoid soil erosion | | Erosion Control and Sediment control measures designed specific to each site | Once prior to land preparation | | |
| | | | Construct open ditches and ponds at the disposal site to prevent soil erosion | | Vegetation clearing remains inside the identified zones (area monitoring) | During land preparation | | |
| | | | Strengthen the foundations by embankment or plantation | | Current condition of Sediment controls and Erosion controls | A weekly basis; and immediately after rainfall events or flooding period | | |
| | | | Make plantation n the temporary land area after the construction finishes to increase vegetation and minimize the soil erosion and landslide | | Status of erosion prone areas (downstream monitoring including TSS levels) | Daily | | |
| | | | Conduct all construction activities including foundation excavation and site levelling in drying season to avoid erosion. | | Status of stockpiles | Daily | | |
| | | | Reuse disposed construction material pieces such as bricks | | Mitigation measures of soil compaction | Throughout construction | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| ■ Generation of domestic waste and wastewater | | | and stones. Use the excavated soil for backfilling and road construction. Other kinds of construction materials including irons and steels will be collected, transferred back to the manufacturer, reused, or scrap trading. | | and erosion are in place | and operation phases (increase frequency during heavy rain months) | | |
| | | | Arrange about ten dustbins on site | | Waste Disposal and Leaks/Spills:<br>■ Arsenic, Cadmium, Total Chromium, Copper, Lead and Zinc in compliance with *QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of heavy metals in soil*<br>■ Monitoring locations: 2 locations<br>- Substation area, and<br>- Turbine area. | Every 6 months | | |
| | | | Collect solid waste generated from the working teams who accommodate in the rented houses and transport to the local garbage collection point for further treatment. | | | | | |
| | | ESIA 10.4.4.1 10.4.4.2 | Prepare and implement a soil and erosion management plan as part of Construction E&S Management Program to incorporate requirements such as use of dust suppression, soil stabilisation during construction and storm water and sediment management and control | | | | | |
| | | | Limit construction activities including site clearance, and excavation in some rainy days or during heavy winds and downpour to minimize erosion and run-off | | | | | |
| | | | Develop and implement procedures for responding to emergencies/accidental spills of hazardous materials, fuel and waste handling & management | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Restrict maintenance works to specially designated platforms with strict control of accidental spills | | | | | |
| | | | Restore the Project site at the end of the Project life cycle to pre-Project level. | | | | | |
| | | | Contract a competent/licensed contractor to collect, transport and treat domestic, construction and hazardous wastes from the project site | | | | | |
| | | | Prohibit dumping any solid wastes to the soil or burning waste on the site | | | | | |
| | | | Ensure that hazardous materials are stored in designated areas that are designed with impermeable floor, inflammable walls and accessible to authorized personnel | | | | | |
| | | | Manage properly hazardous waste (HW) in accordance with *Decree No. 38/2015/ND-CP, Circular No. 36/2015/TT-BTNMT and QVCN 07:2009/BTNMT* on Hazardous Waste as follows:<br>■ Prohibit HW to be illegally disposed into the ground<br>■ Train all workers and staffs on hazardous and non-hazardous waste classification and their handling methods<br>■ Supply proper facilities and clearly determine areas for HW | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | storage in the construction sites in accordance with *Circular No. 36/2015/TT-BTNMT*<br>■ Contract appropriate organizations with proper license in order to periodically transport and dispose hazardous waste, and<br>■ Ensure that a record of hazardous waste should be documented and available at the site (using the form specified in *Circular No. 36/2015/TT-BTNMT*) to allow monitoring volume of generated and disposed hazardous waste in place by the authorized contractors. The numeric data in the record must be consistent in order to ensure that none of the improper disposal is made in the Project's area or other locations.<br>In case of accidental/unintended spillage, collect and store immediately the contaminated soil as hazardous waste | | | | | |
| **Operation Phase** | | | | | | | | |
| ■ Spillage of fuel, oil, chemicals and hazardous materials from | ■ Loss of soil stabilizing vegetation; Soil | ESIA 10.4.4.1 10.4.4.2 | Contract a competent/licensed contractor to collect, transport and treat domestic and hazardous wastes from the project site | Project owner | Waste Disposal and Leaks/Spills:<br>■ Arsenic, Cadmium, Total | Every 6 months | Monitoring report | Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| Operation and Maintenance activities<br>■ Generation of domestic waste and wastewater | compaction and erosion;<br>■ Soil contamination. | | Prohibit dumping any solid wastes to the soil or burning waste on the site | | Chromium, Copper, Lead and Zinc in compliance with *QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of heavy metals in soil*<br>■ Monitoring locations: 2 locations<br>- Substation area, and<br>- Turbine area. | | | |
| | | | Ensure that hazardous materials are stored in designated areas that are designed with impermeable floor, inflammable walls and accessible to authorized personnel | | | | | |
| | | | Manage properly HW in accordance with *Decree No. 38/2015/ND-CP, Circular No. 36/2015/TT-BTNMT* and *QVCN 07:2009/BTNMT on Hazardous Waste* as follows:<br>■ Prohibit HW to be illegally disposed into the ground Train all workers and staffs on hazardous and non-hazardous waste classification and their handling methods Supply proper facilities and clearly determine areas for HW storage in the construction sites in accordance with *Circular No. 36/2015/TT-BTNMT*<br>■ Contract appropriate organizations with proper license in order to periodically transport and dispose hazardous waste, and<br>■ Ensure that a record of hazardous waste should be documented and available at the site (using the form | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | specified in *Circular No. 36/2015/TT-BTNMT*) to allow monitoring volume of generated and disposed hazardous waste in place by the authorized contractors. The numeric data in the record must be consistent in order to ensure that none of the improper disposal is made in the Project's area or other locations. | | | | | |
| | | | In case of accidental/unintended spillage, collect and store immediately the contaminated soil as hazardous waste | | | | | |

### 16.9.5 Electromagnetic Interference Management

**Table 16.8 Electromagnetic Interference Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Operation Phase** | | | | | | | | |
| Waste, emissions (including electromagnetic interference) and discharge generation, handling and disposal | Electromagnetic fields (EMF) from transmission line and transformers in substations lead to health risks | EPP | There are no existing controls. | – | – | – | – | – |
| | | ESIA 10.5.4.1 10.5.4.2 10.5.4.3 | Avoid residential buildings, or acquire houses within the ROW (if any). A validation survey shall be conducted to ensure there is existence of any houses or else locating within the ROW. | ■ Project owner<br>■ EPC Contractor | EMF from Overhead 220kV Transmission Line:<br>■ Conduct the EMF monitoring survey yearly<br>■ The EMF result must comply with *Decree No. 14/2014/ND-CP on Stipulating in detail the implementation of electricity law regarding electricity safety* and *National Technical Regulation QCVN 25:2016/BYT on Industrial Frequency Electromagnetic Fields – Permissible* | Yearly | Monitoring report | Part of Operation cost |
| | | | Avoid schools, hospitals, health clinics, and other similar buildings – the ETP alignment avoids these sensitive buildings and maintains at least a 32 m buffer to all schools and health clinics. | | | | | |
| | | | Tower safety features – place warning signs prohibiting climbing on towers and incorporate design elements that prevent climbing of the towers. | | | | | |
| | | | Implement all H&S measures as specified in the regulations including earthling of buildings that are metal clad and directly below the transmission line. | | | | | |
| | | | Conduct regular clearance of the clear zone to ensure the area is safe as required by the regulation. | | | | | |
| | | | Conduct regular checking/ maintenance to ensure the safe condition of the tower and the cable. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | | | *Exposure Level of Industrial Frequency Electromagnetic Fields in the Workplace*<br>■ Monitoring locations: in the safety corridors of the 220 kV transmission line, at the substation and at the location of turbine | | | |
| | | | Provide signage at each tower with emergency phone numbers, emergency contact information. | | EMF from 22 kV Underground Transmission Line:<br>■ Monitor EMF by using suitable magnetic and electric filed sensors within the first year of the operation<br>■ This monitoring will be included as part of the occupational health and safety | Quarterly | | |
| | | | Shield electric fields by trees, fences, buildings and most other structures. However, magnetic fields are much more difficult to shield than electric fields. | | | | | |
| | | | Arrange the phases to maximize the magnetic field cancellation for double circuit lines | | | | | |
| | | | Install a passive shielding loop to reduce the magnetic field at a particular point | | | | | |
| | | | Equip staffs who come in contact with EMF with PPE and ensure O&M staff can work in different shifts to avoid the exposure time with EMF | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Put up warning signs for high voltage areas | | monitoring program. | | | |
| | | | Organize periodic health check-ups for staff who work in EMF field location | | EMF from Substation:<br>■ Monitor the electromagnetic filed at the vicinity of the substation<br>■ The EMF result must comply with *Decree No. 14/2014/ND-CP* and *National Technical Regulation QCVN 25:2016/BYT*. | Yearly | | |
| | | | Provide staff with training on EMF section before performing work | | | | | |
| | | | Use ferromagnetic and conductive materials for shielding as a barrier to reduce the field strength at the source, and | | | | | |
| | | | Limit staff who have health problems such as cardiovascular and congenital diseases from working in areas with EMF. | | | | | |
| | | | Place warning signs prohibiting climbing on wind turbines and incorporating design elements that prevent climbing of the wind turbines, and provide emergency contact information by placing signage at each wind turbine containing emergency phone numbers to enhance safety. | | | | | |

### 16.9.6 Climate Change Management

**Table 16.9 Climate Change Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Pre-construction Phase** | | | | | | | | |
| Vegetation clearance | Change of carbon stocks from the removal of living biomass | FS Report | There are no existing measures/ controls | – | – | – | – | – |
| **Construction and Operation Phases** | | | | | | | | |
| Operation process of heavy equipment (excavator, heavy trucks, bulldozer, crane) Transportation of turbine and material from the purchasing point to the Project site | Consumption of a relatively huge amount of diesel lead to the production of greenhouse gases (GHG), especially carbon dioxide ($CO_2$), that contributing to climate change impacts. | EPP | There are no existing measures/controls | Project owner | – | – | – | – |
| Generating electricity by harnessing the power of the wind | The Project helps to reduce consumption of fossil fuels to generate electricity, and as a result, reducing the emissions of GHG and air pollutant emission. | | Install stone embankment for each turbine and compact foundation pit to avoid flooding and landslide | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| Extreme weather events | Reduce the output of energy, damage generation and grid infrastructure, affect security of energy supply and cause difficult access to the Project's location for maintenance | | Consider some technical specifications in the Envision Design extreme climate condition such as extreme wind speed (10 min average) of 37.5 m/s; survival wind speed (3s gust) of 52.50 m/s and turbulence intensity. These parameters are adapted with extreme weather of Dak Lak province, Vietnam as several storm, typhoons were recorded in Dak Lak province with the maximum wind speed of 36.6 m/s (level 12). The wind turbine will stop producing power at ambient temperature below -40ºC and above 50ºC. The turbine is designed for use at altitudes up to 1,000 MASL standard and optional up to 2,000 MASL | | | | | |
| Rapid change in wind speed | Reduce power generation | | Design and build drainage system around the turbine foundation and transmission line pylon to ensure to accommodate the increased precipitation because of climate change | | | | | |
| Severe natural disaster such as flooding and landslide | affect to substation and other components which results in loss of supply locally | | Prepare flood warning and prevention system and develop an Emergency Preparedness and Response Plan, and | | | | | |
| | | | Evacuate workers out of dangerous areas, using on-site equipment and manpower to control the incidents by the Project owner when the flash flood occurs. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | ESIA 10.6.4.2 | Take into account the increase in wind intensity in construction design to ensure stability of the WTG and avoid any community/occupational safety incidents | | | | | |
| | | | Adapt selected turbine design (Envision 2.65 MW and 3.0MW) to handle higher wind speeds and gusts in case that wind speeds are likely to increase, to capture greater wind energy with taller towers | | | | | |
| | | | Specify redundancy in control systems, multiple transmission and distribution routes, relocation for transmission and distribution (including substation). Where stronger winds are expected, adopt higher design standards for distribution poles. | | | | | |
| | | | Apply enhanced lightning protection and grounding system (earth wires, and spark gaps) in the distribution network where lightning strikes may increase. | | | | | |
| | | | Ensure the presence of rapid emergency teams to repair any damaged turbines in timely manner | | | | | |
| | | | Determined clearly and demarcate the planned areas for vegetation clearance linked to the construction works by landmarks to avoid any accidental violation. Prepare Site clearance plan to identify areas that will be retained with | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | natural vegetation within the Project's boundaries | | | | | |
| | | | Prohibit clearing vegetation outside of designated areas for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with sanctions, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation. | | | | | |
| | | | Do some mitigation measures regarding to transportation plan to avoid unnecessary trips that would make more vegetation clearance. | | | | | |

### 16.9.7 Shadow Flicker Management

**Table 16.10 Shadow Flicker Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Operation Phase** | | | | | | | | |
| Operation of turbines | The association between shadow flicker caused by wind turbines and the effects on human health is highly debated. | EPP | There are no existing measures/controls. | _ | _ | _ | _ | _ |
| | | ESIA 10.7.6.4 | **Grievance Monitoring and Reporting** – Implement a process to assess the real occurrence of the shadow flickering at local identified receptors (312) in order to eliminate the phenomena. In case of dwellings experienced flickering shadow, a detailed grievance mechanism should be available and the local community must be aware of the availability of grievance mechanism to submit their complaints regarding nuisances related to shadow flicker from turbines. Ensuring close monitoring through engagement with local stakeholders during the operational phase where there are predicted impacts from shadow flickers | Project owner | Grievance related to shadow flickering issue monitoring measures are identified and recommended. | _ | Monitoring report | Part of operation cost |
| | | | **Visual Screening (Natural)** – Assess potential sensitive receptors, for which shadow flicker modelling indicates could exceed 30 hours per year and 30 minutes per day (785 impacted receptors as result of Worst Case Scenario and 312 in real case scenario), through an on site validation survey to verify exact receptors and to ascertain the extent of existing natural visual screening in place. If not existing, the occurrence of shadow flickering during operation could be furtherly investigated, and if confirmed, increasing natural screening could be considered to minimise the effect. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | **Visual Screening (Architectural/ Structural)** – Perform further assessments and apply certain mitigation actions as installation of blinds, window shades, window tinting, awnings or fences at affected receptors, which will help to minimize the effect of shadow flicker, if grievances are received linked to this impact or if natural visual screening at potential sensitive receptors are found to be insufficient to mitigate the shadow effect. | | | | | |
| | | | **Operational Curtailment** – Investigate wind turbines operations to determine specific wind turbine that result to shadow flicker exceedance of 30 hours/year and 30 minutes/day on affected structure (almost WTGs cast flickering effect on a majority of communities during sunrise and sunset periods of time according to shadow flicker calendar of modelling results), if shadow flicker related grievances are logged and/or after visual screening has been done. Based on such information, operational curtailment can be applied to reduce the effect to the impacted receptors, which are identified based on the results of monitoring. | | | | | |
| | | | **Relocation** – Consider the relocation of affected dwellings, if so, present openly this relocation option to local community by the Client for prior consent, after concluding the additional suggested assessment, if visual screening (both natural and architectural/ structural) and stopping operation of wind turbines fail to mitigate shadow flicker impact at impacted receptors. Perform any relocation process in accordance with AIIB ESS2 related to resettlement. A community disclosure will be highly recommended to | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | clarify the significant of impact and ensure the community would be affected in case of changes of likelihood. However, it is important to understand that:<br>■ The Project Owner shall conduct a detailed census or inventory of loss of all impacted receptors by the worst-case scenario and set out a "cut-off' date to avoid any new residential settlements within the impact zone after the date. In case the Project does not have enough resources, a communication channel via local authorities especially villages' heads should be established as long as all impacted receptors are well-informed about the impacts, cut-off date and grievance process<br>■ The Project Owner shall also strengthen the cooperation with local authorities to continuously implement local awareness raising of the Project impacts, especially flickering shadow affect, to local people, and<br>■ For any new settlements after the cut-off date and within the impacted zone, if their settlement lands are legally classified as residential lands, the Project Owner, with the support from local authorities, shall notify them about the shadow flickering issue and provide support to such households whether building structure or surrounding environment designs including natural and artificial barriers | | | | | |

### 16.9.8 Visual Quality Management

**Table 16.11 Visual Quality Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Pre-Construction, Construction and Operation Phases** | | | | | | | | |
| ■ Construction and installation of wind turbines<br>■ Operation of turbines | Visual impacts | EPP | There are no existing measures/controls. | _ | _ | _ | _ | _ |
| | | ESIA 10.8.5.2 | Siting and design of roads and other infrastructure to minimize off-site visibility from visually sensitive areas should be an important consideration | ■ Project owner<br>■ EPC Contractor | _ | _ | _ | _ |
| | | | Avoid obvious logos and/or patterns with colours at long wavelength of the visible spectrum to be painted for the WTGs | | | | | |
| | | | Use of materials that will minimise light reflection should be used for all Project components; The replacement of wind turbines with visually different wind turbines can result in visual clutter, so replacing wind turbines with the same or a visually similar model over the lifetime of the project may be an important requirement | | | | | |
| | | | Retain existing vegetation to the greatest extent possible. Retain vegetation along roads, substations, and other the Project's infrastructure | | | | | |

## 16.9.9 Traffic and Transport Management

### Table 16.12 Traffic and Transport Management

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| ■ Transport of equipment (wind turbines and transmission line components)<br>■ Transportation materials from local vendors<br>■ Daily movement of local construction workers | ■ Degradation of the public road infrastructure and network due to heavy load vehicle movement<br>■ Disturbance to local transportation due to an increase of ordinary traffic movement that might cause traffic congestion, and<br>■ Increase of Traffic Safety Risks. | EPP | There are no existing measures/ controls | ■ Project owner<br>■ EPC Contractor | Monitor the implementation of all proposed mitigation measures specified in the TMP (such as specifying speed limits and safe distance for vehicles entering the site, using qualified drivers, stopping distracted driving) | Monthly | Monitoring report | Part of construction cost |
| | | ESIA 10.10.4.1 | Develop a detailed Traffic Management Plan (TMP) prior to the commencement of construction. Measures including in TMP should be: | | Monitor road condition along the transportation route | Bi-weekly | | |
| | | | Establish, train and monitor compliance with speed limits to reduce accidents and speed-related injuries | | | | | |
| | | | Avoid peak times of day to reduce the risk of accidents | | | | | |
| | | | Due to heavy load vehicle movement, require some works such as temporary removal of some trees, cooperating with local authority and seeking support from | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | local community to expand the road for easily movement | | | | | |
| | | | Collaborate with local communities and responsible authorities to improve signage, visibility and overall safety of roads | | | | | |
| | | | Make information boards about traffic safety hazards and emergency contact information available at the wind farm site | | | | | |
| | | | Ensure that drivers carrying construction machinery and materials are instructed to drive within speed limits with careful consideration for village traffic | | | | | |
| | | | Coordinate with emergency responders to ensure that appropriate first aid is provided in the event of accidents | | | | | |
| | | | Establish a proper and accessible grievance mechanism to report concerns about public road conditions raised by local communities along the transportation route. The Project will carry out immediate investigation when the community submits related complaints | | | | | |
| | | | Coordinate between the Project proponent and the government agencies for road maintenance to | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | identify necessary road repairs during Project construction | | | | | |
| | | | Repair of any damaged road surfaces as needed which caused by the Project-related transportation. | | | | | |
| **Operation Phase** | | | | | | | | |
| Operational traffic (e.g. WTG operations, inspection and maintenance) | Negligible | EPP | There are no existing measures/controls. | Project owner | Monitor the implementation of all proposed mitigation measures specified in the TMP (such as specifying speed limits and safe distance for vehicles entering the site, using qualified drivers, stopping distracted driving) | Monthly | Monitoring report | Part of Operation cost |
| | | ESIA 10.10.4.2 | Establish and monitor compliance with defensive driving guideline (e.g. speed limits to reduce accidents and speed-related injuries) | | Regularly monitor road condition monitoring of the internal road | _ | | |
| | | | Make the proposed grievance mechanism accessible for all villagers to report concerns associated with health and safety. | | | | | |

### 16.9.10 Biodiversity Management

**Table 16.13 Biodiversity Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Construction and Operation Phases** | | | | | | | | |
| ■ Loss of habitats due to footprint of short- and long-termed land acquisition | Habitat loss | ■ EPP<br>■ Safe & Civilized Construction Plan | **Below mitigation measures are for construction phase and are assumed to be continued during operation phase where relevant:** | ■ Project owner<br>■ EPC Contractor | _ | _ | Monitoring report | Part of construction cost and operation cost |
| | | | Conduct land clearance only within the boundary consented by governmental authorities. Conduct permanent land acquisition only for development of turbine foundations and substations | | | | | |
| | | | Develop a sanction plan and have a supervisor/inspector during the construction work | | | | | |
| | | | Ensure the restoration of the landscape at temporary used areas after completion of construction | | | | | |
| ■ Interruptions or changes to fauna behaviours caused by noise, light, vibration and visual disturbances | Disturbance to fauna | | Utilize existing roads as much as possible | | | | | |
| | | | Abide any Project-related traffic passing through the national roads, provincial roads and trails by regulations of *National Technical Standard TCVN 5949-1998*. The speed and transportation time (only after 20:00) shall be in accordance with the regulated limitation | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Check regularly all motor vehicles, heavy trucks, and construction equipment used in the Project for noise and vibration | | | | | |
| | | | Avoid construction works from 22:00 to 6:00 the next day | | | | | |
| ■ Reduction in quality of habitats due to (i) land clearance, (ii) discharge of waste, wastewater and dust and (iii) introduction and/or spreading of alien/invasive species and (iv) increasing edge effects. | Habitat degradation | | Refer to existing mitigation measures from EPP, FS Report and Safe & Civilized Construction Plan in section Air Quality Management and Water Resource Management | | | | | |
| ■ Loss of habitats due to footprint of short- and long-termed land acquisition | Habitat loss | ESIA 11.9.4.1 - 11.9.4.8, 11.9.6 | **Additional mitigation measures to control the loss of terrestrial habitat are proposed during construction as follows:** | ■ Project owner<br>■ EPC Contractor | During construction, inspections are to occur along all Project boundaries and Project footprint to ensure compliance with clearing within marked boundaries/zones | Weekly | | |
| | | | Conduct additional field survey to confirm the presence of Smooth-coated Otter within the project area as the evidence of this species being present | | ■ N/A | ■ N/A | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | came through an interview with only one person stating having observed 4 individuals of this species | | | | | |
| | | | Use a Wildlife Shepherding Protocol within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, relocate fauna to their point of origin or similar natural adjacent areas | | ■ During operation, monitoring of rehabilitation success/failure is to occur on all replanting sites.<br>■ Where plant rehabilitation is determined to have failed, re-establishment is to occur with corrective measures after review of reasons of failure.<br>■ Indicators for vegetation re-establishment should be at least 75% successful coverage. | Quarterly | | |
| | | | Use of appropriate noise suppression techniques (such as silencer, noise barrier) where applicable to limit the extent of indirect habitat loss. | | | | | |
| | | | **To mitigate the effect of cumulative habitat loss, below measures are recommended:** | Project owner | – | – | | |
| | | | Facilitate a Cumulative Impact Assessment (CIA) association with other projects and government representation (such as Dak Lak Provincial People Committee) to govern a system for managing cumulative | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | impacts. This system should seek guidance from Vietnam regulations (such as Vietnam Data Red Book) and Vietnam commitments to international treaties such as Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) | | | | | |
| | | | Share best practices in avoidance of forest loss through active monitoring during land clearance in construction phase (e.g. mark a defined boundary of clearance) and forest rehabilitation | | | | | |
| | | | Promote a fauna conservation program to raise awareness for local people about the protected status of endangered species under the laws of Vietnam. Violations could lead to sanctions and imprisonment. | | | | | |
| Interruptions or changes to fauna behaviours caused by noise, light, vibration and visual disturbances | Disturbance to fauna | | **Additional mitigation measures to control the disturbance to terrestrial species are recommended during construction phase:** | ■ Project owner<br>■ EPC Contractor | During construction, conduct supervision on the implementation of mitigation measures for fauna disturbances. | Daily | | |
| | | | Conduct additional field survey to confirm the presence of Smooth-coated Otter within the project area as the evidence of this species being present came through an interview with only one person stating having observed 4 individuals of this species | | | | | |
| | | | Use a Wildlife Shepherding Protocol within the terrestrial Project Area to | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, relocate fauna to their point of origin or similar natural adjacent areas | | | | | |
| | | | Apply Injured Wildlife Management Protocol when injured individuals are found during daily inspection | | | | | |
| | | | Place fencing around major project sites during construction to restrict access to local fauna, and therefore stopping wildlife becoming trapped or harmed by works | | | | | |
| | | | Use of appropriate noise suppression techniques (such as silencer, noise barrier) where applicable | | | | | |
| | | | Maintain regularly machinery | | | | | |
| | | | Use cowl, hood and shield to minimize light spill. | | | | | |
| ■ Reduction in quality of habitats due to (i) land clearance, (ii) discharge of waste, wastewater and dust and (iii) introduction and/or spreading of alien/invasive | Habitat degradation | | **The following mitigation measures will be applied during construction and continue during operation to control invasive species:** | ■ Project owner<br>■ EPC Contractor | During construction, conduct daily supervision on the implementation of the Invasive Species Management Plan. | Daily | | |
| | | | Manage existing populations and the introduction of new invasive species. Outline these measures in an Invasive Species Management Plan and the plan will include measures such as: | | During construction, conduct inspections in Project area to identify any new proliferations | Monthly | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| species and (iv) increasing edge effects. | | | ■ Check the provenance of any fill material brought onto the site for invasive species contamination; and<br>■ Inspect transportation vehicles before entering site and wash down on arrival and departure. | | and eradicate invasive species. | | | |
| | | | Rehabilitate temporary-used land using native species after construction. | | During operation, conduct monitoring in rehabilitated areas to check for presence of invasive species and remove if any. | Monthly | | |
| ■ Mortality due to potential flight of volant species through the Rotor Swept Zone (RSZ) of the wind turbines.<br>■ Mortality of birds due to electrocution on the transmission line | Mortalities of birds | | **Additional mitigation measures for mortality impacts on birds as follows:**<br><u>During construction phase</u><br>Undertake a Collision Risk Modelling to further assess collision risks for species that are vulnerable to collisions and electrocution (e.g. the Germain's swiftlet in this case of this Project)<br>Use a Wildlife Shepherding Protocol within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, relocate fauna to their point of origin or similar natural adjacent areas | ■ Project owner<br>■ EPC Contractor | ■ Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily<br>■ Where fauna is identified during regular inspections, this is to be confiscated (if poached) and photographed for record keeping. Records of injured | Daily | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Apply Injured Wildlife Management Protocol when injured individuals are found during daily inspection | | and/or shepherded wildlife should be kept;<br>■ Keep records and regularly review them (quarterly) for implementation of the workforce training program for fauna/flora awareness. | | | |
| | | | Prohibit hunting and poaching for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws | | | | | |
| | | | Provide training to staff and workers all rules, regulations and information concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations | | | | | |
| | | | <u>During operation phase</u> | Project owner | Conduct carcass monitoring during operations in the vicinity (within 85m radius) of the turbines and along the transmission line frequently by trained personnel/dogs and bird experts. All carcasses or feather spots (remains of at least 10 feathers indicating a fatality whose carcass has been largely removed | Monthly | | |
| | | | Ensure that power towers and transmission lines meet safety standards such as Avian Power Line Interaction Committee (APLIC) to minimise birds and bats electric shock risk:<br>■ Framing structures so that there is adequate separation between phases or phases and grounds to accommodate large perching birds. Based on the dimensions of eagles, APLIC recommends 132 cm of horizontal separation and 88 cm of vertical separation; | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | ■ Applying covers on phases or grounds where adequate separation is not feasible. Examples of covers include insulator/conductor covers, bushing covers, arrester covers, cutout covers, and jumper wire covers. Cover designs should be evaluated and approved by company engineers prior to use. (Note: bird/animal protection covers are not intended for human protection);<br>■ On three phase structures, a vertical clearance of at least 105 cm between un-insulated conductors, ground wires and grounded hardware on poles with 8-foot crossarms will provide the 196 cm required clearance. | | by scavengers) will be GPS referenced, photographed and notes taken on the following:<br>■ Species (this may require investigation of remains or photographs by bat/ ornithological specialist);<br>■ Sex and age (if known or which may require specialist input);<br>■ Date and time collected;<br>■ Turbine number, distance and compass direction (in degrees) from base;<br>■ Conditions (intact - fresh and no signs of scavenging; scavenged; feather spot - 10 or more feathers at one location indicating scavenging); and<br>■ Comments (e.g. any evidence of cause of death; recent weather conditions). | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Develop an Adaptive Bird Management Plan. The plan should include:<br>■ Post-construction monitoring (see section Monitoring and audit below) and limits of acceptable of number of mortalities (triggers).<br>■ Further mitigation measure should be undertaken if exceeding triggers, which may involves:<br>– Installation of bird multi-sensor monitoring system and deterrent system;<br>– Increase curtailment of wind farms | | Bag and remove carcasses, and any not identified to species, age and sex held for examination, by a bird specialist. | – | | |
| | | | | | Undertake periodic unannounced calibration checks to assess the finding efficiency (taking into account removal of carcasses by scavengers and observer variation) of observers and their dogs. These will involve the placement of 10 marked carcasses and a follow up visit to assess how many were found. | At least twice during both migration/dry season and non-migration/wet seasons to check for seasonal variation and influences | | |
| | | | | | Seasonal bird studies in year 1 and year 2 of operation, including ongoing monitoring to detail the understanding of bird utilization of the Project area. If species with significant conservation status are detected or monitoring indicates | Twice a year, especially during migration seasons (September – November, February – May) | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | | | that turbines have a high collision risk, additional mitigation measures are to be considered and/or modified in these. Bird studies are highly recommended to be performed. | | | |
| Mortality of bats due to barotrauma | Mortalities of bats | | **Additional mitigation measures for mortality impacts on bats as follows:**<br><br><u>During construction phase</u><br><br>Use a Wildlife Shepherding Protocol within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior to any clearance and construction work. Wherever possible, relocate fauna to their point of origin or similar natural adjacent areas<br><br>Apply Injured Wildlife Management Protocol when injured individuals are found during daily inspection<br><br>Prohibit hunting and poaching for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws<br><br>Provide training to staff and workers on all rules, regulations and information | ■ Project owner<br>■ EPC Contractor | n Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily;<br>n Where fauna is identified during regular inspections, this is to be confiscated (if poached) and photographed for record keeping. Records of injured and/or shepherded wildlife should be kept;<br>n Keep records and regularly review them (quarterly) for implementation of the workforce training program for fauna/flora awareness. | Daily | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations | | | | | |
| | | | <u>During operation phase</u><br>Use lights that have low ultraviolet wavelengths (reduce insect congregations around lights that bats forage on)<br>Develop an Adaptive Bat Management Plan that includes:<br>■ Post-construction monitoring (see section below) and limits of acceptable of number of mortalities (triggers).<br>■ Further mitigation measure should be undertaken if reaching triggers:<br>- Installation of suitable bat detectors fitted to the turbine or bat deterrent system;<br>- Increase cut-in speed for rotors, as evidence suggests bats are more likely to collide with turbines in calmer conditions as low wind conditions provide better foraging and flying conditions than conditions with strong winds. | Project owner | Conduct carcass monitoring within 85m radius from the turbines during operations on a monthly basis by trained personnel and bat experts (within the first year). All carcasses will be GPS referenced, photographed and notes taken on the following:<br>■ Species (this may require investigation of remains or photographs by bat/ ornithological specialist);<br>■ Sex and age (if known or which may require specialist input);<br>■ Date and time collected; | Monthly | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | | | ■ Turbine number, distance and compass direction (in degrees) from base;<br>■ Conditions (intact - fresh and no signs of scavenging; scavenged; and<br>■ Comments (e.g. any evidence of cause of death; recent weather conditions). | | | |
| | | | | | Bag and remove carcasses, and if species or age and sex are not identified , a bat specialist will be consulted | _ | | |
| | | | | | Undertake periodic unannounced calibration checks to assess the finding efficiency (taking into account removal of carcasses by scavengers and observer variation) of observers and their dogs. These will involve the placement of 10 marked carcasses and a follow | At least twice during both migration/dry season and non-migration/wet season to check for seasonal variation and influences | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | | | up visit to assess how many were found. | | | |
| | | | | | Seasonal bat studies in year 1 and year 2 of operation, including ongoing monitoring to detail the understanding of bat utilization of the Project area. If species with significant conservation status are detected or monitored indicates that turbines have a high collision risk, additional mitigation measures are to be considered and/or modified in these. | Twice a year linked to the dry and wet season during year 1 and year 2 of operation | | |
| Fauna mortalities due to vehicle strikes, poaching and hunting and clearance of nests | Mortalities of other fauna | | **Additional mitigation measures for mortality impacts on other fauna during construction as follows:** | ■ Project owner<br>■ EPC Contractor | ■ Supervise the implementation of anti-hunting and poaching policy for all labour forces and inspection for any wildlife in construction areas daily during construction phase;<br>■ Where fauna is identified during regular inspections, | Daily | | |
| | | | Develop a detailed Traffic Management Plan (TMP) prior to the commencement of construction (see section Traffic and Transportation Management) that should ensure vehicles speed are in compliance with relevant regulations | | | | | |
| | | | Use a Wildlife Shepherding Protocol within the terrestrial Project Area to ensure that no active nests/dens or wildlife remain in the affected zone prior | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | to any clearance and construction work. Wherever possible, relocate fauna to their point of origin or similar natural adjacent areas | | this is to be confiscated (if poached) and photographed for record keeping. Records of injured and/or shepherded wildlife should be kept;<br>■ Keep records and regularly review them (quarterly) for implementation of the workforce training program for fauna/flora awareness. | | | |
| | | | Apply Injured Wildlife Management Protocol when injured individuals are found during daily inspection | | | | | |
| | | | Prohibit hunting and poaching for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws | | | | | |
| | | | Provide training to staff and workers on all rules, regulations and information concerning restrictions related to the fauna/flora awareness, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations | | | | | |
| ■ Mortality due to potential flight of volant species through the Rotor Swept Zone (RSZ) of the wind turbines.<br>■ Mortality of birds due to | Mortalities of birds and bats | | **The mitigation measures for cumulative bird and bat impacts are recommended as follows:** | Project owner | _ | _ | | |
| | | | Facilitate a Cumulative Impact Assessment (CIA) in association with other projects and government representation (such as Dak Lak Provincial People Committee) to govern a system for managing cumulative impacts. This system should be based on Vietnam regulations (such as | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| electrocution on the transmission line<br>■ Mortality of bats due to barotrauma | | | Vietnam Data Red Book) and Vietnam commitments to international treaties such as Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) | | | | | |
| | | | Encourage CIA Projects to implement Wildlife Shepherding Protocol and Injured Wildlife Management Protocol across all projects | | | | | |
| | | | Share best practices in bird transmission line designs and bird diverter deployment (designs for diverters, spacing and location along sensitive areas) | | | | | |
| | | | Share post-construction monitoring results, which would be very valuable to help understand the cumulative bird and bat mortalities | | | | | |

## 16.9.11 Social Management

**Table 16.14 Social Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Pre-construction** | | | | | | | | |
| Economic Displacement and Loss of Livelihood | ■ Economic displacement: loss of land and access to production land, resulting in loss of access, livelihood and income to the land users;<br>■ Social/ cultural tension from dissatisfaction towards the compensation price and /or the unequal compensation between the affected households, especially among the Indigenous Peoples;<br>■ Negative impacts on the reputation of | ESIA 12.3.3 | Affected households will receive the compensation payment and different types of support (e.g. job transition support, life stabilization support, job recruitment assistance, training) in cash. There is no other compensation or supporting method to be applied to assist affected households | Project owner | – | – | – | – |
| | | ESIA 12.3.4 | ■ Disclose the Community Grievance Mechanism (CGM) that is developed as part of the Stakeholder Engagement Plan (SEP) immediately as soon as it is finalised to support the local authorities in receiving and addressing land acquisition-related grievances. CGM should be disclosed to the affected communities, including affected ethnic minorities so that the affected community is aware of communications grievance lines and understand how to submit a grievance. Continuously coordinate with local authorities to solve any submitted grievance relevant to land acquisition activities. | Project owner | ■ Creation and maintenance of a Consultation and Grievance record in relation to land acquisition<br>■ Grievance related to economic displacement and loss of livelihood<br>■ Effectiveness of RLRP and CDP implementation | ■ Monitoring of the RLRP in a quarterly term | ■ SEP<br>■ Monitoring report | Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | the Project; and<br>■ Potential physical displacement that need to be confirmed as the land acquisition process is deemed to be completed. | | ■ Disclose the SEP to ensure effective Project information disclosure and communication with affected households as well as relevant government stakeholder. Immediate disclosure of the Project update, ESIA findings, land acquisition and CSR policies should be conducted with land affected households through a culturally appropriate communication plan consisting of visual/graphic demonstration (e.g. leaflets, signs, video) and outreach activities (e.g. community events, informed sessions, open houses, meetings).<br>■ Conduct a Land Acquisition Audit (LAA) to identify the gaps between the government-led process, the Project's practice and AIIB and IFC requirements on land acquisition and resettlement. Specific actions to minimize the gaps in providing appropriate compensation should be recommended and implemented.<br>■ Develop and implement a RLRP based on the current RLRF to support the economically displaced households in restoring their livelihoods at least equal to similar level of livelihood condition before land acquisition. The RLRP should take the women, poor, and other vulnerable groups into account to | | ■ PAPs' feedback RLRP and CDP implementation programs. | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ensure improvement of their standards of living to at least national minimum standards, they are not overlooked during Project implementation and left worse off.<br>■ Assist the local community via a Community Development Plan (CDP) focusing on affected communities to ensure that local communities can benefit from the project. CDP will include community based development initiatives and programs to support the local communities where the project is located. A CDP would be implemented throughout the Project life and through a CDP, the Project can listen to concerns of the local people and thus build a relationship between the Project and the surrounding communities. Households who had sold land for the Project without acknowledging land use purpose conversion for the wind power project should be prioritised in participating CDP programs. It is important that CDP budgets are committed on steady and multi-year timeframes, which reflects changing business needs and drivers for community development at various stages of the business or project cycle. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| **Construction Phases** | | | | | | | | |
| Disturbance to Agricultural production | ■ Soil erosion around the turbine locations<br>■ Accumulation of sediment and disturbance to the production land located adjacent to the turbines and the Project's Site<br>■ Soil and water degradation as a result of dust accumulation from construction work<br>■ Disrupted access to farming areas during the construction phase | ■ EPP<br>■ FS Report<br>■ Safe & Civilized Construction Plan | ■ Excavation, filling and construction works shall be complied with the current regulations<br>■ Dykes should be constructed along the construction works to avoid soil erosion<br>■ Open ditches and ponds are constructed at the disposal site to prevent soil erosion<br>■ Strengthen the foundations by embankment or plantation<br>■ Plantation can be made in the temporary land area after the construction finishes to increase vegetation and minimise the soil erosion and landslide<br>■ All construction activities including foundation excavation and site levelling are conducted in drying season to avoid erosion, and<br>■ Disposed construction material pieces such as bricks and stones shall be reused. The excavated soil shall be used for backfilling and road construction. Other kinds of construction materials including irons and steels will be collected, transferred back to the manufacturer, reused, or scrap trading. | ■ Project owner<br>■ EPC Contractor | Grievance related to disturbance to agricultural production | As suggested in each management plan | ■ SEP<br>■ Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package | | | | | |
| | | ESIA 12.4.4 | ■ The Project Owner should provide and communicate detailed information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers located near the Project locations. Due to the presence of the Ede IP and other ethnic minority groups in this area, culturally sensitive communication approaches should be taken into account;<br>■ The Project Owner should disclose and implementing the Community Grievance Mechanism (CGM) that is understood by and accessible to all villagers. The mechanism will be simple, efficient, timely and consultative; Grievance Mechanism for Indigenous peoples ill also be disclosed.<br>■ Project Owner will closely monitor the temporary impacts on land of villagers during construction. Construction contractors must restore the soil to the quality as before being affected to return to the households. The Project will | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | request construction contractors to prepare and implement the suitable construction methods to mitigate the impacts on land of villagers during construction of access roads and other Project's components.<br>■ Should any incident occur and cause damage to the surrounding agriculture production, the Project Owner will ensure that such incident should be investigated to determine the Project's responsibilities and compensation amount if necessary. Standard for compensation will follow the Vietnamese civil law and be based on negotiations between the Project's contractors and the land users. If a related community grievance is submitted to the Project, it will be solved in accordance with the procedure described in the SEP and CGM. | | | | | |
| Impacts on Worker Rights, Occupational Health and Safety | **Worker's Rights**<br>■ Lack of awareness on worker's rights;<br>■ Violation of worker's rights encountered by contractors;<br>■ Potential employment of children, | EPP | ■ Provide open information of workers rights and contractual terms.<br>■ provide the required PPE to workers as per regulations;<br>■ have regulations on occupational safety and closely monitor these regulations throughout the construction phase;<br>■ have fire prevention and emergency plans to prevent and respond any incidents; | ■ Project owner<br>■ EPC Contractor | ■ Worker's grievance related to their rights, occupational health and safety;<br>■ Number of worker having occupational diseases | As suggested in each management plan | Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | forced or bonded labour. This risk is often higher for vulnerable groups (e.g. migrant labour); | | ■ establish rules on order, hygiene and environmental protection in worker camps.<br>■ A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package | | ■ Number of accident and injury cases in workplace<br>■ Number of worker infected COVID-19 | | | |
| | ■ Potential for discriminatory practices to occur in the hiring process;<br>■ Potential for discrimination against workers that join unions (or other similar organisations) or take part in collective bargaining;<br>■ Inappropriate or delayed payments to workers;<br>■ Unjustified dismissals; and<br>■ Risk of association with contractors | ESIA 12.5.4 | **Policies and Procedures**<br>Develop a Human Resources (HR) policies and procedures that are in line with Vietnam labour regulations, AIIB ESS1, and IFC PS2. The HR policy and procedure should include but not limited to:<br>■ Working conditions and Management of Worker Relationship;<br>– HR Policy;<br>– Working Relationship;<br>– Working Condition and Terms of Employment;<br>– Workers' Organization;<br>– Non-discrimination and Equal Opportunity;<br>– Retrenchment;<br>– Grievance Mechanism;<br>– Child labor, forced labor and gender equity | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | (e.g. service contracts) or third parties (e.g. recruitment agents) adhering to relevant laws and international standards and guidance.<br>**Worker's health and safety**<br>*Accidents and injuries*<br>■ Injury/fatality risks associated with working at heights (e.g. excavation, foundation construction, pylon, scaffolding, cranes);<br>■ Injury/fatality in a collision due to the movement of the vehicle and large mobile | | ■ Protecting the workforce: child labour and forced labour;<br>■ Occupational Health and Safety;<br>■ Workers engaged by Third Parties; and<br>■ Supply chain.<br>**Worker's Rights**<br>■ The Project Owner develop and implement a Labour Management Plan;<br>■ EPC Contractors shall establish employment practices that ensure workers are paid appropriately in accordance with working hours and in a timely manner, informed by national standards and industry benchmarks;<br>■ Project Owner and their EPC Contractors shall comply with Vietnam Labour Code requirements related to the hiring of labour and with applicable requirements from the EHS international guidelines;<br>■ Special attention shall be given to establishing clear contractual agreements through the inclusion of particular clauses between Project Owner and all of their subcontractors to avoid child labour, forced labour, and human trafficking and other violations of human rights; | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | plant equipment such as backhoes, bulldozers, graders and mobile cranes present health and safety risks if not handled appropriately;<br>■ Non-compliance with health and safety programs, poor safety culture, and inappropriate use of worker personal protective equipment (PPE) may place workers at risk of accidents and injuries;<br>■ A surge in vehicle usage increases the potential for an accident or | | ■ EPC Contractors shall establish employment practices to check legal worker's age in identification document upon recruitment to ensure no child labour or forced labour and avoidance of unjustified dismissals;<br>■ EPC Contractors shall establish employment practices that ensure workers are not discriminated against on the grounds of ethnicity, sex, religion, political opinion, social origin, age, marital or relationship status, sexual orientation, or trade union activity. As part of the hiring process, age checks will be conducted;<br>■ EPC Contractors shall ensure workers are made aware of their rights as part of the induction process;<br>■ EPC Contractors should implement a "zero tolerance" policy towards inappropriate behaviour from and amongst the workforce;<br>■ EPC Contractors Ensure workers have a right to join unions;<br>■ Project Owner and EPC Contractors shall establish a grievance mechanism for workers. This should include an option for grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain, | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | injury to occur; and<br>■ Manual handling associated with day to day construction activities can result in injuries.<br>*Occupational diseases*<br>■ Hearing impairment due to exposure to high noise levels during equipment transport and use of large machinery;<br>■ Respiratory disease due to exposure to dust and reduced ambient air quality;<br>■ Repetitive work movements which may | | should have access to a grievance mechanism to ensure that their issues and concerns are identified and addressed. Contractors should be required to inform the Project about grievances raised;<br>**<u>Occupational Health and Safety</u>**<br>■ The Project Owner shall develop and implement an Occupational Health and Safety (H&S) Management Plan (MP);<br>■ EPC Contractors shall regularly inspect all critical components of the involved equipment and machinery;<br>■ EPC Contractors shall establish operation and safety procedure for each equipment and make available for the workers involved;<br>■ EPC Contractors shall ensure that only appropriately skilled and trained employees are assigned to the operation and maintenance of the corresponding equipment and machinery;<br>■ EPC Contractors shall perform audits of different subcontractors involved in terms of health and safety topics to ensure these companies comply with the findings and remedial action follow-up;<br>■ EPC Contractors shall establish health and safety internal rules and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | cause lateral epicondylitis (i.e. tennis elbow);<br>*Infectious diseases*<br>■ Disease vectors (e.g. mosquitos), which may result in diseases such as dengue fever or malaria;<br>■ Ingestion of unsanitary food and water, which may result in a parasitic infection or diseases such as salmonella, E.coli, and listeria; and<br>■ Human or pest contact, which may result in diseases such as sexually transmitted infections (STIs), | | ensure worker's awareness of these rules;<br>■ EPC Contractors shall ensure day to day compliance with the health and safety requirements (i.e. procedures, equipment usage, PPE usage, demonstration of safe behaviours, competent personnel, compliance with work permit system);<br>■ EPC Contractors shall ensure safety measures are in place before workers perform high-risk tasks, such as working-at-height, loading and unloading of equipment, hot work, electrical works, use of scaffolds and heavy machinery;<br>■ EPC Contractors shall monitor and report health and safety performance through site inspections to all involved subcontractors, using appropriate health and safety metrics, operations auditing as well as senior management review and follow-up;<br>■ EPC Contractors shall monitor and report high-risk sites to restrict entry and prevent near misses, injuries and fatalities;<br>■ EPC Contractors shall ensure training programs to adequately include the usage of appropriate PPE, good hygiene practices, | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | tuberculosis, influenza and rabies.<br>*COVID-19 pandemic* | | awareness of infectious diseases, and the management of risks and hazards;<br>■ EPC Contractors shall provide first aid box and competent first-aider at all construction sites and worker's accommodation facilities;<br>■ Project Owner and their EPC Contractors shall conduct medical assessments of workers before they are mobilized to the site, including screening for infectious diseases and other health issues. This is to ensure workers are fit for work;<br>■ Project Owner shall implement a system for selection and management of contractors/subcontractors/suppliers with clear criteria on required environmental and safety management capabilities;<br>■ Project Owner and their EPC Contractors shall develop and implement a Worker Accommodation Management Plan in accordance with local regulations and IFC requirements to ensure the well-being of the workforce as well as the health, safety and security of local communities;<br>■ EPC Contractors shall ensure the worker accommodation is constructed/leased and managed in accordance with Vietnam | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | requirements and Worker's Accommodation: Processes and Standards developed by WBG, IFC and EBRD;<br>■ Minimum requirements for the worker's accommodation facilities shall include:<br>– Free of charge to workers, meaning that workers do not have to pay if they choose to stay in workers' camp built or owned by the Project Owner or the contractors;<br>– Adequate living space for each worker;<br>– At least one toilet shall be arranged for every 15 workers;<br>– At least one shower/bathroom is provided for each 15 persons;<br>– Wastewater, sewage, food and other waste materials shall be adequately discharged in compliance which Vietnam standard;<br>– Male and female toilet/shower/bathroom shall be separated;<br>– Sanitary, laundry and cooking facilities and potable water;<br>– Adequate health, fire safety measures, including first aid and medical facilities; | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | – Adequate heating and ventilation; and<br>– Non-restrictive to workers' freedom of movement to and from the accommodation.<br>■ Project Owner shall conduct regular audits of workers´ accommodation sites of all involved subcontractors. | | | | | |
| Non-influx Impact on Community Health, Safety and Security | ■ Health Issues as a Result of Noise, Dust, Vibration, and Waste<br>■ Unauthorized Access to the Project Site<br>■ Traffic Safety Issue during the Construction Phase including:<br>– Degradation of the public road infrastructure and network due to heavy load vehicle movement;<br>– Traffic congestion due to an | ESIA<br>12.6.4 | ■ Project Owner shall disclose the proposed grievance mechanism to make it accessible for all villagers to report concerns associated with health and safety issues. An immediate investigation shall be undertaken when complaints on accidents or near misses are submitted<br>■ EPC Contractor should ensure:<br>– All new drivers (including contractors for construction material transportation) must be licensed with good experience, and should be required to undergo safety training;<br>– Flagmen should operate at the junction between the main roads and the access road to coordinate the trucks entering and exiting;<br>– Speed limits should be enforced for all Project vehicles;<br>■ The Project Owner should: | ■ Project owner<br>■ EPC Contractor | ■ Grievance related to non-influx impact<br>■ Number of people having health Issues as a result of noise, dust, vibration, and waste<br>■ Number of accident and injury cases in community | As suggested in each management plan | ■ SEP<br>■ Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | increase of traffic movement; and<br>– Increase of local traffic incidents | | – Together with EPC Contractor, develop a Traffic Management Plan for the construction phase. Procedure for responding to the traffic emergency should also be included in the plan;<br>– Conduct disclosure and consultation with the surroundings communities and public facility (school) on key Project traffic routes, timing of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding community, through corporation with the local police to ensure local residents be aware of increase in the level of transportation activities during the Project Construction;<br>– Disclose the proposed grievance mechanism so that it is accessible for all villagers to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project will undertake an immediate investigation;<br>– Local communities should be familiarised with safety awareness and traffic management such as warning signs, limited speed and notifications of the risks of traffic | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | accidents. This measure will need to be incorporated into a Community Health and Safety Management Plan;<br>– Project Owner should, where road conditions are poor occur as a result of Project activities, improve the road to ensure conditions meet the standard required for construction vehicle use; and<br>– Regular road condition monitoring along the transportation route to understand road quality during construction phase. | | | | | |
| Impacts Associated with Migrant Workers Influx | ■ COVID-19 related risks;<br>■ Increased risks of infectious diseases;<br>■ General disturbance and tension between migrant workers and local communities; and<br>■ Pressure on public service | EPP | ■ Coordinating with local authorities and relevant agencies to organize programs such as education and awareness raising for workers in terms of health and safety measures, and how to minimize or avoid conflict with local people;<br>■ Coordinating with local authorities to manage temporary resident registration for migrant workers and to monitor social security in the area where migrant workers will be accommodated.<br>■ No measure was proposed for the protection of local workers' right, health and safety. No gender mainstreaming measure in place to | | ■ Grievance related to migrant workers influx;<br>■ Number of people infected COVID-19 (before and after construction phase);<br>■ Number of people got infectious diseases (before and after | As suggested in each management plan | Monitoring report | Part of construction cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | and infrastructure. | | address gender-based violence and sexual harassment. | | construction phase) | | | |
| | | ESIA 12.7.4 | ■ Project Owner and their EPC Contractors shall strictly follow the Government's instructions on COVID-19, including compulsory COVID-19 tests and quarantine for migrant workers as well as wearing of face masks;<br>■ Project Owner should develop a COVID-19 monitoring and response team, who are tasked with outbreak tracking and protocols and procedures developments as appropriate in line with local and national requirements and guidelines;<br>■ Strictly follow the Government's instructions on COVID-19, including compulsory COVID-19 tests and quarantine for migrant workers, wearing of masks. The Project Owner should develop a COVID-19 monitoring and response team, who are tasked with tracking developments in the project countries and provinces, developing protocols and procedures as appropriate in line with local Government and international requirements and guidelines;<br>■ Project Owner and their EPC Contractors shall conduct | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | compulsory medical examinations (i.e. bi-annual health check-ups) for Project workers, including contractors, as required by national regulations, to ensure they are fit for work and to monitor the prevalence of communicable diseases<br>■ Project Owner and their EPC Contractors shall ensure the health and safety of all workers and local communities by complying with relevant regulatory national requirements and international best practices on medical safety and food hygiene on the construction sites if there will be installed canteens among the working areas and in the workers´ accommodation areas that are equipped with canteens;<br>■ The Project Environmental and Social Focal Point should assign and deliver induction training to guide requirements for culturally appropriate behaviours, and an overview of the risks to migrant staff and workers. The training will include key cultural sensitivity awareness topics/programs to ensure workers, including security staff, do not unintentionally offend the local community;<br>■ Project Owner and their EPC Contractors shall regularly engage | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | with local authorities relevant to crime (i.e. local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation purposes when Project influx-related issues arise;<br>■ A Code of Conduct, including requirements on social interaction with the local community, gender awareness, vulnerable groups and environmental protection obligations, shall be developed for all involved staff and workers within the construction site (including all subcontractors). An appropriate mechanism to address non-compliance shall also be included as part of the labour contract. All staff and workers within the construction site shall be trained and made aware of the Code of Conduct;<br>■ Project Owner should establish and implement regulatory requirements and good practices in relation to a background check, hiring, rules of conduct, training, equipping of security personnel;<br>■ Project Owner shall ensure that training to security force will include adequate and clear requirements in using force and appropriate conduct toward workers and affected communities. Project Owner shall | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat; and<br>■ Project Owner shall implement the Stakeholder Engagement Plan and disclose a grievance mechanism for workers and affected communities to express concerns about the Project-related issues as well as security arrangements and acts of security personnel.<br>■ Establish a Local Recruitment Policy in the Labor Management Plan which commits a certain percentage of local recruitment, including women from local communities;<br>■ Establish employment practices to check legal worker age in identification document upon recruitment to ensure no child labour or forced labour;<br>■ Establish employment practices that ensure workers are provided an easy to understand contract that specifies working hours, overtime hours, breaks, and holidays;<br>■ Establish employment practices that ensure workers are paid appropriately and in a timely manner, informed by national | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | standards and industry benchmarks;<br>■ Establish safeguards if recruitment agents are utilised. This includes pre-screening of potential agents and establishment of appropriate contractual obligations with the agent to ensure appropriate oversight is in place (so that workers are not placed in debt);<br>■ Develop Influx Management Plan integrated in the Labor Management Plan including specific gender sensitive measures such as training for workers on gender based violence, including sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community, and commitment/policy to cooperate with law enforcement agencies investigating perpetrators of gender-based violence;<br>■ Establish safeguards to avoid gender-based violence and sexual harassment in the work place;<br>■ Ensure the provision of occupational health and safety measures, including but not limited to: resting area and enough resting breaks during working hours, free PPEs, etc. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ Establish a grievance mechanism for workers. This should include an option for grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain, should have access to a grievance mechanism to ensure that their issues and concerns are identified and addressed. Contractors should be required to inform the Project about grievances raised. Disclose the grievance mechanism to workers and local people;<br>■ Collaborate with local/relevant authorities to organise educational or awareness-raising programs for local workers about their rights;<br>■ EPC Contractor should register temporary residence for non-local workers to local authorities to ensure the management of Project's related workforce; Regularly engage with local authorities relevant to crime (i.e. local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation purposes when issues arise;<br>■ EPC Contractor should conduct compulsory medical examinations (i.e. annual health check-ups) for Project workers, including contractors, as required by national | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | regulations, to ensure they are fit for work and to monitor the prevalence of communicable diseases detected through annual medical check-ups;<br>■ Project Owner should develop Human Resource policies and procedures as well as Project Code of Conduct with an adoption of EPC contractors, and disseminate these to all workers including workers of contractors and ensuring their compliance. HR policies and procedures include commitment to non-employment of child labor and forced labor, non-discrimination and equal opportunity, respect for freedom of association, and aspects pertaining to working conditions, retrenchment, and worker accommodation as required applied for all types of employees;<br>■ Project Owner and EPC contractors should ensure that the accommodation for immigrant workers meet the standards as guidance provided in the "Workers and Accommodation: Process and Standards" – a Guidance note by IFC and ERBD; Workers Accommodation Management Plan will be prepared with gender sensitive measures; | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| **Operation Phase** | | | | | | | | |
| ■ General Disturbance to Local Community | ■ Impacts from workers' presence, operation and maintenance of the turbines and substations | ■ ESIA 12.8.4 | The Project Owner is required to implement the additional measures as proposed in Noise Impact Assessment, Visual Impact Assessment and Shadow Flicker Impact Assessment and other measures as below:<br>■ As part of the Project SEP implementation, Project Owner should conduct close communication with local communities on Project environmental and social risks. Future risk-communication efforts will be undertaken in the context of continuing, intense social distrust and will have to be designed in a culturally appropriate way;<br>■ Project Owner shall implement community grievance mechanism is implemented to obtain and resolve community's feedback and concerns in a timely manner;<br>■ Project Owner shall ensure the implementation of community health and safety management and emergency preparedness and response measures are effectively maintained;<br>■ Project Owner shall conduct regular compliance assessments; undertake site visits as required, | ■ Project Owner | ■ Grievance related to Noise, Visual, and Shadow Flicker impacts<br>■ Effectiveness of CDP implementation<br>■ PAPs' feedback CDP implementation programs. | ■ As suggested in each management plan | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | identify any environment-related and social-related issues; and<br>■ Project Owner shall document issues, propose necessary corrective actions, and prepare these in a corrective action plan<br>To remain the significance of the impact as minor or reduce to negligible, the Project is required to implement the additional measures for Noise Impact Assessment, Visual Impact Assessment and Shadow Flicker Impact Assessment and other measures as below:<br>■ Project Owner should keep implementing the SEP including grievance procedure during the Project's operation;<br>■ Project Owner should keep implementing the CDP to support the local people in improvement of their socio-economic conditions. The CDP should be implemented throughout the Project's operation period and considered as Corporate Social Responsibility program of the Project Company;<br>■ Basic skill requirements for operation phase should be announced at least six months in advance so that local people can have appropriate training orientation for themselves; | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ Local procurement should be promoted during operation of the Project. In particular, the Project should use local foods/products and local supply to enhance benefits to the local communities. | | | | | |
| ■ Relocation Impact Due to Health and Safety Reasons | ■ Blade ejection failure;<br>■ Noise impact; and<br>■ Shadow flicker impact | ■ ESIA 12.9.4 | ■ Monitor the land acquisition process to ensure it complies with Vietnamese regulations, AIIB and IFC performance standards. This activity should be supported by documentation recording the land acquisition process. This will be required for internal and external audits;<br>■ Perform validation survey to clearly identify the affected households by tese three events.  Additional fieldwork needs to be performed coverthis census.<br>■ Based on the CSR completion report, identify the gap between national, AIIB ESS2 and IFC PS 5 requirements on land acquisition and resettlement. Then formulate a Corrective Action Plan to close the gaps found;<br>■ Prepare and include a SEP within the ESIA which covers Grievance Management Plan (GMP). GMP should be disclosed to the affected communities prior to the Project's construction implementation. As | ■ Project Owner | ■ Grievance related to Land acquisition<br>■ Effectiveness of LARP, CDP implementation<br>■ PAPs' feedback LARP, CDP implementation programs. | ■ As suggested in each management plan | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | such, the affected community is aware of communication's grievance lines and understand how to submit a grievance;<br>■ Continuously coordinate with commune PC to solve any submitted grievance relevant to land acquisition activities;<br>■ if physical relocation is confirmed, Project shall develop and implement the Land Acquisition and Resettlement Plan (LARP) for those identified as Project affected households. The LARP will be designed to ensure sustainable restoration and enhancement of income for impacted land users. The Project Owner should priority the relocation before the turbine construction occurs to also minimise the disturbance impacts cause by the construction activities to the local people staying in the huts/houses. The LARP should take into account the women and other vulnerable groups to ensure they are not overlooked during Project implementation and left worse off. | | | | | |
| Construction and Operation | | | | | | | | |
| ■ Positive Impacts on Local Employment | ■ Increase local employment and income; | ■ ESIA 12.10.4 | Based on the above analysis, the Project is expected to have a positive impact in terms of employment, procurement, and induced job | ■ Project Owner<br>■ EPC contractors | ■ Number of workers hired local and non-local | ■ As suggested in each | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| and Community Development | ■ Provide temporary direct employment for the Project and induced employment opportunities by local suppliers;<br>■ Provide opportunities for small and medium local businesses; and<br>■ Community discontent due to high expectation in business and worker recruitment | | opportunities and increase the economic conditions of the local people. In order to enhance positive impacts, the following measures are recommended:<br>■ Facilitate employment for local workers (e.g. un-skilled workers and provide adequate training for the tasks to be performed);<br>■ Encourage contractors to hire local labour by the provision of a clear stipulation/commitment of using local labour, particularly in regards to economically displaced households, in the EPC contract and instruct the EPC contractors to prioritise qualified local people as construction workers in accordance with the needs of the Project;<br>■ Communicate clear information about Project-related employment and business opportunities and prioritize local people wherever feasible. Such communication should be conducted at least two weeks before recruitment so that local people have enough time to prepare for the recruitment process (for example, preparing administration documentation for job application.);<br>■ As locals are more likely to qualify for low-skilled jobs, the Project | | ■ Type and frequency of information disclosure to community and government on workforce hiring<br>■ Number of grievances received regarding workforce recruitment<br>■ Effectiveness of CDP implementation<br>■ PAPs' feedback CDP implementation programs. | management plan | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | Owner should negotiate with Contractors to provide detailed requirements on educational qualifications and skills for each job opportunity;<br>■ Work closely with local/relevant authorities to synchronize the Project's needs in terms of local labour as well as locals' capacity; and<br>■ Provide grievance mechanism process from the beginning of Project construction process to manage community complaints and expectation on job hiring and purchasing process.<br>Based on ESIA requirements to optimise the benefits to the local community through employment and business opportunities, the Project Owner should implement the following additional measures to increase the adaptability local communities:<br>■ Project Owner shall formalise, in all contracts, a clause on the Project's commitment to local employment and acquiring local goods and services wherever possible<br>■ The Project Community Development Plan (CDP) should target the promotion of local employment, local business support, and improvement of health | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | and sanitation as recommended during the social baseline interview with local communities. The CDP should also consider priority for women and other vulnerable groups, and<br>■ Project Owner shall track and monitor the community grievance mechanism (as set out in the Stakeholder Engagement Plan) to handle concerns associated with Project employment/workforce recruitment | | | | | |
| ■ Impacts on Indigenous Peoples | ■ Commercial development of their cultural resources and knowledge;<br>■ Physical displacement from their traditional or customary lands; and<br>■ Commercial development of natural resources within customary lands under use that would impact the | ■ ESIA 12.11.3 | Existing control:<br>■ A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package.<br>■ An Indigenous Peoples Plan including ICP approach has been developed within this ESIA package and will have to be implemented ASAP within the project of interest and surrounding communieities. | ■ Project Owner<br>■ EPC contractors | ■ Comply with the monitoring mechanism proposed in the SEP, IPP, RLRP, CDP and Chance Find Procedure during the implementation of these plans<br>■ PAPs' feedback IPP, RLRP, CDP implementation programs. | ■ As suggested in each management plan | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |
| | | ■ ESIA 12.11.5 | The Project is expected to implement the following mitigation measures:<br>■ Disclose and implement a Stakeholder Engagement Plan during construction and operation. The SEP should include an Informed Consultation and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | livelihoods or the cultural, ceremonial, or spiritual uses that define their identity and community | | Participation process for the Indigenous Peoples;<br>■ Provide and communicate detailed information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project locations;<br>■ It is recommended that once the ESIA has been finalised, it should be publicly disclosed to local authorities and community, with the participation of Indigenous People. The public disclosure should be in a form that allow two-way communication approach (i.e. public meeting, etc.) and in a culturally appropriate manner and understandable form for local people (non-technical languages). Provide assistance of local language that more familiar with IP context/understanding.<br>■ Review all public consultation process to ensure:<br>– The continued access to natural resources independent of Project's land purchasing; and<br>– The provision of access, usage, and transit on land that the Project is developing on (i.e. access and use of land within the Project's footprint), subject to | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | overriding health, safety, and security considerations to the Affected Communities of Indigenous Peoples.<br>■ Disclose and implement a community grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative. It should be disclosed in a culturally appropriate manner, with local language and easy to access.<br>■ Disclose and implement the IPP based on the results of socio-economic baseline survey and consultations with relevant local authorities and communities. The implementation of the IPP should propose development programs that aid the avoidance and minimization of negative impacts on IPs, ensure social and economic benefits to IPs in a culturally appropriate and gender responsive manner; and strengthen the social, legal and technical capabilities of IPs to enable them to represent the affected IPs more effectively.<br>■ Include affected IPs households as priority in RLRP and CDP programs when the management plans are developed. | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ A Chance Find Procedure should be developed for the pre-construction and construction phase, given that the Project is located nearby the IP's location with probably physical cultural heritage | | | | | |
| ■ Gender Impact Assessment | ■ Maintenance of Structural Gender Inequality in Work<br>■ Local Women's Ability to Sustain Livelihood<br>■ Women's Workload<br>■ Women's Dependency<br>■ Women's Safety | ■ ESIA 12.12.2 | ■ A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package<br>■ An Indigenous Peoples Plan has been developed within this ESIA package | ■ Project Owner | ■ Comply with the monitoring mechanism proposed in the SEP, IPP, RLRP, CDP and Chance Find Procedure during the implementation of these plans<br>■ PAPs' feedback IPP, RLRP, CDP implementation programs.<br>■ A mid-program and completion RLRP audit of livelihood restoration measures undertaken by third-party to determine if the livelihoods of displaced | ■ As suggested in each management plan | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |
| | | ■ ESIA 12.12.4 | ■ Ensure that the Project's social management plans including SEP, IPP, RLRP, and CDP will include gender mainstreaming measures to ensure women's participation and benefits from all of the Project's activities. This will include but not limited to:<br>■ Create job opportunities and adequate trainings for women to increase their income, particularly for poor ethnic minority women;<br>■ Include measures to encourage women's participation in community activities, Project's information disclosure;<br>■ Ensure gender responsive social protection for the labour force during the project implementation | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | and maintenance HIV/AIDS, sexually transmitted infections (STIs), and other communicable diseases<br>■ Contractors are recommended to utilize local work labours giving preference to women labourers in both skilled and unskilled types of labour. For unskilled types of labour, it should be ensured that they are equally paid with men on time and days. Gender responsive social protection for the labour force should implemented by the Project, including awareness raising on and programming responding to the risks of gender based violence;<br>■ Ensure that occupational safety of women labourers are taken care of by contractors; and<br>■ Ensure that women are well informed and have full access to the Community Grievance Mechanism in SEP. | | people are restored and sustained, and that no further interventions are considered necessary | | | |
| ■ Human Rights Impact Assessment | ■ Inability of Stakeholders to Participate and/ or Access Remedy;<br>■ Impact to Workers' Rights, Either | ■ ESIA 12.13.2 | ■ A Stakeholder Engagement Plan (SEP) including a Community Grievance Mechanism (CGM) has been developed within this ESIA package<br>■ An Indigenous Peoples Plan has been developed within this ESIA package | ■ Project Owner | ■ Comply with the monitoring mechanism proposed in the SEP during the implementation of these plans | ■ As suggested in each management plan | ■ SEP<br>■ Monitoring report | ■ Part of operation cost |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | Directly by the Project or Within its Supply Chain;<br>■ Impact of an Accident or Injury to occur Involving a Worker;<br>■ Impact Associated with Employment of Security Personnel | ■ ESIA 12.13.4 | ■ It will be important that the Stakeholder Engagement Plan that has been developed to guide ongoing engagement with stakeholders is actively implemented. This should include regular reviews and updates based on stakeholder feedback. Continued vigilance will be needed to ensure ongoing support is provided to vulnerable groups.<br>■ Ensure all workers (including contractors) are aware of their role in the engagement and grievance management processes, as part of the workforce induction process. This should enable grievances to be lodged anonymously. All workers, including those employed through the Project's supply chain, should have access to a grievance mechanism to ensure that workers issues and concerns are being addressed.<br>■ Implement the Project's grievance mechanism. This will provide an appropriate channel for stakeholders to voice their concerns, including opportunities for written and verbal communication. Ensure vulnerable groups are informed of their rights and the ways in which they can communicate their grievance. | | ■ Monitor and documented allegations of human rights violations, and where necessary investigate and take disciplinary action | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ Develop and implement the policies across the Project's supply chain, including:<br>– Labour management policies;<br>– Community relations policies; and<br>– Supply chain policies, including the supplier, vendor and contractor expectations.<br>These requirements should be embedded in relevant contracts, including agreements with EPC contractors.<br>■ Employment practices will ensure that workers are not discriminated against on the grounds of race, colour, sex, religion, political opinion, national extraction, social origin, age, marital or relationship status, sexual orientation or trade union activity, other than in compliance with local content policy. As part of the hiring process, age checks will be conducted.<br>■ Employment practices will ensure that passports or other forms of identification are not withheld. The identification can be stored in a safe location, but workers should always have access to their identification.<br>■ Employment practices will ensure that workers are paid appropriately and in a timely manner, informed by | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | national standards and industry benchmarks.<br>■ Employment practices will ensure that workers are provided an easy to understand contract that specifies working hours, overtime hours, breaks, and holidays.<br>■ Safeguards should be established if recruitment agents are utilised. This includes pre-screening and contractual obligations to ensure appropriate oversight of recruitment fees (so that workers are not placed in debt), and ensure passports or other forms of identification are not withheld.<br>■ As part of the induction process, ensure workers are made aware of their rights.<br>■ Development and implementation a HSE Plan. Provide an induction and on-going training for all workers regarding health and safety, including identification and management of risks and hazards and wearing appropriate personal protective equipment.<br>■ Requirement that workers (including contractors) complete a JHAs prior to undertaking work, as well as daily toolbox discussions to ensure hazards are identified and | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | management measures are implemented.<br>■ Ensuring equipment is well maintained and sufficient lighting is available to maintain a safe work environment.<br>■ Development of a traffic management plan to reduce the risk of accidents.<br>■ Provision of 24/7 medical support to treat minor health issues, provide preventative care, and stabilize personnel; and coordinate with local medical emergency services for a higher level of care as needed.<br>■ Conduct local risk assessments to identify security threats to determine the appropriate security requirements.<br>■ Develop and implement a Workforce Code of Conduct, which outlines workforce behaviour expectations while onsite, in the workers camp and when interacting with local communities. This will apply to the security personnel.<br>■ Document and investigate allegations of human rights abused by public or private security personnel. Report incidents of inappropriate force used by security personnel, and ensure appropriate | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | action is taken to address the incident.<br>■ Take appropriate disciplinary action where required, such as removal of personnel credibly alleged to have committed a human rights abuse | | | | | |

### 16.9.12 Unplanned Events Management

**Table 16.15 Unplanned Events Management**

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| **Pre-construction and Construction Phases** | | | | | | | | |
| Small scale leakage and spill incidents from site-preparation / construction activities | Communities: Based on the liquid fuel storage volumes, the potential exists for exposure to contaminated water or soil and resulting in long-term effects on surrounding communities utilizing groundwater resources if a spill was not being contained.<br>Environment: Based on the liquid fuel storage volumes potential for loss of containment of oil/chemicals into the ground of surrounding area, including nearby surface water | ■ EPP<br>■ FS Report | Arrange an oil conservator tank with capacity of 90m$^3$ to be constructed at site for the oil loss of containment during the construction phase. | ■ Project owner<br>■ EPC Contractor | Monitor the implementation of all proposed mitigation measures specified in Emergency Preparedness and Response Plan | Monthly | Monitoring report | Part of construction cost |
| | | ESIA 13.4.1.1 | Design the site to include good site management practices to ensure that the products are properly stored on site (e.g. secondary containment, double walled tanks, over filling alarm system). | EPC contractor | Inspect of any secondary containment of oil/chemical on site and ensure good maintenance procedures to minimize small leaks and spills | Daily | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project owner | | | | |
| | | | Ensure good inspection and maintenance procedures for large mobile construction plant | EPC contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | resources results in localized, potentially long-term, degradation. | | to minimize small leaks and spills such as:<br>(i) Hazardous material (such as oil, fuel, etc.) should be stored in proper and designated areas where are hard impermeable surface, flame-proof, accessible only by authorized personnel and locked when not in use;<br>(ii) Maintain MSDS present at all times;<br>(iii) refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to the ground;<br>(iv) Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused or removed by a local contractor;<br>(v) The Project will restrict storage and handling of hazardous materials and fuels;<br>(vi) Storage containers will be regularly checked and maintained;<br>(vii) Ensure the preparation of spill absorbent (including elite, clay, peat, etc.) and spill kit at | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | hazardous material storage facility. | | | | | |
| | | | Monitoring and Reporting Requirements:<br>■ Inspect of storage hazardous materials; and<br>■ Report any spillages and measures taken to minimise the impact and prevent from reoccurring in the future. | Project owner | | | | |
| | | | Prepare an Emergency Preparedness and Response Plan to cover accidental and emergency situations. This Plan will detail:<br>■ Planning coordination: including procedures for informing local communities about emergency response, documentation and first aid / medical treatment;<br>■ Emergency equipment: including equipment in the project design and any additional emergency equipment;<br>■ Maintain good housekeeping including containment, cleaning up and disposal of contaminated soil as hazardous waste. | Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | ■ Training: employees and contractors will be trained in emergency response procedures; and<br>■ Auditing: audit records will be maintained on how the Plan is being implemented. | | | | | |
| Road traffic transporting personnel or materials involved in a collision | Communities:<br>Traffic accidents that involved community members, resulting in injury or fatality. Accidents might require use of local medical emergency services in the Project area and could temporarily decrease access to these services for local residents.<br>Properties:<br>Traffic accident once happening can induce damage to the existing roads, highways, bridges and utility lines (e.g. electricity cable lines) | EPP | There are no existing measures/controls | – | Monitor the implementation of all proposed mitigation measures specified in the Traffic Management Plan (TMP)<br>Monitor road condition along the transportation route to understand road quality | Monthly | Monitoring report | |
| | | ESIA 13.4.1.2 | Developed and implemented a Traffic and Transportation Management Plan before commencement of any transportation activities. This should include measures such as:<br>■ Scrutinized analysis and study of the entire route for transportation of the project components from the manufactured area to the project site.<br>■ Active traffic controls (e.g. flaggers to direct traffic at the Project site entrance); and<br>■ Schedule construction deliveries and employee shift changes to minimize traffic congestion and delay | EPC contractor | | | | |
| | | | Design an H&S plan and good safety practices for the | EPC contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | transportation (e.g. alcohol policy, good driving practice). | | | | | |
| | | | Strictly abide by the regulations specified in the Transport License granted by the Directorate for Roads of Viet Nam for transporting the oversized and over-mass equipment:<br>■ The transportation only be allowed during 11:00PM – 5:00AM<br>■ The allowable speed on the road could not exceed 20 km/h, and<br>■ A competent and certified organizations or authorities to monitor and regulate the traffic flow. | Transportation contractor / Project owner / Certified organizations and Authorities | | | | |
| | | | Upgrade the access road systems to the Project site | Project owner | | | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | Prepare Emergency Response Plan (ERP) and Emergency Management Plan (EMP). | Project owner | | | | |
| | | | Implement ERP and EMP and monitor contractors to ensure consistent implementation | ■ Project owner<br>■ EPC Contractor | | | | |
| Fire and Explosion including Unexploded Ordnance (UXO) | Communities:<br>Based on the liquid fuel storage volumes the potential exists for exposure to ignited due to malfunctioned equipment and resulting in potentially severe injuries to employees and spread to nearby communities' members<br><br>Environment:<br>Based on the liquid fuel storage volumes potential for ignition of leakage or spill of oil/chemicals due to human errors and malfunctioned | Project owner's information | Incorporate and sign the contract with 3197 Enterprise under the 319 Corporation Ministry of National Defence to conduct the survey on UXO identification, clearance and elimination for all four Projects (KB1, KB2, CN1, and CN2) in Cu Ne, Cu Pong Communes, Dak Lak Province. | Project owner | Establish audit program to check the implementation of emergency response and evacuation plan, staff training, equipment inspection, and firefighting drills | Monthly | Monitoring report | |
| | | ESIA 13.4.1.3 | Regarding the preventive measures for UXO:<br>■ Install the warning signs around the UXO-contained areas where clearing has not been undertaken, if any<br>■ Hold the induction training to all workers on UXO areas, and retrain as needed. | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Install firefighting equipment (such as fire extinguishers, proper communication equipment), especially at area with high risks of fire and explosion, such as | ■ Project owner<br>■ EPC Contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | short-circuit equipment, accidents might lead to uncontrollable wildfire, loss of crops and habitat, causing injury and life-threatening of local community. | | warehouses of chemical and transformer stations | | | | | |
| | | | Prepare the Fire prevention and Fighting Plan that ensure compliance with *Decree No. 79/2014/ND-CP guiding the Law on Fire Prevention and Fighting* | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Conduct firefighting training to the emergency support team, contractors and workers on site and camping areas | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Store flammable materials away from ignition sources and oxidizing materials | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Conduct regular inspections and maintenance to eliminate potential risks | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Implement the SEP and a robust stakeholder engagement program/ plan on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event. | Project owner | | | | |
| | | | Implement routine inspection and maintenance procedures (in line with international best | EPC contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | practice) for large storage vessels. | | | | | |
| | | | Develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation. The Emergency response plan should include:<br>■ Immediately pull the nearest fire alarm if a fire occurs, report the event to shift supervisor or foreman immediately for emergency response;<br>■ When the emergency alarm sounds, all employees shall stop all activities and move to emergency assembly places immediately;<br>■ Limit the fire areas by utilizing the appropriate firefighting equipment, if the fire is small and controllable; and<br>■ Follow the procedure included in the Emergency Response and Evacuation Plan to take actions | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Implement an Emergency Response Plan and | EPC contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Emergency Management Plan and monitor contractors to ensure consistent implementation | | | | | |
| Occupational Health and safety | <u>Workers and employees:</u> Health and safety risks during construction may result in an accident, injury or fatality. | Project owner's information | Develop Safety and Civilized Construction Plan that requires the implementation of both EPC contractor and the Project's owner during the construction and operation phases. | Project owner | Random audits to the project areas with high risk activities to ensure proper implementation of the mitigation measures and other internal safety procedures | Monthly | Monitoring report | |
| | | ESIA 13.4.1.4 | Provide all workers (including any subcontractors) with trainings on the Health and Safety policy in place, safe working practices, and provide PPE and inform them regarding any Emergency Response Plans or first aid kits provided on-site. | EPC Contractor | | | | |
| | | | Establish a grievance redressed mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities. | EPC Contractor | | | | |
| | | | Assign supervisors to supervise the activities on site to ensure all safety regulations and practices are followed and the risks will be minimized | EPC Contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | Use appropriate work equipment/methods in case of working at height, hot areas, work in confined spaces etc. | EPC Contractor | | | | |
| | | | Ensure that workers (including contractors) complete a Job Hazard Analysis (JHA) prior to undertaking construction activities, and also conduct daily toolbox discussions to ensure hazards are identified and management measures are implemented | EPC Contractor | | | | |
| | | | Establish and maintain suitable exclusion zones underneath any working at height activities, where possible, to protect workers from falling objects | EPC Contractor | | | | |
| | | | Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk of lightning strikes | ■ Project owner<br>■ EPC Contractor | | | | |
| | | | Provide an emergency rescue plan detailing the methods in place to rescue workers who are stranded or incapacitated while working at height | ■ Project owner<br>■ EPC Contractor | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| **Commissioning and Operation Phase** | | | | | | | | |
| Small scale leakage and spill incidents from activities on site | Communities – Based on the liquid fuel storage volumes the potential exists for exposure to contaminated water or soil and resulting in long-term effects on surrounding communities utilizing groundwater resources if a spill is not contained. Environment - Based on the liquid fuel storage volumes potential for loss of containment of oil/chemicals into ground of surrounding area, including nearby surface water resources resulting in localized, potentially long-term, degradation. | EPP | There are no existing controls. | _ | Monitor the implementation of all proposed mitigation measures specified in Emergency Preparedness and Response Plan | Monthly | Monitoring report | Part of operation cost |
| | | ESIA 13.4.2.1 | Implement good site management practices to ensure that the products are properly stored on site and in areas where spills will not easily release out to the environment (e.g. in paved areas with secondary containment). | O&M Contractor / Project owner | Inspect any secondary containment of oil/chemical on site and ensure good maintenance procedures to minimize small leaks and spills | Daily | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. | Project owner | | | | |
| | | | Prepare an Emergency Preparedness and Response Plan to cover accidental and emergency situations. This Plan will detail:<br>■ Planning coordination: including procedures for informing local communities about emergency response, | O&M Contractor / Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
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| | | | documentation and first aid / medical treatment;<br>■ Emergency equipment: including equipment in the project design and any additional emergency equipment;<br>■ Training: employees and contractors will be trained in emergency response procedures; and<br>■ Auditing: audit records will be maintained on how the Plan is being implemented. | | | | | |
| | | | Implement Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation. | Project owner | | | | |
| Fire and explosion | Communities – A large-scale fire could result in injuries to people in the surrounding communities, or in the worst-case fatalities. Explosions of malfunctioned equipment could result in rapid | EPP | There are no existing controls. | – | Establish an audit program to check the implementation of emergency response and evacuation plan, staff training, equipment inspection, and firefighting drills | – | Monitoring report | |
| | | ESIA 13.4.2.2 | Implement the SEP and a robust stakeholder engagement program on emergency response. | Project owner | | | | |
| | | | Implement routine inspection and maintenance procedures (in line with international best practice) for any Unplanned Events substances' storage vessels and WTGs. | EPC contractor / Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | spread of fire and projectile spread of debris. This could result in injuries to people in the surrounding communities, or in the worst-case fatalities. Environment: – A large-scale fire could result in damage/death of local flora and fauna. Accidents might lead to uncontrollable wildfire, loss of crops and habitat given the environment settings at the Project area. Explosions could result in rapid spread of fire and projectile spread of debris. This could result in damage/death of local flora and fauna. | | Install warning system, signal boards, lighting protection system where risks of fire and explosion exposed | Project owner | | | | |
| | | | Implement Emergency Preparedness and Response Plan with forest fire protection and monitor contractors to ensure consistent implementation<br>Provide regularly safety and fire prevention & fighting drills. | Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| Occupational Health and Safety | Workers and employees: - Health and safety risks during construction may result in an accident, injury or fatality. | Project owner's information | Develop Safety and Civilized Construction Plan that requires the implementation of both EPC contractor and the Project's owner during the construction and operation phases. | Project owner | Conduct random audits to the areas with high risk activities to ensure proper implementation of the mitigation measures and other internal safety procedures | Monthly | Monitoring report | |
| | | ESIA 13.4.2.3 | All workers (including any subcontractors) should be provided with trainings on the Health and Safety policy in place, safe working practices, provided with PPE and informed regarding any Emergency Response Plans or first aid kits provided on-site. | EPC contractor / Project owner | | | | |
| | | | Establish a grievance redressed mechanism in place, to allow for the employees and workers to report any concerns or grievance related to work activities. | Project owner | | | | |
| | | | Use appropriate work equipment/methods in case of working at height, hot areas, work in confined spaces etc. | Project owner | | | | |
| | | | Establish and maintain suitable exclusion zones underneath any working at height activities, where | Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | possible, to protect workers from falling objects. | | | | | |
| | | | Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk of lightning strikes | Project owner | | | | |
| | | | Provide an emergency rescue plan detailing the methods in place to rescue workers who are stranded or incapacitated while working at height | Project owner | | | | |
| Blade ejection failure | Communities – Blade ejection failure could result in rapid spread of fire and projectile spread of debris given the heights of wind turbines. This could result in injuries to surrounding communities, or in the worst-case fatalities Environment – As above with local flora and fauna. | EPP | There are no existing controls. | _ | Establish an audit program to check the implementation of regular technical inspection of the WTGs and blades' safety | Quarterly | Monitoring report | |
| | | ESIA 13.4.2.4 | Establish safety zone at least 312 m away from the WTGs with warning signals if possible. It was recommended that the minimum setback distances required to meet noise and shadow flicker limits be maintained with respect to sensitive residential receptors to provide further protection; | Project owner | | | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. | Project owner | | | | |
| | | | Implement periodic routine inspection and maintenance | O&M contractor/ Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | procedures (in line with international best practice). | | | | | |
| | | | Install warning system, signal boards, lighting prevention system around the 312 m radius of danger zone where the WTGs located. Equipped vibration sensors for the warning of any imbalances in rotor blades. | O&M contractor/ Project owner | | | | |
| | | | Develop an Emergency Preparedness Response Plan (EPRP) and monitor contractors to ensure consistent implementation. | O&M contractor/ Project owner | | | | |
| | | | Implement EPRP and monitor contractors to ensure consistent implementation | O&M contractor/ Project owner | | | | |
| Accidental transmission line snapping and tower swaying/collapsing | Communities – Electrocutions that involved community members, resulting in injury or fatality, livestock leading to death of livestock and loss/reduction in community member's livelihood | EPP | There are no existing controls. | _ | Establish an audit program to check the implementation of regular technical inspection of the transmission lines and transmission pylons' safety | _ | Monitoring report | |
| | | ESIA 13.4.2.5 | Establish a good practice and should comply with electricity safety related regulation or international standard, whichever, more stringent, in the design and installation of transmission line and transmission pylons | O&M Contractor / Project owner | | | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. | Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Implement periodic routine inspection and maintenance procedures (in line with the international best practice) | O&M Contractor / Project owner | | | | |
| | | | Install warning system, signal boards, lighting prevention system, and anti-climbing devices on the tower. | O&M Contractor / Project owner | | | | |
| | | | Develop an EPRP and monitor contractors to ensure consistent implementation. | O&M Contractor / Project owner | | | | |
| | | | Implement EPRP and monitor contractors to ensure consistent implementation | O&M Contractor / Project owner | | | | |
| Natural Hazards – Flooding and landslides | Communities: Flood and Landslide can result in loss of human life, damage to property, destruction of crops, and loss of livestock that affects to livelihood. Flood and landslide may affects to substation and power components that lead to loss of electricity supply | Safe and Civilized Construction Plan | Establish the geological disaster emergency plan, set up the corresponding emergency leading and working agencies, and clarify the job responsibilities | Project owner | The monitoring and auditing program is similar to the construction stage | | | |
| | | | Organize geological inspection prior to the commencement of the Project to find out the parts of areas that may be prone to landslide and try to avoid setting up camps, building facilities and carrying out the operations in high-risk areas of geological disasters, | | | | | |
| | | | Provide publicity and education on natural disasters | | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | locally.<br>Environment: A large-scale flood and landslide could result in damage/death of local flora and fauna.<br>Properties – Natural hazards once happening can induce damage to many houses, existing roads, highways, bridges and utility lines (e.g. electricity cable lines) | | to improve awareness of all personnel participating the Project on preventing geological disasters | | | | | |
| | | | Periodically carry out geological monitoring in the areas with high risk of geological disasters and give timely warning if abnormal conditions are found during the construction process, and | | | | | |
| | | | Conduct the preventive and control measures for the inevitable disasters. | | | | | |
| | | ESIA 13.4.2.6 | Incorporate siting and safety engineering criteria to prevent failures due to natural disasters. | O&M contractor / Project owner | | | | |
| | | | Strengthen the weather forecasting system to notify the potential floods for the basin | Require more support from Meteorological stations at the region | | | | |
| | | | Implement the SEP and a robust stakeholder engagement program on emergency response. | Project owner | | | | |
| | | | Implement periodic routine inspection and maintenance procedures (in line with international best practice) | O&M contractor / Project owner | | | | |

| Activity/Aspect | Potential Impact | Source Document | Mitigation Measure | Responsibility | Monitoring Parameter | Monitoring Frequency | Reporting | Estimated |
|---|---|---|---|---|---|---|---|---|
| | | | Install warning system, signal boards, flood prevention systems. | O&M contractor / Project owner | | | | |
| | | | Develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation. | O&M contractor / Project owner | | | | |
| | | | Implement an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation | O&M contractor / Project owner | | | | |

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# APPENDIX L SHADOW FLICKER MAIN RESULTS – WORST CASE SCENARIO

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

### Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

| | |
|---|---|
| Minimum sun height over horizon for influence | 3 ° |
| Day step for calculation | 1 days |
| Time step for calculation | 1 minutes |

Sunshine probability S (Average daily sunshine hours) []

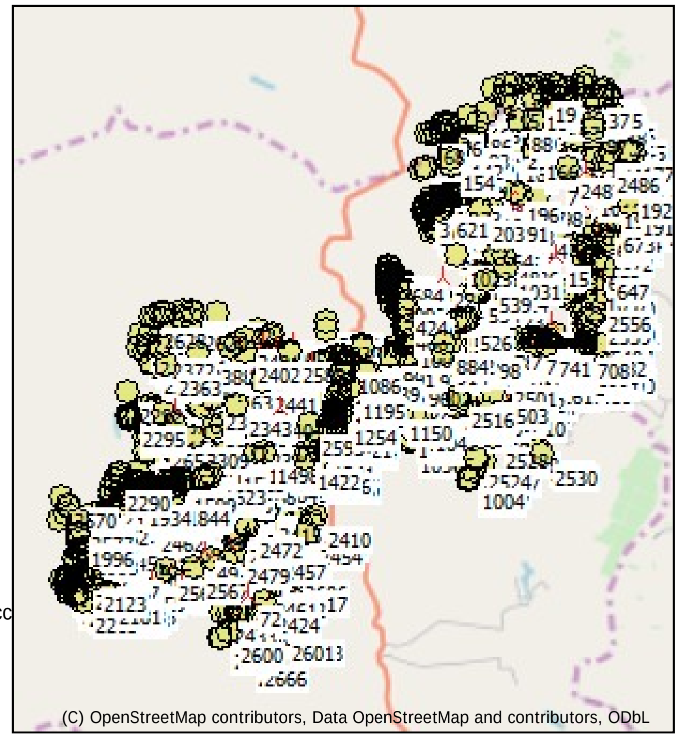
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.16 | 6.18 | 6.35 | 5.70 | 6.96 | 5.65 | 5.58 | 4.98 | 5.13 | 6.14 | 7.61 | 8.24 |

Operational time

| N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | 315 | 1,658 | 1,177 | 888 | 548 | 243 | 133 | 124 | 184 | 779 | 1,457 |

| W | WNW | NW | NNW | Sum |
|---|---|---|---|---|
| 761 | 247 | 75 | 82 | 8,760 |

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Project Wizard Elevation Data Grid (NASADEM (Succ
Obstacles used in calculation
Eye height for map: 1.5 m
Grid resolution: 1.0 m




Scale 1:200,000
New WTG
Shadow receptor

All coordinates are in
UTM (north)-WGS84 Zone: 48

### WTGs

| | Easting | Northing | Z | Row data/Description | WTG type Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Shadow data Calculation distance | RPM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | | | | | [kW] | [m] | [m] | [m] | [RPM] |
| 1 | 854,238 | 1,452,139 | 776.0 | D1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 2 | 853,773 | 1,452,659 | 783.3 | D2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 3 | 854,371 | 1,452,685 | 779.6 | D3 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 4 | 855,081 | 1,452,906 | 796.7 | D4 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 5 | 855,237 | 1,452,594 | 802.7 | D5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 6 | 855,420 | 1,452,224 | 815.0 | D6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 7 | 854,827 | 1,451,695 | 800.1 | D7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 8 | 855,589 | 1,451,811 | 819.2 | D8 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 9 | 855,557 | 1,451,450 | 813.0 | D9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 10 | 855,510 | 1,450,935 | 799.0 | D10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 11 | 853,726 | 1,451,235 | 804.6 | D11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 12 | 853,637 | 1,450,863 | 818.7 | D12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 13 | 853,953 | 1,450,581 | 800.6 | D13 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 14 | 854,277 | 1,450,255 | 772.1 | D14 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 15 | 854,797 | 1,449,575 | 755.8 | D15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 16 | 853,890 | 1,449,411 | 785.9 | D16 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 17 | 853,793 | 1,449,778 | 780.1 | D17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 18 | 852,984 | 1,451,362 | 788.8 | D18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 19 | 852,619 | 1,451,803 | 786.6 | D19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 20 | 853,064 | 1,450,371 | 804.6 | C1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 21 | 852,149 | 1,449,667 | 769.9 | C2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 22 | 851,858 | 1,448,886 | 762.6 | C3 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 23 | 853,650 | 1,448,412 | 737.8 | C5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 24 | 853,819 | 1,448,854 | 778.7 | C6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 25 | 853,503 | 1,447,664 | 745.4 | C7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 26 | 854,303 | 1,447,663 | 761.0 | C8 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 27 | 854,269 | 1,446,917 | 781.0 | C10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 28 | 853,423 | 1,446,806 | 758.3 | C11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 29 | 853,763 | 1,446,020 | 746.4 | C12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 30 | 852,210 | 1,445,365 | 749.5 | C16 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Easting | Northing | Z | Row data/Description | WTG type Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Shadow data Calculation distance | RPM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | | | | | [kW] | [m] | [m] | [m] | [RPM] |
| 31 | 852,278 | 1,445,974 | 734.6 | C19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 32 | 847,925 | 1,447,138 | 729.1 | B1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 33 | 847,463 | 1,446,986 | 700.3 | B2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 34 | 844,831 | 1,445,373 | 655.4 | B7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 35 | 844,818 | 1,444,179 | 673.2 | B9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 36 | 845,656 | 1,444,245 | 688.7 | B10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 37 | 845,338 | 1,444,410 | 675.6 | B11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 38 | 846,270 | 1,444,717 | 675.9 | B13 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 39 | 845,751 | 1,445,162 | 655.7 | B14 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 40 | 847,550 | 1,445,475 | 680.0 | B15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 41 | 847,491 | 1,446,156 | 628.2 | B17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 42 | 847,912 | 1,445,475 | 704.0 | B18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 43 | 848,481 | 1,446,623 | 711.4 | B19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 44 | 846,071 | 1,443,400 | 687.3 | A2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 45 | 843,493 | 1,441,916 | 624.0 | A5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 46 | 844,265 | 1,442,495 | 649.7 | A6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 47 | 843,006 | 1,442,177 | 623.5 | A7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 48 | 844,931 | 1,441,379 | 653.2 | A9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 49 | 845,688 | 1,441,648 | 667.7 | A10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 50 | 846,237 | 1,441,903 | 711.0 | A11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 51 | 847,142 | 1,442,842 | 697.1 | A12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 52 | 846,049 | 1,440,780 | 660.4 | A15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 53 | 846,819 | 1,442,473 | 704.7 | A17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 54 | 843,046 | 1,441,629 | 597.8 | A18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 55 | 844,258 | 1,440,850 | 622.6 | A19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 56 | 852,387 | 1,448,118 | 756.9 | C4 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 57 | 854,775 | 1,447,751 | 760.1 | C9 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 58 | 853,328 | 1,445,045 | 756.5 | C13 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 59 | 853,282 | 1,445,629 | 761.2 | C14 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 60 | 853,212 | 1,446,272 | 762.5 | C15 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 61 | 851,878 | 1,446,443 | 742.0 | C17 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 62 | 847,116 | 1,447,121 | 673.4 | B3 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 63 | 846,486 | 1,446,202 | 627.8 | B4 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 64 | 844,935 | 1,446,396 | 622.3 | B5 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 65 | 845,275 | 1,445,950 | 633.3 | B6 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 66 | 844,933 | 1,444,699 | 652.4 | B8 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 67 | 847,181 | 1,444,943 | 676.3 | B16 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 68 | 847,171 | 1,443,679 | 695.8 | A1 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 69 | 845,738 | 1,442,480 | 651.3 | A3 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 70 | 844,059 | 1,441,327 | 627.4 | A8 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 71 | 846,849 | 1,441,206 | 685.3 | A13 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 72 | 846,844 | 1,440,509 | 678.3 | A14 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 73 | 845,028 | 1,440,930 | 637.5 | A16 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |

### Shadow receptor-Input

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1 | 855,607 | 1,454,197 | 794.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2 | 855,649 | 1,454,043 | 788.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 3 | 855,539 | 1,454,106 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 4 | 854,743 | 1,454,059 | 745.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 5 | 854,838 | 1,454,025 | 749.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 6 | 854,389 | 1,454,069 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 7 | 854,226 | 1,453,999 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 8 | 854,173 | 1,453,995 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 9 | 854,038 | 1,454,017 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 10 | 853,705 | 1,454,091 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 11 | 853,498 | 1,454,053 | 720.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 853,134 | 1,453,865 | 720.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 13 | 853,148 | 1,453,877 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 14 | 853,423 | 1,453,782 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 15 | 853,525 | 1,453,673 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 16 | 853,543 | 1,453,775 | 751.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 17 | 854,319 | 1,453,789 | 728.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 18 | 854,265 | 1,453,620 | 748.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 19 | 854,461 | 1,453,852 | 736.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 20 | 854,628 | 1,453,833 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 21 | 854,679 | 1,453,761 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 22 | 854,717 | 1,453,793 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 23 | 854,727 | 1,453,706 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 24 | 854,735 | 1,453,664 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 25 | 854,670 | 1,453,529 | 783.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 26 | 854,796 | 1,453,693 | 758.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 27 | 854,956 | 1,453,672 | 771.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 28 | 854,975 | 1,453,861 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 29 | 855,042 | 1,453,534 | 785.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 30 | 855,124 | 1,453,571 | 790.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 31 | 855,344 | 1,453,709 | 796.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 32 | 855,175 | 1,453,958 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 33 | 855,407 | 1,453,761 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 34 | 855,306 | 1,454,016 | 761.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 35 | 855,803 | 1,453,793 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 36 | 855,860 | 1,453,715 | 780.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 37 | 855,852 | 1,453,695 | 781.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 38 | 855,831 | 1,453,633 | 783.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 39 | 856,053 | 1,453,627 | 786.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 40 | 856,115 | 1,453,655 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 41 | 856,165 | 1,453,766 | 786.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 42 | 856,057 | 1,453,868 | 786.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 43 | 856,086 | 1,453,934 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 44 | 856,270 | 1,453,756 | 775.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 45 | 856,223 | 1,453,737 | 779.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 46 | 856,528 | 1,453,356 | 782.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 47 | 856,433 | 1,453,310 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 48 | 856,374 | 1,453,298 | 778.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 49 | 856,352 | 1,453,275 | 775.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 50 | 856,347 | 1,453,289 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 51 | 855,929 | 1,453,442 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 52 | 856,072 | 1,453,412 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 53 | 856,315 | 1,453,425 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 54 | 856,087 | 1,453,524 | 780.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 55 | 855,182 | 1,453,394 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 56 | 855,201 | 1,453,412 | 781.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 57 | 854,943 | 1,453,317 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 58 | 854,551 | 1,453,442 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 59 | 854,542 | 1,453,440 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 60 | 854,554 | 1,453,452 | 785.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 61 | 854,442 | 1,453,225 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 62 | 853,980 | 1,453,320 | 773.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 63 | 853,980 | 1,453,225 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 64 | 853,711 | 1,453,433 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 65 | 852,987 | 1,453,305 | 735.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 66 | 852,461 | 1,453,185 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 67 | 851,464 | 1,452,693 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 68 | 851,494 | 1,452,668 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 69 | 851,657 | 1,452,781 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 70 | 851,686 | 1,452,751 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 71 | 851,674 | 1,452,722 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 72 | 851,768 | 1,452,819 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 73 | 851,751 | 1,452,843 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 74 | 851,770 | 1,452,888 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 75 | 851,828 | 1,452,885 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 76 | 851,918 | 1,452,911 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 77 | 851,839 | 1,452,989 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 78 | 851,910 | 1,453,016 | 748.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 79 | 852,193 | 1,452,853 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 80 | 852,290 | 1,452,628 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 81 | 852,405 | 1,452,628 | 776.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 82 | 852,634 | 1,452,661 | 780.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 83 | 852,708 | 1,452,607 | 783.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 84 | 852,752 | 1,453,024 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 85 | 852,782 | 1,453,028 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 86 | 852,787 | 1,453,027 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 87 | 853,799 | 1,452,931 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 88 | 853,774 | 1,453,098 | 744.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 89 | 854,138 | 1,453,173 | 766.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 90 | 854,158 | 1,453,125 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 91 | 854,246 | 1,453,102 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 92 | 854,271 | 1,453,126 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 93 | 854,281 | 1,453,111 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 94 | 854,446 | 1,452,948 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 95 | 855,574 | 1,453,053 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 96 | 855,861 | 1,453,095 | 770.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 97 | 855,789 | 1,453,035 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 98 | 855,765 | 1,453,114 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 99 | 855,840 | 1,452,936 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 100 | 855,978 | 1,453,022 | 781.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 101 | 855,970 | 1,452,872 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 102 | 856,160 | 1,452,911 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 103 | 856,137 | 1,452,975 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 104 | 856,421 | 1,452,851 | 786.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 105 | 856,544 | 1,452,882 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 106 | 856,333 | 1,452,681 | 807.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 107 | 856,258 | 1,452,499 | 823.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 108 | 855,887 | 1,452,721 | 807.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 109 | 855,736 | 1,452,733 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 110 | 855,905 | 1,452,451 | 805.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 111 | 855,487 | 1,452,523 | 795.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 112 | 852,707 | 1,452,475 | 781.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 113 | 852,667 | 1,452,478 | 782.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 114 | 852,617 | 1,452,461 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 115 | 852,536 | 1,452,493 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 116 | 852,522 | 1,452,505 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 117 | 852,471 | 1,452,440 | 791.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 118 | 852,459 | 1,452,439 | 791.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 119 | 852,422 | 1,452,468 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 120 | 852,385 | 1,452,506 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 121 | 852,437 | 1,452,541 | 789.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 122 | 852,314 | 1,452,497 | 787.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 123 | 852,323 | 1,452,455 | 790.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 124 | 852,341 | 1,452,414 | 788.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 125 | 852,290 | 1,452,400 | 789.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 126 | 852,160 | 1,452,399 | 786.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 127 | 852,196 | 1,452,445 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 128 | 852,236 | 1,452,478 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 129 | 852,141 | 1,452,447 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 130 | 852,089 | 1,452,427 | 778.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 131 | 852,079 | 1,452,432 | 777.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 132 | 852,077 | 1,452,399 | 776.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 133 | 852,080 | 1,452,375 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 134 | 852,077 | 1,452,351 | 781.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 135 | 852,063 | 1,452,345 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 136 | 852,113 | 1,452,314 | 782.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 137 | 852,122 | 1,452,361 | 784.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 138 | 852,172 | 1,452,347 | 785.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 139 | 852,183 | 1,452,350 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 140 | 852,210 | 1,452,354 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 141 | 852,243 | 1,452,358 | 788.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 142 | 852,260 | 1,452,360 | 789.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 143 | 852,304 | 1,452,364 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 144 | 852,160 | 1,452,313 | 782.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 145 | 852,188 | 1,452,300 | 782.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 146 | 852,029 | 1,452,299 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 147 | 852,025 | 1,452,280 | 787.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 148 | 852,010 | 1,452,264 | 789.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 149 | 852,027 | 1,452,207 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 150 | 852,073 | 1,452,245 | 783.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 151 | 852,089 | 1,452,260 | 783.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 152 | 852,006 | 1,452,103 | 782.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 153 | 852,009 | 1,452,113 | 781.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 154 | 852,046 | 1,452,028 | 782.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 155 | 852,012 | 1,451,868 | 775.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 156 | 852,005 | 1,451,869 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 157 | 852,086 | 1,451,880 | 777.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 158 | 852,314 | 1,452,225 | 780.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 159 | 852,467 | 1,452,272 | 785.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 160 | 852,641 | 1,452,161 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 161 | 853,600 | 1,452,268 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 162 | 853,453 | 1,452,606 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 163 | 853,641 | 1,452,300 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 164 | 854,353 | 1,452,454 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 165 | 854,376 | 1,452,507 | 769.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 166 | 854,273 | 1,452,359 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 167 | 854,222 | 1,452,355 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 168 | 854,245 | 1,452,308 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 169 | 854,568 | 1,452,273 | 773.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 170 | 854,620 | 1,452,298 | 776.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 171 | 855,313 | 1,452,283 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 172 | 855,364 | 1,452,465 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 173 | 855,277 | 1,452,642 | 807.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 174 | 855,402 | 1,452,377 | 808.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 175 | 856,210 | 1,452,393 | 823.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 176 | 856,356 | 1,452,403 | 822.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 177 | 856,803 | 1,452,284 | 831.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 178 | 856,894 | 1,452,278 | 828.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 179 | 856,802 | 1,452,137 | 831.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 180 | 856,792 | 1,452,233 | 834.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 181 | 856,738 | 1,452,287 | 829.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 182 | 856,694 | 1,452,266 | 827.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 183 | 856,599 | 1,452,268 | 826.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 184 | 856,375 | 1,452,252 | 816.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 185 | 856,270 | 1,452,251 | 818.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 186 | 856,270 | 1,452,220 | 816.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 187 | 856,151 | 1,452,148 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 188 | 856,058 | 1,452,151 | 801.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 189 | 856,223 | 1,452,067 | 798.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 190 | 856,970 | 1,451,222 | 776.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 191 | 856,843 | 1,450,898 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 192 | 856,719 | 1,451,320 | 786.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 193 | 856,510 | 1,451,045 | 784.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 194 | 856,278 | 1,451,035 | 787.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 195 | 856,251 | 1,451,255 | 787.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 196 | 853,786 | 1,451,240 | 806.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 197 | 853,917 | 1,451,093 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 198 | 854,353 | 1,451,071 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 199 | 852,908 | 1,450,812 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 200 | 852,873 | 1,450,851 | 803.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 201 | 852,865 | 1,450,817 | 806.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 202 | 852,858 | 1,450,758 | 812.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 203 | 852,866 | 1,450,696 | 812.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 204 | 852,806 | 1,450,760 | 814.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 205 | 852,787 | 1,450,774 | 814.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 206 | 852,772 | 1,450,798 | 813.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 207 | 852,768 | 1,450,823 | 812.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 208 | 852,789 | 1,450,910 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 209 | 852,750 | 1,450,832 | 811.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 210 | 852,767 | 1,450,918 | 805.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 211 | 852,680 | 1,451,145 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 212 | 852,478 | 1,451,046 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 213 | 852,454 | 1,451,055 | 792.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 214 | 852,439 | 1,451,059 | 790.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 215 | 852,432 | 1,451,057 | 790.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 216 | 852,406 | 1,451,063 | 789.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 217 | 852,366 | 1,451,050 | 789.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 218 | 852,352 | 1,451,031 | 788.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 219 | 852,417 | 1,451,107 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 220 | 852,380 | 1,451,105 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 221 | 852,374 | 1,451,104 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 222 | 852,361 | 1,451,103 | 793.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 223 | 852,353 | 1,451,105 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 224 | 852,329 | 1,451,106 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 225 | 852,335 | 1,451,167 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 226 | 852,350 | 1,451,167 | 797.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 227 | 852,268 | 1,451,056 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 228 | 852,261 | 1,451,059 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 229 | 852,257 | 1,451,104 | 792.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 230 | 852,253 | 1,451,098 | 792.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 231 | 852,223 | 1,451,099 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 232 | 852,233 | 1,451,107 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 233 | 852,184 | 1,451,090 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 234 | 852,199 | 1,451,097 | 792.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 235 | 852,175 | 1,451,102 | 791.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 236 | 852,139 | 1,451,105 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 237 | 852,104 | 1,451,088 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 238 | 852,107 | 1,451,053 | 792.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 239 | 852,136 | 1,451,055 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 240 | 852,154 | 1,451,054 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 241 | 852,001 | 1,451,133 | 796.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 242 | 851,973 | 1,451,136 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 243 | 852,005 | 1,451,091 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 244 | 852,061 | 1,451,038 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 245 | 852,046 | 1,451,045 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 246 | 852,038 | 1,451,045 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 247 | 852,026 | 1,451,043 | 795.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 248 | 852,016 | 1,451,046 | 795.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 249 | 852,009 | 1,451,051 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 250 | 852,005 | 1,451,050 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 251 | 851,992 | 1,451,048 | 797.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 252 | 851,986 | 1,451,046 | 798.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 253 | 851,976 | 1,451,039 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 254 | 851,971 | 1,451,034 | 800.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 255 | 851,963 | 1,451,029 | 800.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 256 | 851,953 | 1,451,027 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 257 | 851,960 | 1,451,052 | 801.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 258 | 851,956 | 1,451,049 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 259 | 851,948 | 1,451,045 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 260 | 851,904 | 1,451,046 | 803.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 261 | 851,891 | 1,451,046 | 802.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 262 | 851,874 | 1,451,041 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 263 | 851,893 | 1,451,027 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 264 | 851,862 | 1,451,041 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 265 | 851,844 | 1,451,030 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 266 | 851,825 | 1,451,042 | 800.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 267 | 851,848 | 1,450,994 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 268 | 851,854 | 1,450,998 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 269 | 851,828 | 1,450,980 | 801.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 270 | 851,807 | 1,451,031 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 271 | 851,900 | 1,450,990 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 272 | 851,914 | 1,450,992 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 273 | 851,932 | 1,451,000 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 274 | 851,941 | 1,451,007 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 275 | 851,935 | 1,451,008 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 276 | 851,909 | 1,451,092 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 277 | 851,895 | 1,451,074 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 278 | 851,879 | 1,451,085 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 279 | 851,842 | 1,451,081 | 801.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 280 | 851,816 | 1,451,079 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 281 | 851,742 | 1,451,097 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 282 | 851,938 | 1,450,960 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 283 | 851,909 | 1,450,943 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 284 | 851,873 | 1,450,926 | 806.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 285 | 851,819 | 1,450,914 | 805.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 286 | 851,713 | 1,450,865 | 804.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 287 | 851,757 | 1,450,857 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 288 | 851,957 | 1,450,926 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 289 | 851,932 | 1,450,919 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 290 | 851,917 | 1,450,913 | 803.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 291 | 851,904 | 1,450,913 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 292 | 851,944 | 1,450,883 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 293 | 851,933 | 1,450,881 | 798.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 294 | 851,917 | 1,450,875 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 295 | 851,901 | 1,450,861 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 296 | 851,843 | 1,450,849 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 297 | 851,812 | 1,450,838 | 805.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 298 | 851,801 | 1,450,835 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 299 | 851,776 | 1,450,828 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 300 | 851,721 | 1,450,805 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 301 | 851,617 | 1,450,838 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 302 | 851,639 | 1,450,849 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 303 | 851,654 | 1,450,836 | 803.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 304 | 851,587 | 1,450,825 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 305 | 851,576 | 1,450,823 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 306 | 851,559 | 1,450,812 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 307 | 851,540 | 1,450,802 | 805.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 308 | 851,529 | 1,450,802 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 309 | 851,524 | 1,450,771 | 803.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 310 | 851,537 | 1,450,778 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 311 | 851,554 | 1,450,788 | 804.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 312 | 851,552 | 1,450,779 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 313 | 851,604 | 1,450,802 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 314 | 851,564 | 1,450,752 | 799.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 315 | 851,586 | 1,450,765 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 316 | 851,601 | 1,450,770 | 801.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 317 | 851,642 | 1,450,778 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 318 | 851,544 | 1,450,739 | 798.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 319 | 851,480 | 1,450,779 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 320 | 851,467 | 1,450,780 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 321 | 851,452 | 1,450,771 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 322 | 851,439 | 1,450,763 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 323 | 851,416 | 1,450,764 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 324 | 851,380 | 1,450,754 | 800.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 325 | 851,374 | 1,450,753 | 799.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 326 | 851,355 | 1,450,747 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 327 | 851,341 | 1,450,712 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 328 | 851,362 | 1,450,717 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 329 | 851,557 | 1,451,003 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 330 | 851,562 | 1,450,967 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 331 | 851,539 | 1,450,919 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 332 | 850,467 | 1,449,173 | 739.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 333 | 850,496 | 1,449,149 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 334 | 850,473 | 1,449,151 | 739.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 335 | 850,449 | 1,449,090 | 746.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 336 | 850,429 | 1,449,022 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 337 | 850,433 | 1,448,953 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 338 | 850,506 | 1,449,102 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 339 | 850,516 | 1,449,064 | 737.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 340 | 850,498 | 1,449,010 | 739.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 341 | 850,475 | 1,448,924 | 747.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 342 | 850,495 | 1,448,904 | 748.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 343 | 850,487 | 1,448,893 | 749.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 344 | 850,586 | 1,449,013 | 737.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 345 | 850,588 | 1,448,989 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 346 | 850,596 | 1,448,897 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 347 | 850,604 | 1,448,882 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 348 | 850,540 | 1,448,856 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 349 | 850,481 | 1,448,855 | 748.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 350 | 850,494 | 1,448,857 | 747.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 351 | 850,442 | 1,448,849 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 352 | 850,639 | 1,448,865 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 353 | 850,672 | 1,448,861 | 735.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 354 | 850,691 | 1,448,845 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 355 | 850,703 | 1,448,856 | 733.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 356 | 850,776 | 1,448,848 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 357 | 850,616 | 1,448,796 | 741.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 358 | 850,648 | 1,448,804 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 359 | 850,620 | 1,448,769 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 360 | 850,633 | 1,448,742 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 361 | 850,677 | 1,448,754 | 739.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 362 | 850,776 | 1,448,752 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 363 | 850,720 | 1,448,707 | 740.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 364 | 850,575 | 1,448,804 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 365 | 850,558 | 1,448,802 | 743.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 366 | 850,523 | 1,448,804 | 746.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 367 | 850,500 | 1,448,805 | 749.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 368 | 850,467 | 1,448,816 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 369 | 850,502 | 1,448,741 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 370 | 850,470 | 1,448,749 | 754.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 371 | 850,506 | 1,448,777 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 372 | 850,714 | 1,448,813 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 373 | 850,565 | 1,448,689 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 374 | 850,480 | 1,448,695 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 375 | 850,666 | 1,448,692 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 376 | 850,802 | 1,448,685 | 741.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 377 | 850,846 | 1,448,682 | 738.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 378 | 850,877 | 1,448,712 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 379 | 850,877 | 1,448,644 | 733.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 380 | 850,846 | 1,448,641 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 381 | 850,794 | 1,448,647 | 740.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 382 | 850,788 | 1,448,605 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 383 | 850,767 | 1,448,599 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 384 | 850,704 | 1,448,601 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 385 | 850,649 | 1,448,599 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 386 | 850,554 | 1,448,597 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 387 | 850,497 | 1,448,590 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 388 | 850,481 | 1,448,586 | 749.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 389 | 850,449 | 1,448,590 | 750.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 390 | 850,470 | 1,448,660 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 391 | 850,903 | 1,448,557 | 730.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 392 | 850,841 | 1,448,551 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 393 | 850,829 | 1,448,553 | 733.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 394 | 850,812 | 1,448,543 | 735.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 395 | 850,719 | 1,448,555 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 396 | 850,697 | 1,448,524 | 741.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 397 | 850,672 | 1,448,504 | 738.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 398 | 850,579 | 1,448,550 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 399 | 850,542 | 1,448,547 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 400 | 850,534 | 1,448,542 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 401 | 850,538 | 1,448,528 | 742.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 402 | 850,577 | 1,448,580 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 403 | 850,506 | 1,448,494 | 739.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 404 | 850,546 | 1,448,268 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 405 | 850,681 | 1,448,277 | 737.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 406 | 850,705 | 1,448,067 | 756.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 407 | 850,733 | 1,448,075 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 408 | 850,716 | 1,448,087 | 756.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 409 | 850,791 | 1,448,079 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 410 | 850,769 | 1,448,116 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 411 | 850,768 | 1,448,138 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 412 | 850,734 | 1,448,138 | 755.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 413 | 850,838 | 1,448,041 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 414 | 850,842 | 1,447,993 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 415 | 850,879 | 1,447,989 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 416 | 850,906 | 1,447,982 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 417 | 850,889 | 1,448,049 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 418 | 850,858 | 1,448,031 | 752.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 419 | 850,854 | 1,448,089 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 420 | 850,906 | 1,448,118 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 421 | 850,884 | 1,448,150 | 743.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 422 | 850,851 | 1,448,125 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 423 | 850,812 | 1,448,186 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 424 | 850,851 | 1,448,194 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 425 | 850,851 | 1,448,240 | 739.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 426 | 850,905 | 1,448,177 | 741.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 427 | 850,927 | 1,448,191 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 428 | 850,941 | 1,448,149 | 737.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 429 | 850,947 | 1,448,091 | 740.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 430 | 850,999 | 1,448,062 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 431 | 851,009 | 1,448,245 | 731.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 432 | 851,010 | 1,448,229 | 732.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 433 | 851,012 | 1,448,198 | 734.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 434 | 851,070 | 1,448,218 | 729.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 435 | 851,056 | 1,448,197 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 436 | 851,084 | 1,448,234 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 437 | 851,094 | 1,448,208 | 730.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 438 | 851,060 | 1,448,271 | 727.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 439 | 851,061 | 1,448,288 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 440 | 851,092 | 1,448,290 | 727.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 441 | 851,017 | 1,448,313 | 730.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 442 | 851,032 | 1,448,275 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 443 | 851,008 | 1,448,259 | 730.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 444 | 851,006 | 1,448,332 | 730.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 445 | 851,103 | 1,448,336 | 727.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 446 | 851,042 | 1,448,330 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 447 | 851,168 | 1,448,302 | 724.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 448 | 851,234 | 1,448,247 | 721.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 449 | 850,973 | 1,448,062 | 743.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 450 | 850,980 | 1,447,988 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 451 | 851,030 | 1,448,000 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 452 | 851,044 | 1,447,998 | 745.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 453 | 851,064 | 1,447,991 | 745.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 454 | 850,991 | 1,447,960 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 455 | 850,953 | 1,447,952 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 456 | 850,929 | 1,447,885 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 457 | 850,894 | 1,447,887 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 458 | 850,954 | 1,447,888 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 459 | 850,977 | 1,447,895 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 460 | 851,041 | 1,447,897 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 461 | 851,064 | 1,447,899 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 462 | 851,063 | 1,447,860 | 750.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 463 | 851,022 | 1,447,844 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 464 | 850,968 | 1,447,843 | 754.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 465 | 850,908 | 1,447,847 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 466 | 850,839 | 1,447,814 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 467 | 851,021 | 1,448,161 | 737.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 468 | 851,029 | 1,448,084 | 741.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 469 | 851,028 | 1,448,032 | 743.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 470 | 851,058 | 1,447,965 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 471 | 851,167 | 1,447,915 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 472 | 851,172 | 1,447,942 | 740.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 473 | 850,984 | 1,447,743 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 474 | 850,964 | 1,447,781 | 754.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 475 | 850,914 | 1,447,730 | 754.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 476 | 850,905 | 1,447,699 | 752.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 477 | 850,955 | 1,447,679 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 478 | 850,997 | 1,447,700 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 479 | 850,991 | 1,447,681 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 480 | 850,944 | 1,447,641 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 481 | 850,991 | 1,447,622 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 482 | 850,909 | 1,447,642 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 483 | 850,843 | 1,447,625 | 739.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 484 | 850,930 | 1,447,530 | 740.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 485 | 850,993 | 1,447,536 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 486 | 851,025 | 1,447,543 | 745.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 487 | 850,972 | 1,447,470 | 738.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 488 | 850,935 | 1,447,444 | 734.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 489 | 851,457 | 1,448,121 | 714.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 490 | 851,456 | 1,448,143 | 715.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 491 | 851,441 | 1,448,225 | 712.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 492 | 851,351 | 1,448,208 | 714.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 493 | 851,939 | 1,447,800 | 732.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 494 | 851,931 | 1,447,739 | 730.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 495 | 851,979 | 1,447,753 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 496 | 851,964 | 1,447,702 | 728.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 497 | 851,938 | 1,447,694 | 726.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 498 | 851,893 | 1,447,697 | 722.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 499 | 851,872 | 1,447,591 | 718.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 500 | 851,964 | 1,447,583 | 715.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 501 | 851,991 | 1,447,642 | 722.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 502 | 852,035 | 1,447,698 | 728.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 503 | 851,998 | 1,447,690 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 504 | 852,077 | 1,447,692 | 730.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 505 | 852,092 | 1,447,696 | 731.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 506 | 852,137 | 1,447,695 | 730.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 507 | 852,186 | 1,447,708 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 508 | 852,222 | 1,447,702 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 509 | 852,256 | 1,447,714 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 510 | 852,303 | 1,447,726 | 728.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 511 | 852,356 | 1,447,731 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 512 | 852,373 | 1,447,740 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 513 | 852,243 | 1,447,759 | 732.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 514 | 852,131 | 1,447,732 | 730.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 515 | 851,991 | 1,447,812 | 735.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 516 | 852,241 | 1,447,886 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 517 | 852,299 | 1,447,768 | 731.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 518 | 852,346 | 1,447,785 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 519 | 852,396 | 1,447,804 | 731.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 520 | 852,342 | 1,447,832 | 735.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 521 | 852,332 | 1,447,879 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 522 | 852,442 | 1,447,777 | 727.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 523 | 852,475 | 1,447,775 | 724.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 524 | 852,506 | 1,447,791 | 725.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 525 | 852,461 | 1,447,829 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 526 | 852,571 | 1,447,843 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 527 | 852,625 | 1,447,861 | 727.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 528 | 852,641 | 1,447,949 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 529 | 852,393 | 1,448,373 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 530 | 852,533 | 1,448,376 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 531 | 852,567 | 1,448,474 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 532 | 852,676 | 1,448,523 | 771.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 533 | 852,733 | 1,448,543 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 534 | 852,772 | 1,448,578 | 772.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 535 | 852,822 | 1,448,652 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 536 | 852,873 | 1,448,540 | 774.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 537 | 852,819 | 1,448,515 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 538 | 852,791 | 1,448,493 | 770.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 539 | 853,026 | 1,448,836 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 540 | 853,030 | 1,449,000 | 773.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 541 | 852,874 | 1,449,018 | 757.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 542 | 853,101 | 1,449,204 | 773.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 543 | 853,147 | 1,449,208 | 773.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 544 | 853,085 | 1,449,174 | 772.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 545 | 853,071 | 1,449,138 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 546 | 853,177 | 1,449,380 | 781.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 547 | 853,285 | 1,449,297 | 778.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 548 | 853,296 | 1,449,566 | 791.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 549 | 853,373 | 1,449,709 | 802.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 550 | 853,426 | 1,449,685 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 551 | 853,432 | 1,449,727 | 803.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 552 | 853,293 | 1,449,841 | 797.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 553 | 853,249 | 1,449,893 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 554 | 853,247 | 1,449,900 | 803.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 555 | 853,242 | 1,449,907 | 803.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 556 | 853,214 | 1,449,932 | 801.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 557 | 853,207 | 1,449,937 | 800.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 558 | 853,199 | 1,449,936 | 799.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 559 | 853,192 | 1,449,941 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 560 | 853,202 | 1,449,988 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 561 | 853,220 | 1,449,977 | 796.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 562 | 853,164 | 1,449,963 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 563 | 853,138 | 1,449,960 | 806.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 564 | 853,127 | 1,449,963 | 807.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 565 | 853,110 | 1,449,972 | 808.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 566 | 853,084 | 1,449,977 | 808.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 567 | 853,075 | 1,449,978 | 808.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 568 | 853,049 | 1,449,981 | 809.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 569 | 853,009 | 1,449,973 | 809.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 570 | 853,003 | 1,449,944 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 571 | 853,005 | 1,450,018 | 814.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 572 | 852,998 | 1,450,033 | 814.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 573 | 852,992 | 1,450,046 | 814.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 574 | 852,977 | 1,450,051 | 814.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 575 | 852,968 | 1,450,060 | 814.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 576 | 852,957 | 1,450,073 | 814.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 577 | 853,007 | 1,450,106 | 812.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 578 | 853,034 | 1,450,046 | 812.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 579 | 852,866 | 1,449,971 | 805.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 580 | 852,853 | 1,449,970 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 581 | 852,838 | 1,449,954 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 582 | 852,544 | 1,450,478 | 774.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 583 | 852,501 | 1,450,424 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 584 | 852,495 | 1,450,648 | 783.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 585 | 851,999 | 1,449,940 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 586 | 851,695 | 1,450,206 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 587 | 851,704 | 1,450,269 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 588 | 851,806 | 1,450,390 | 761.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 589 | 851,812 | 1,450,385 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 590 | 851,742 | 1,450,417 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 591 | 851,725 | 1,450,461 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 592 | 851,510 | 1,450,110 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 593 | 851,565 | 1,450,581 | 786.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 594 | 851,456 | 1,450,573 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 595 | 851,843 | 1,450,890 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 596 | 851,864 | 1,450,900 | 805.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 597 | 851,873 | 1,450,902 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 598 | 851,883 | 1,450,906 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 599 | 851,980 | 1,450,887 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 600 | 851,980 | 1,450,836 | 794.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 601 | 851,960 | 1,450,818 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 602 | 851,967 | 1,450,791 | 798.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 603 | 851,941 | 1,450,859 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 604 | 851,866 | 1,450,831 | 801.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 605 | 851,878 | 1,450,830 | 800.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 606 | 851,842 | 1,450,824 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 607 | 851,824 | 1,450,814 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 608 | 851,794 | 1,450,801 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 609 | 851,777 | 1,450,791 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 610 | 851,899 | 1,450,804 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 611 | 851,888 | 1,450,799 | 802.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 612 | 851,879 | 1,450,792 | 803.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 613 | 851,857 | 1,450,785 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 614 | 851,727 | 1,450,710 | 796.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 615 | 851,740 | 1,450,719 | 797.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 616 | 851,741 | 1,450,745 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 617 | 851,775 | 1,450,732 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 618 | 851,781 | 1,450,742 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 619 | 851,795 | 1,450,727 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 620 | 851,888 | 1,450,761 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 621 | 851,901 | 1,450,777 | 802.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 622 | 851,914 | 1,450,782 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 623 | 851,957 | 1,450,732 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 624 | 851,928 | 1,450,746 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 625 | 851,886 | 1,450,736 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 626 | 851,895 | 1,450,715 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 627 | 851,915 | 1,450,723 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 628 | 851,873 | 1,450,711 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 629 | 851,862 | 1,450,704 | 798.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 630 | 851,851 | 1,450,701 | 798.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 631 | 851,834 | 1,450,715 | 800.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 632 | 851,823 | 1,450,689 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 633 | 851,816 | 1,450,709 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 634 | 851,783 | 1,450,696 | 797.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 635 | 851,800 | 1,450,679 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 636 | 851,720 | 1,450,644 | 786.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 637 | 851,749 | 1,450,677 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 638 | 851,699 | 1,450,737 | 797.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 639 | 851,859 | 1,450,757 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 640 | 851,844 | 1,450,777 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 641 | 851,805 | 1,450,768 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 642 | 851,792 | 1,450,762 | 801.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 643 | 852,375 | 1,450,901 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 644 | 852,448 | 1,450,686 | 780.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 645 | 855,049 | 1,450,156 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 646 | 855,165 | 1,450,083 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 647 | 856,170 | 1,449,224 | 758.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 648 | 856,152 | 1,449,227 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 649 | 856,080 | 1,449,280 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 650 | 856,020 | 1,449,284 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 651 | 855,958 | 1,449,368 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 652 | 855,927 | 1,449,399 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 653 | 855,854 | 1,449,418 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 654 | 855,832 | 1,449,451 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 655 | 855,817 | 1,449,470 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 656 | 855,727 | 1,449,612 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 657 | 855,697 | 1,449,636 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 658 | 855,692 | 1,449,642 | 756.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 659 | 855,684 | 1,449,645 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 660 | 855,566 | 1,449,535 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 661 | 855,589 | 1,449,583 | 744.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 662 | 855,638 | 1,449,657 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 663 | 855,695 | 1,449,758 | 752.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 664 | 855,678 | 1,449,821 | 744.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 665 | 855,340 | 1,449,831 | 726.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 666 | 855,760 | 1,450,302 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 667 | 855,890 | 1,450,344 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 668 | 855,876 | 1,450,118 | 772.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 669 | 856,062 | 1,450,121 | 787.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 670 | 856,131 | 1,450,172 | 789.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 671 | 856,175 | 1,450,333 | 772.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 672 | 856,246 | 1,449,961 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 673 | 856,320 | 1,450,442 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 674 | 856,445 | 1,450,440 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 675 | 856,403 | 1,450,419 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 676 | 856,449 | 1,450,211 | 775.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 677 | 856,934 | 1,450,597 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 678 | 856,161 | 1,446,967 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 679 | 856,180 | 1,446,997 | 798.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 680 | 856,141 | 1,447,063 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 681 | 856,108 | 1,447,203 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 682 | 856,132 | 1,447,207 | 803.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 683 | 856,147 | 1,447,222 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 684 | 856,182 | 1,447,231 | 806.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 685 | 856,062 | 1,447,408 | 798.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 686 | 856,135 | 1,447,431 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 687 | 856,292 | 1,447,471 | 786.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 688 | 855,999 | 1,446,758 | 808.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 689 | 856,036 | 1,446,721 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 690 | 855,957 | 1,446,770 | 811.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 691 | 855,929 | 1,446,781 | 812.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 692 | 855,954 | 1,446,820 | 809.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 693 | 855,923 | 1,446,841 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 694 | 855,897 | 1,446,808 | 810.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 695 | 855,853 | 1,446,826 | 807.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 696 | 855,804 | 1,446,824 | 808.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 697 | 855,781 | 1,446,920 | 806.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 698 | 855,736 | 1,446,842 | 809.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 699 | 855,715 | 1,446,931 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 700 | 855,665 | 1,446,888 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 701 | 855,647 | 1,446,950 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 702 | 855,609 | 1,446,923 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 703 | 855,551 | 1,446,911 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 704 | 855,649 | 1,447,015 | 800.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 705 | 855,585 | 1,447,040 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 706 | 855,611 | 1,447,082 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 707 | 855,653 | 1,447,050 | 802.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 708 | 855,668 | 1,447,107 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 709 | 855,680 | 1,447,164 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 710 | 855,653 | 1,447,179 | 804.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 711 | 855,643 | 1,447,154 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 712 | 855,809 | 1,447,281 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 713 | 855,874 | 1,447,299 | 799.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 714 | 855,696 | 1,447,284 | 805.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 715 | 855,492 | 1,447,001 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 716 | 855,470 | 1,446,963 | 796.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 717 | 855,464 | 1,446,963 | 796.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 718 | 855,466 | 1,447,018 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 719 | 855,428 | 1,446,967 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 720 | 855,398 | 1,446,976 | 793.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 721 | 855,365 | 1,446,983 | 796.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 722 | 855,340 | 1,446,992 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 723 | 855,315 | 1,446,988 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 724 | 855,355 | 1,447,048 | 798.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 725 | 855,304 | 1,447,071 | 797.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 726 | 855,197 | 1,447,051 | 795.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 727 | 855,160 | 1,446,919 | 792.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 728 | 855,162 | 1,446,877 | 792.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 729 | 855,174 | 1,446,838 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 730 | 855,120 | 1,447,077 | 794.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 731 | 855,086 | 1,447,061 | 794.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 732 | 855,034 | 1,447,093 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 733 | 855,029 | 1,447,134 | 794.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 734 | 855,003 | 1,447,142 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 735 | 854,942 | 1,447,162 | 793.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 736 | 854,859 | 1,447,132 | 789.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 737 | 854,759 | 1,447,152 | 795.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 738 | 854,761 | 1,447,199 | 795.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 739 | 854,719 | 1,447,163 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 740 | 854,681 | 1,447,174 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 741 | 854,658 | 1,447,184 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 742 | 854,653 | 1,447,150 | 785.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 743 | 854,610 | 1,447,194 | 783.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 744 | 854,619 | 1,447,227 | 778.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 745 | 854,592 | 1,447,244 | 781.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 746 | 854,713 | 1,447,036 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 747 | 854,726 | 1,446,990 | 786.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 748 | 854,627 | 1,446,953 | 787.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 749 | 854,697 | 1,446,834 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 750 | 854,508 | 1,446,885 | 784.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 751 | 854,455 | 1,447,032 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 752 | 854,483 | 1,447,084 | 783.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 753 | 854,552 | 1,447,248 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 754 | 854,541 | 1,447,262 | 778.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 755 | 854,474 | 1,447,218 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 756 | 854,429 | 1,447,249 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 757 | 854,447 | 1,447,282 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 758 | 854,377 | 1,447,296 | 785.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 759 | 854,349 | 1,447,247 | 782.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 760 | 854,360 | 1,447,293 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 761 | 854,401 | 1,447,294 | 785.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 762 | 854,296 | 1,447,275 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 763 | 854,249 | 1,447,277 | 780.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 764 | 854,361 | 1,447,344 | 786.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 765 | 854,395 | 1,447,338 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 766 | 854,479 | 1,447,346 | 780.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 767 | 854,580 | 1,447,361 | 786.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 768 | 854,631 | 1,447,346 | 784.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 769 | 854,257 | 1,447,325 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 770 | 854,246 | 1,447,272 | 780.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 771 | 854,234 | 1,447,320 | 779.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 772 | 854,126 | 1,447,322 | 778.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 773 | 854,117 | 1,447,285 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 774 | 854,083 | 1,447,281 | 781.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 775 | 854,027 | 1,447,269 | 778.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 776 | 853,942 | 1,447,319 | 775.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 777 | 853,913 | 1,447,282 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 778 | 853,853 | 1,447,279 | 777.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 779 | 853,614 | 1,447,307 | 774.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 780 | 853,767 | 1,447,275 | 774.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 781 | 853,515 | 1,447,318 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 782 | 853,375 | 1,447,298 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 783 | 853,434 | 1,447,317 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 784 | 853,398 | 1,447,226 | 770.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 785 | 853,250 | 1,447,218 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 786 | 853,220 | 1,447,211 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 787 | 853,222 | 1,447,246 | 767.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 788 | 853,110 | 1,447,187 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 789 | 853,035 | 1,447,203 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 790 | 852,900 | 1,447,129 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 791 | 852,865 | 1,447,105 | 758.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 792 | 852,844 | 1,447,103 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 793 | 852,834 | 1,447,094 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 794 | 852,833 | 1,447,149 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 795 | 852,807 | 1,447,085 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 796 | 852,776 | 1,447,121 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 797 | 852,734 | 1,447,117 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 798 | 852,741 | 1,447,059 | 753.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 799 | 852,708 | 1,447,050 | 750.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 800 | 852,699 | 1,447,100 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 801 | 852,647 | 1,447,088 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 802 | 852,651 | 1,447,025 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 803 | 852,650 | 1,446,975 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 804 | 852,621 | 1,447,069 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 805 | 852,631 | 1,447,074 | 748.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 806 | 852,639 | 1,447,185 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 807 | 852,568 | 1,447,068 | 750.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 808 | 852,542 | 1,447,029 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 809 | 852,520 | 1,447,034 | 747.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 810 | 852,515 | 1,446,979 | 748.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 811 | 852,553 | 1,446,983 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 812 | 851,439 | 1,450,741 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 813 | 851,481 | 1,450,757 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 814 | 851,500 | 1,450,763 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 815 | 851,576 | 1,450,791 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 816 | 851,484 | 1,450,473 | 779.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 817 | 851,431 | 1,450,464 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 818 | 851,520 | 1,450,352 | 784.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 819 | 851,559 | 1,450,447 | 777.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 820 | 852,488 | 1,446,992 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 821 | 852,436 | 1,446,960 | 743.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 822 | 852,405 | 1,446,995 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 823 | 852,376 | 1,446,990 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 824 | 852,423 | 1,447,039 | 738.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 825 | 852,381 | 1,447,042 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 826 | 852,322 | 1,447,007 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 827 | 852,348 | 1,447,002 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 828 | 852,357 | 1,447,098 | 737.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 829 | 852,332 | 1,447,104 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 830 | 852,327 | 1,447,054 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 831 | 852,268 | 1,447,064 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 832 | 852,265 | 1,447,016 | 745.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 833 | 852,337 | 1,446,935 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 834 | 852,324 | 1,446,944 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 835 | 852,327 | 1,446,953 | 745.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 836 | 852,270 | 1,446,897 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 837 | 852,306 | 1,446,900 | 743.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 838 | 852,338 | 1,446,897 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 839 | 852,364 | 1,446,897 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 840 | 852,398 | 1,446,889 | 749.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 841 | 852,441 | 1,446,885 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 842 | 852,428 | 1,446,934 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 843 | 852,389 | 1,446,929 | 748.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 844 | 852,478 | 1,446,913 | 747.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 845 | 852,533 | 1,446,894 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 846 | 852,462 | 1,447,143 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 847 | 852,498 | 1,447,128 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 848 | 852,498 | 1,447,128 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 849 | 852,597 | 1,447,177 | 748.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 850 | 852,641 | 1,447,216 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 851 | 852,512 | 1,447,186 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 852 | 852,546 | 1,447,191 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 853 | 852,535 | 1,447,244 | 738.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 854 | 852,546 | 1,447,297 | 736.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 855 | 852,467 | 1,447,251 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 856 | 852,409 | 1,447,216 | 730.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 857 | 852,391 | 1,447,259 | 728.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 858 | 852,351 | 1,447,266 | 723.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 859 | 852,339 | 1,447,159 | 730.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 860 | 852,328 | 1,447,183 | 728.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 861 | 852,285 | 1,447,219 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 862 | 852,291 | 1,447,277 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 863 | 852,217 | 1,447,290 | 726.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 864 | 852,215 | 1,447,225 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 865 | 852,234 | 1,447,172 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 866 | 852,220 | 1,447,169 | 735.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 867 | 852,237 | 1,447,137 | 738.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 868 | 852,246 | 1,447,109 | 740.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 869 | 852,274 | 1,447,123 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 870 | 852,298 | 1,447,121 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 871 | 852,212 | 1,447,068 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 872 | 852,226 | 1,447,064 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 873 | 852,182 | 1,447,068 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 874 | 852,134 | 1,447,035 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 875 | 852,067 | 1,447,048 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 876 | 852,085 | 1,447,094 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 877 | 852,059 | 1,447,150 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 878 | 852,088 | 1,447,138 | 739.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 879 | 852,099 | 1,447,166 | 736.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 880 | 852,120 | 1,447,192 | 734.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 881 | 852,133 | 1,447,198 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 882 | 852,130 | 1,447,231 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 883 | 851,988 | 1,447,166 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 884 | 851,976 | 1,447,212 | 738.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 885 | 851,938 | 1,447,213 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 886 | 852,065 | 1,447,205 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 887 | 851,965 | 1,447,141 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 888 | 851,882 | 1,447,138 | 744.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 889 | 851,920 | 1,447,109 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 890 | 851,937 | 1,447,100 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 891 | 851,963 | 1,447,104 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 892 | 851,976 | 1,447,114 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 893 | 851,986 | 1,447,113 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 894 | 852,009 | 1,447,099 | 744.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 895 | 852,024 | 1,447,107 | 744.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 896 | 852,039 | 1,447,102 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 897 | 852,020 | 1,447,044 | 741.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 898 | 851,979 | 1,447,053 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 899 | 851,968 | 1,447,033 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 900 | 851,873 | 1,447,070 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 901 | 852,030 | 1,447,038 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 902 | 852,191 | 1,447,018 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 903 | 852,248 | 1,447,024 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 904 | 852,239 | 1,446,964 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 905 | 852,162 | 1,446,919 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 906 | 852,115 | 1,446,970 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 907 | 852,070 | 1,446,966 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 908 | 852,054 | 1,446,998 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 909 | 852,060 | 1,447,002 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 910 | 852,065 | 1,446,994 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 911 | 852,029 | 1,446,992 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 912 | 852,027 | 1,446,943 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 913 | 851,979 | 1,446,952 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 914 | 851,949 | 1,446,908 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 915 | 852,014 | 1,446,898 | 739.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 916 | 851,866 | 1,446,954 | 736.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 917 | 851,855 | 1,446,915 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 918 | 851,843 | 1,446,913 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 919 | 851,915 | 1,446,849 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 920 | 851,911 | 1,446,915 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 921 | 851,943 | 1,446,851 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 922 | 852,065 | 1,446,833 | 736.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 923 | 852,082 | 1,446,798 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 924 | 852,009 | 1,446,764 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 925 | 852,002 | 1,446,697 | 737.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 926 | 852,059 | 1,446,738 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 927 | 852,077 | 1,446,698 | 748.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 928 | 852,117 | 1,446,682 | 751.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 929 | 852,151 | 1,446,688 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 930 | 852,175 | 1,446,680 | 752.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 931 | 852,220 | 1,446,730 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 932 | 852,228 | 1,446,720 | 750.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 933 | 852,164 | 1,446,729 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 934 | 852,129 | 1,446,736 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 935 | 852,153 | 1,446,773 | 744.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 936 | 852,183 | 1,446,855 | 743.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 937 | 852,234 | 1,446,856 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 938 | 852,223 | 1,446,848 | 747.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 939 | 852,209 | 1,446,806 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 940 | 852,236 | 1,446,763 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 941 | 852,266 | 1,446,734 | 749.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 942 | 852,303 | 1,446,687 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 943 | 852,321 | 1,446,795 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 944 | 852,339 | 1,446,844 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 945 | 852,472 | 1,446,869 | 746.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 946 | 851,927 | 1,447,066 | 745.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 947 | 852,582 | 1,446,980 | 751.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 948 | 852,568 | 1,447,007 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 949 | 852,614 | 1,447,010 | 749.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 950 | 852,638 | 1,447,096 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 951 | 852,623 | 1,447,107 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 952 | 852,732 | 1,447,077 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 953 | 851,257 | 1,446,295 | 712.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 954 | 851,231 | 1,446,289 | 717.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 955 | 851,191 | 1,446,284 | 724.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 956 | 851,173 | 1,446,281 | 724.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 957 | 851,165 | 1,446,331 | 722.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 958 | 851,184 | 1,446,335 | 722.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 959 | 851,200 | 1,446,330 | 721.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 960 | 851,221 | 1,446,333 | 719.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 961 | 851,249 | 1,446,332 | 715.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 962 | 851,266 | 1,446,398 | 719.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 963 | 851,231 | 1,446,378 | 719.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 964 | 851,197 | 1,446,376 | 720.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 965 | 851,165 | 1,446,371 | 723.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 966 | 851,195 | 1,446,419 | 720.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 967 | 851,232 | 1,446,426 | 720.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 968 | 851,256 | 1,446,430 | 719.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 969 | 851,254 | 1,446,138 | 718.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 970 | 851,208 | 1,446,121 | 724.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 971 | 851,209 | 1,446,049 | 725.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 972 | 851,483 | 1,446,797 | 708.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 973 | 851,460 | 1,446,789 | 706.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 974 | 851,446 | 1,446,771 | 705.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 975 | 851,481 | 1,446,753 | 706.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 976 | 851,465 | 1,446,867 | 707.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 977 | 851,222 | 1,446,704 | 717.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 978 | 851,187 | 1,446,677 | 727.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 979 | 851,148 | 1,446,695 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 980 | 850,994 | 1,446,753 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 981 | 850,972 | 1,446,762 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 982 | 851,028 | 1,446,779 | 724.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 983 | 850,874 | 1,446,794 | 726.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 984 | 850,832 | 1,446,809 | 722.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 985 | 850,767 | 1,446,810 | 726.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 986 | 850,717 | 1,446,858 | 725.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 987 | 850,674 | 1,446,829 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 988 | 850,645 | 1,446,833 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 989 | 850,619 | 1,446,869 | 732.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 990 | 850,920 | 1,446,964 | 711.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 991 | 850,571 | 1,446,839 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 992 | 850,460 | 1,446,873 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 993 | 850,381 | 1,446,911 | 738.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 994 | 850,372 | 1,446,912 | 738.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 995 | 850,375 | 1,446,953 | 736.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 996 | 850,368 | 1,446,948 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 997 | 850,586 | 1,447,064 | 729.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 998 | 850,574 | 1,447,043 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 999 | 850,629 | 1,447,089 | 728.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1000 | 850,981 | 1,447,343 | 729.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1001 | 850,946 | 1,447,359 | 728.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1002 | 850,915 | 1,447,425 | 731.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1003 | 851,350 | 1,447,490 | 726.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1004 | 852,663 | 1,443,677 | 715.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1005 | 852,664 | 1,443,628 | 714.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1006 | 852,634 | 1,443,631 | 712.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1007 | 852,646 | 1,443,594 | 717.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1008 | 852,601 | 1,443,620 | 709.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1009 | 852,763 | 1,443,803 | 706.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1010 | 852,745 | 1,443,790 | 707.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1011 | 852,570 | 1,443,927 | 702.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1012 | 854,043 | 1,453,014 | 740.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1013 | 854,608 | 1,453,051 | 751.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1014 | 856,571 | 1,451,591 | 807.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1015 | 856,184 | 1,451,365 | 782.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1016 | 855,698 | 1,451,408 | 810.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1017 | 851,226 | 1,451,726 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1018 | 851,383 | 1,451,819 | 784.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1019 | 851,433 | 1,451,783 | 778.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1020 | 852,052 | 1,450,571 | 779.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1021 | 852,016 | 1,450,316 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1022 | 852,302 | 1,449,693 | 772.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1023 | 852,214 | 1,449,498 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1024 | 852,608 | 1,449,780 | 773.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1025 | 852,674 | 1,449,656 | 766.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1026 | 853,463 | 1,449,552 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1027 | 853,469 | 1,449,520 | 782.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1028 | 853,443 | 1,449,514 | 782.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1029 | 853,512 | 1,449,390 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1030 | 853,530 | 1,449,196 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1031 | 853,565 | 1,449,152 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1032 | 853,574 | 1,449,230 | 754.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1033 | 853,625 | 1,449,293 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1034 | 855,724 | 1,449,045 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1035 | 855,771 | 1,448,921 | 775.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1036 | 855,813 | 1,448,860 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1037 | 855,841 | 1,448,873 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1038 | 855,885 | 1,448,857 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1039 | 856,001 | 1,448,765 | 776.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1040 | 856,026 | 1,448,724 | 776.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1041 | 851,324 | 1,445,117 | 723.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1042 | 851,366 | 1,445,143 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1043 | 851,262 | 1,445,117 | 725.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1044 | 851,212 | 1,445,117 | 728.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1045 | 851,382 | 1,445,049 | 718.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1046 | 851,467 | 1,445,040 | 712.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1047 | 851,509 | 1,445,089 | 710.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1048 | 851,373 | 1,445,243 | 726.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1049 | 851,073 | 1,445,292 | 728.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1050 | 850,908 | 1,444,954 | 708.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1051 | 851,030 | 1,444,877 | 704.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1052 | 851,247 | 1,444,888 | 704.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1053 | 851,285 | 1,444,891 | 703.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1054 | 851,059 | 1,444,629 | 711.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1055 | 851,005 | 1,444,655 | 712.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1056 | 850,984 | 1,444,587 | 718.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1057 | 848,726 | 1,444,048 | 759.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1058 | 848,716 | 1,444,061 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1059 | 848,705 | 1,444,052 | 761.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1060 | 848,693 | 1,444,067 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1061 | 848,761 | 1,444,327 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1062 | 849,134 | 1,446,836 | 778.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1063 | 849,113 | 1,446,830 | 776.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1064 | 849,118 | 1,446,807 | 775.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1065 | 849,145 | 1,446,776 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1066 | 849,244 | 1,446,811 | 772.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1067 | 849,271 | 1,446,808 | 770.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1068 | 849,256 | 1,446,788 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1069 | 849,238 | 1,446,774 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1070 | 849,242 | 1,446,724 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1071 | 849,239 | 1,446,696 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1072 | 849,221 | 1,446,717 | 770.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1073 | 849,234 | 1,446,680 | 766.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1074 | 849,226 | 1,446,663 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1075 | 849,235 | 1,446,649 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1076 | 849,221 | 1,446,632 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1077 | 849,215 | 1,446,618 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1078 | 849,223 | 1,446,602 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1079 | 849,277 | 1,446,729 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1080 | 849,289 | 1,446,733 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1081 | 849,332 | 1,446,737 | 762.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1082 | 849,373 | 1,446,725 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1083 | 849,407 | 1,446,742 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1084 | 849,278 | 1,446,666 | 764.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1085 | 849,296 | 1,446,666 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1086 | 849,313 | 1,446,689 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1087 | 849,347 | 1,446,688 | 763.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1088 | 849,359 | 1,446,689 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1089 | 849,356 | 1,446,683 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1090 | 849,357 | 1,446,662 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1091 | 849,340 | 1,446,659 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1092 | 849,425 | 1,446,677 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1093 | 849,394 | 1,446,725 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1094 | 849,435 | 1,446,618 | 751.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1095 | 849,388 | 1,446,616 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1096 | 849,315 | 1,446,621 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1097 | 849,294 | 1,446,614 | 763.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1098 | 849,280 | 1,446,620 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1099 | 849,264 | 1,446,612 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1100 | 849,447 | 1,446,570 | 751.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1101 | 849,395 | 1,446,566 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1102 | 849,272 | 1,446,579 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1103 | 849,283 | 1,446,576 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1104 | 849,217 | 1,446,592 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1105 | 849,219 | 1,446,572 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1106 | 849,217 | 1,446,556 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1107 | 849,215 | 1,446,530 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1108 | 849,208 | 1,446,506 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1109 | 849,208 | 1,446,494 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1110 | 849,203 | 1,446,469 | 759.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1111 | 849,197 | 1,446,451 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1112 | 849,194 | 1,446,427 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1113 | 849,196 | 1,446,413 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1114 | 849,196 | 1,446,399 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1115 | 849,202 | 1,446,377 | 758.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1116 | 849,131 | 1,446,355 | 754.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1117 | 849,105 | 1,446,334 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1118 | 849,181 | 1,446,356 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1119 | 849,201 | 1,446,353 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1120 | 849,221 | 1,446,357 | 758.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1121 | 849,238 | 1,446,351 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1122 | 849,245 | 1,446,383 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1123 | 849,261 | 1,446,400 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1124 | 849,292 | 1,446,393 | 759.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1125 | 849,304 | 1,446,380 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1126 | 849,256 | 1,446,353 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1127 | 849,280 | 1,446,321 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1128 | 849,336 | 1,446,379 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1129 | 849,348 | 1,446,378 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1130 | 849,378 | 1,446,396 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1131 | 849,385 | 1,446,417 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1132 | 849,437 | 1,446,382 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1133 | 849,414 | 1,446,338 | 746.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1134 | 849,432 | 1,446,334 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1135 | 849,523 | 1,446,336 | 733.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1136 | 849,907 | 1,446,396 | 758.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1137 | 849,852 | 1,446,376 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1138 | 849,837 | 1,446,430 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1139 | 849,833 | 1,446,473 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1140 | 849,868 | 1,446,466 | 751.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1141 | 849,892 | 1,446,260 | 760.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1142 | 849,908 | 1,446,211 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1143 | 850,421 | 1,445,826 | 737.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1144 | 850,516 | 1,445,836 | 736.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1145 | 850,626 | 1,445,617 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1146 | 850,686 | 1,445,672 | 737.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1147 | 850,700 | 1,445,535 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1148 | 850,707 | 1,445,639 | 734.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1149 | 850,614 | 1,445,514 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1150 | 850,716 | 1,445,403 | 732.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1151 | 849,179 | 1,446,333 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1152 | 849,185 | 1,446,305 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1153 | 849,187 | 1,446,282 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1154 | 849,177 | 1,446,196 | 752.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1155 | 849,186 | 1,446,257 | 755.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1156 | 849,219 | 1,446,282 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1157 | 849,286 | 1,446,238 | 752.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1158 | 849,310 | 1,446,282 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1159 | 849,324 | 1,446,223 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1160 | 849,329 | 1,446,176 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1161 | 849,259 | 1,446,187 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1162 | 849,181 | 1,446,233 | 754.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1163 | 849,197 | 1,446,243 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1164 | 849,182 | 1,446,267 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1165 | 849,195 | 1,446,271 | 755.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1166 | 849,352 | 1,446,264 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1167 | 849,427 | 1,446,289 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1168 | 849,401 | 1,446,189 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1169 | 849,157 | 1,446,169 | 751.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1170 | 849,157 | 1,446,149 | 751.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1171 | 849,165 | 1,446,130 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1172 | 849,168 | 1,446,111 | 750.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1173 | 849,169 | 1,446,093 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1174 | 849,155 | 1,446,080 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1175 | 849,144 | 1,446,054 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1176 | 849,160 | 1,446,028 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1177 | 849,148 | 1,446,013 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1178 | 849,159 | 1,445,998 | 760.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1179 | 849,152 | 1,445,966 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1180 | 849,165 | 1,446,014 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1181 | 849,181 | 1,446,015 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1182 | 849,199 | 1,446,017 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1183 | 849,223 | 1,446,011 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1184 | 849,193 | 1,445,942 | 764.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1185 | 849,189 | 1,445,898 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1186 | 849,221 | 1,445,896 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1187 | 849,217 | 1,445,925 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1188 | 849,275 | 1,445,996 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1189 | 849,288 | 1,445,933 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1190 | 849,454 | 1,445,987 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1191 | 849,383 | 1,446,096 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1192 | 849,340 | 1,446,117 | 740.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1193 | 849,427 | 1,446,117 | 734.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1194 | 849,386 | 1,446,030 | 741.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1195 | 849,393 | 1,446,001 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1196 | 849,386 | 1,445,956 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1197 | 849,443 | 1,445,922 | 735.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1198 | 849,303 | 1,445,872 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1199 | 849,335 | 1,445,870 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1200 | 849,316 | 1,445,892 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1201 | 849,345 | 1,445,824 | 746.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1202 | 849,190 | 1,445,811 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1203 | 849,198 | 1,445,827 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1204 | 849,158 | 1,445,812 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1205 | 849,128 | 1,445,821 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1206 | 849,130 | 1,445,812 | 760.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1207 | 849,134 | 1,445,867 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1208 | 849,179 | 1,445,701 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1209 | 849,189 | 1,445,722 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1210 | 849,230 | 1,445,719 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1211 | 849,235 | 1,445,696 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1212 | 849,224 | 1,445,652 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1213 | 849,210 | 1,445,640 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1214 | 849,188 | 1,445,656 | 760.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1215 | 849,179 | 1,445,662 | 761.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1216 | 849,165 | 1,445,644 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1217 | 849,134 | 1,445,637 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1218 | 849,143 | 1,445,672 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1219 | 849,129 | 1,445,695 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1220 | 849,118 | 1,445,731 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1221 | 849,159 | 1,445,729 | 763.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1222 | 849,162 | 1,445,747 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1223 | 849,153 | 1,445,759 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1224 | 849,112 | 1,445,586 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1225 | 849,129 | 1,445,582 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1226 | 849,133 | 1,445,538 | 765.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1227 | 849,132 | 1,445,556 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1228 | 848,938 | 1,445,593 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1229 | 848,951 | 1,445,563 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1230 | 848,975 | 1,445,466 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1231 | 848,950 | 1,445,433 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1232 | 849,072 | 1,445,269 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1233 | 849,079 | 1,445,282 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1234 | 849,068 | 1,445,283 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1235 | 849,074 | 1,445,290 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1236 | 849,064 | 1,445,300 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1237 | 849,157 | 1,445,244 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1238 | 849,097 | 1,445,352 | 764.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1239 | 849,152 | 1,445,365 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1240 | 849,143 | 1,445,368 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1241 | 849,160 | 1,445,366 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1242 | 849,187 | 1,445,368 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1243 | 849,202 | 1,445,363 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1244 | 849,218 | 1,445,370 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1245 | 849,227 | 1,445,371 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1246 | 849,223 | 1,445,401 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1247 | 849,201 | 1,445,398 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1248 | 849,187 | 1,445,398 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1249 | 849,172 | 1,445,402 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1250 | 849,257 | 1,445,378 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1251 | 849,252 | 1,445,394 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1252 | 849,249 | 1,445,414 | 754.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1253 | 849,233 | 1,445,299 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1254 | 849,223 | 1,445,299 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1255 | 849,216 | 1,445,305 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1256 | 849,210 | 1,445,310 | 759.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1257 | 849,198 | 1,445,308 | 758.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1258 | 849,193 | 1,445,308 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1259 | 849,180 | 1,445,301 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1260 | 849,160 | 1,445,313 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1261 | 849,142 | 1,445,314 | 760.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1262 | 849,203 | 1,445,456 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1263 | 849,197 | 1,445,456 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1264 | 849,163 | 1,445,446 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1265 | 849,155 | 1,445,459 | 757.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1266 | 849,218 | 1,445,445 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1267 | 849,262 | 1,445,478 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1268 | 849,261 | 1,445,460 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1269 | 849,265 | 1,445,453 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1270 | 849,258 | 1,445,430 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1271 | 849,265 | 1,445,437 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1272 | 849,274 | 1,445,356 | 754.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1273 | 849,207 | 1,445,548 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1274 | 849,218 | 1,445,530 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1275 | 849,232 | 1,445,551 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1276 | 849,222 | 1,445,486 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1277 | 849,209 | 1,445,500 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1278 | 849,191 | 1,445,486 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1279 | 849,319 | 1,445,542 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1280 | 849,384 | 1,445,629 | 738.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1281 | 849,382 | 1,445,650 | 739.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1282 | 849,259 | 1,445,778 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1283 | 849,346 | 1,445,754 | 747.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1284 | 849,344 | 1,445,735 | 747.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1285 | 849,385 | 1,445,767 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1286 | 849,392 | 1,445,803 | 740.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1287 | 849,419 | 1,445,809 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1288 | 849,428 | 1,445,767 | 734.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1289 | 849,446 | 1,445,766 | 733.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1290 | 849,479 | 1,445,797 | 734.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1291 | 849,461 | 1,445,815 | 735.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1292 | 849,440 | 1,445,699 | 732.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1293 | 849,433 | 1,445,700 | 733.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1294 | 849,423 | 1,445,685 | 734.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1295 | 849,337 | 1,445,693 | 745.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1296 | 849,307 | 1,445,696 | 749.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1297 | 849,341 | 1,445,649 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1298 | 849,335 | 1,445,638 | 743.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1299 | 849,355 | 1,445,624 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1300 | 849,387 | 1,445,589 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1301 | 849,315 | 1,445,211 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1302 | 849,127 | 1,445,397 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1303 | 849,122 | 1,445,412 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1304 | 849,115 | 1,445,426 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1305 | 849,108 | 1,445,472 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1306 | 849,110 | 1,445,506 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1307 | 849,061 | 1,446,035 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1308 | 849,161 | 1,445,149 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1309 | 849,195 | 1,445,115 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1310 | 849,253 | 1,445,122 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1311 | 849,256 | 1,445,181 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1312 | 849,205 | 1,445,207 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1313 | 849,237 | 1,445,013 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1314 | 849,226 | 1,444,904 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1315 | 849,233 | 1,444,845 | 748.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1316 | 849,192 | 1,444,985 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1317 | 849,189 | 1,445,008 | 763.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1318 | 849,143 | 1,445,025 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1319 | 849,121 | 1,445,033 | 763.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1320 | 849,154 | 1,444,961 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1321 | 849,146 | 1,444,972 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1322 | 849,118 | 1,444,978 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1323 | 849,079 | 1,445,002 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1324 | 848,850 | 1,445,008 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1325 | 848,700 | 1,444,925 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1326 | 848,633 | 1,444,930 | 766.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1327 | 848,667 | 1,444,975 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1328 | 848,611 | 1,444,969 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1329 | 848,808 | 1,444,838 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1330 | 848,717 | 1,444,776 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1331 | 848,850 | 1,444,775 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1332 | 848,861 | 1,444,868 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1333 | 848,920 | 1,444,928 | 764.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1334 | 848,970 | 1,444,955 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1335 | 848,946 | 1,444,966 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1336 | 848,953 | 1,444,976 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1337 | 848,974 | 1,444,984 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1338 | 848,986 | 1,444,836 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1339 | 849,237 | 1,445,076 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1340 | 849,109 | 1,445,262 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1341 | 848,716 | 1,444,399 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1342 | 848,676 | 1,444,422 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1343 | 848,649 | 1,444,427 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1344 | 848,639 | 1,444,443 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1345 | 848,581 | 1,444,527 | 755.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1346 | 848,558 | 1,444,870 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1347 | 848,525 | 1,444,904 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1348 | 848,488 | 1,444,870 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1349 | 848,455 | 1,444,850 | 761.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1350 | 848,462 | 1,444,807 | 760.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1351 | 848,303 | 1,444,534 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1352 | 848,260 | 1,444,506 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1353 | 848,307 | 1,444,485 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1354 | 848,321 | 1,444,465 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1355 | 848,318 | 1,444,451 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1356 | 848,312 | 1,444,438 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1357 | 848,311 | 1,444,430 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1358 | 848,314 | 1,444,413 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1359 | 848,318 | 1,444,389 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1360 | 848,315 | 1,444,365 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1361 | 848,316 | 1,444,351 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1362 | 848,320 | 1,444,326 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1363 | 848,324 | 1,444,315 | 767.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1364 | 848,308 | 1,444,285 | 767.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1365 | 848,328 | 1,444,265 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1366 | 848,362 | 1,444,287 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1367 | 848,356 | 1,444,306 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1368 | 848,353 | 1,444,330 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1369 | 848,386 | 1,444,345 | 766.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1370 | 848,397 | 1,444,360 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1371 | 848,402 | 1,444,314 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1372 | 848,410 | 1,444,300 | 771.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1373 | 848,404 | 1,444,282 | 772.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1374 | 848,468 | 1,444,356 | 770.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1375 | 848,455 | 1,444,465 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1376 | 848,458 | 1,444,554 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1377 | 848,452 | 1,444,569 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1378 | 848,488 | 1,444,248 | 771.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1379 | 848,271 | 1,444,448 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1380 | 848,273 | 1,444,409 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1381 | 848,272 | 1,444,382 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1382 | 848,285 | 1,444,328 | 767.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1383 | 848,283 | 1,444,310 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1384 | 848,506 | 1,444,126 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1385 | 848,485 | 1,444,123 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1386 | 848,488 | 1,444,080 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1387 | 848,472 | 1,444,087 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1388 | 848,459 | 1,444,113 | 770.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1389 | 848,441 | 1,444,117 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1390 | 848,423 | 1,444,120 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1391 | 848,402 | 1,444,125 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1392 | 848,395 | 1,444,119 | 765.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1393 | 848,372 | 1,444,121 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1394 | 848,350 | 1,444,124 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1395 | 848,450 | 1,444,161 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1396 | 848,436 | 1,444,166 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1397 | 848,427 | 1,444,164 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1398 | 848,434 | 1,444,184 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1399 | 848,418 | 1,444,166 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1400 | 848,411 | 1,444,165 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1401 | 848,402 | 1,444,163 | 767.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1402 | 848,392 | 1,444,165 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1403 | 848,386 | 1,444,170 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1404 | 848,378 | 1,444,161 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1405 | 848,373 | 1,444,163 | 768.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1406 | 848,362 | 1,444,162 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1407 | 848,353 | 1,444,161 | 768.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1408 | 848,348 | 1,444,166 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1409 | 848,337 | 1,444,164 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1410 | 848,326 | 1,444,158 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1411 | 848,315 | 1,444,159 | 768.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1412 | 848,304 | 1,444,156 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1413 | 848,343 | 1,444,123 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1414 | 848,333 | 1,444,128 | 766.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1415 | 848,299 | 1,444,122 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1416 | 848,292 | 1,444,122 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1417 | 848,278 | 1,444,126 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1418 | 848,267 | 1,444,125 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1419 | 848,252 | 1,444,125 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1420 | 848,241 | 1,444,127 | 765.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1421 | 848,232 | 1,444,123 | 764.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1422 | 848,225 | 1,444,124 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1423 | 848,221 | 1,444,125 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1424 | 848,200 | 1,444,129 | 766.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1425 | 848,179 | 1,444,115 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1426 | 848,150 | 1,444,124 | 766.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1427 | 848,163 | 1,444,119 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1428 | 848,186 | 1,444,130 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1429 | 848,281 | 1,444,173 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1430 | 848,267 | 1,444,174 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1431 | 848,259 | 1,444,167 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1432 | 848,251 | 1,444,159 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1433 | 848,236 | 1,444,164 | 768.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1434 | 848,227 | 1,444,164 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1435 | 848,222 | 1,444,158 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1436 | 848,217 | 1,444,161 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1437 | 848,206 | 1,444,158 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1438 | 848,199 | 1,444,159 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1439 | 848,194 | 1,444,161 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1440 | 848,186 | 1,444,156 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1441 | 848,177 | 1,444,158 | 769.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1442 | 848,161 | 1,444,163 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1443 | 848,143 | 1,444,163 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1444 | 848,117 | 1,444,152 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1445 | 848,106 | 1,444,158 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1446 | 848,112 | 1,444,098 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1447 | 848,137 | 1,444,125 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1448 | 848,099 | 1,444,121 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1449 | 848,075 | 1,444,157 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1450 | 847,997 | 1,444,156 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1451 | 847,877 | 1,444,114 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1452 | 847,721 | 1,444,104 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1453 | 847,719 | 1,444,117 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1454 | 847,678 | 1,444,100 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1455 | 847,690 | 1,444,115 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1456 | 847,674 | 1,444,157 | 754.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1457 | 847,645 | 1,444,149 | 753.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1458 | 848,488 | 1,444,227 | 771.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1459 | 848,436 | 1,444,213 | 771.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1460 | 848,424 | 1,444,243 | 775.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1461 | 848,413 | 1,444,257 | 776.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1462 | 848,409 | 1,444,268 | 774.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1463 | 848,398 | 1,444,328 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1464 | 848,263 | 1,444,215 | 763.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1465 | 848,269 | 1,444,225 | 762.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1466 | 848,272 | 1,444,234 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1467 | 848,275 | 1,444,252 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1468 | 848,286 | 1,444,154 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1469 | 848,451 | 1,444,114 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1470 | 848,406 | 1,444,128 | 766.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1471 | 848,495 | 1,444,071 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1472 | 848,535 | 1,444,036 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1473 | 848,550 | 1,444,030 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1474 | 848,563 | 1,444,017 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1475 | 848,602 | 1,444,001 | 762.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1476 | 848,585 | 1,443,998 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1477 | 848,590 | 1,444,002 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1478 | 848,624 | 1,443,985 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1479 | 848,639 | 1,443,989 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1480 | 848,631 | 1,443,967 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1481 | 848,642 | 1,443,957 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1482 | 848,668 | 1,443,946 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1483 | 848,713 | 1,443,933 | 766.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1484 | 848,737 | 1,443,941 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1485 | 848,732 | 1,443,922 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1486 | 848,771 | 1,443,920 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1487 | 848,762 | 1,443,935 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1488 | 848,768 | 1,443,893 | 761.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1489 | 848,775 | 1,443,890 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1490 | 848,747 | 1,443,889 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1491 | 847,321 | 1,444,176 | 731.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1492 | 847,322 | 1,444,188 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1493 | 847,312 | 1,444,203 | 729.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1494 | 847,305 | 1,444,213 | 727.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1495 | 847,271 | 1,444,240 | 723.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1496 | 847,248 | 1,444,262 | 720.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1497 | 847,240 | 1,444,264 | 719.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1498 | 847,217 | 1,444,273 | 718.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1499 | 847,190 | 1,444,223 | 712.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1500 | 847,234 | 1,444,162 | 711.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1501 | 847,156 | 1,444,278 | 708.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1502 | 847,138 | 1,444,288 | 703.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1503 | 847,097 | 1,444,280 | 697.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1504 | 847,024 | 1,444,302 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1505 | 847,014 | 1,444,291 | 694.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1506 | 846,995 | 1,444,308 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1507 | 847,005 | 1,444,244 | 689.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1508 | 846,980 | 1,444,261 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1509 | 847,066 | 1,444,247 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1510 | 846,919 | 1,444,318 | 691.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1511 | 846,849 | 1,444,268 | 694.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1512 | 846,751 | 1,444,245 | 695.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1513 | 846,311 | 1,444,161 | 720.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1514 | 846,301 | 1,444,178 | 721.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1515 | 846,203 | 1,444,214 | 702.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1516 | 846,182 | 1,444,226 | 700.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1517 | 846,162 | 1,444,206 | 698.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1518 | 846,219 | 1,444,263 | 703.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1519 | 846,299 | 1,444,272 | 707.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1520 | 846,278 | 1,444,261 | 707.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1521 | 846,268 | 1,444,264 | 705.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1522 | 846,339 | 1,444,128 | 716.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1523 | 846,334 | 1,444,068 | 718.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1524 | 846,289 | 1,444,056 | 714.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1525 | 846,275 | 1,444,083 | 711.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1526 | 846,078 | 1,444,148 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1527 | 846,063 | 1,444,142 | 694.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1528 | 846,060 | 1,444,159 | 695.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1529 | 846,113 | 1,444,228 | 696.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1530 | 845,926 | 1,444,252 | 687.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1531 | 845,902 | 1,444,204 | 689.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1532 | 845,783 | 1,444,181 | 691.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1533 | 844,815 | 1,444,973 | 662.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1534 | 844,865 | 1,444,911 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1535 | 844,332 | 1,445,361 | 678.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1536 | 844,263 | 1,445,323 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1537 | 844,188 | 1,445,471 | 667.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1538 | 844,488 | 1,445,298 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1539 | 844,086 | 1,445,411 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1540 | 843,957 | 1,445,415 | 650.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1541 | 844,413 | 1,443,303 | 664.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1542 | 844,424 | 1,443,305 | 666.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1543 | 844,443 | 1,443,312 | 669.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1544 | 844,454 | 1,443,313 | 670.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1545 | 844,436 | 1,443,341 | 669.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1546 | 844,472 | 1,443,319 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1547 | 844,490 | 1,443,346 | 672.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1548 | 844,499 | 1,443,393 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1549 | 844,521 | 1,443,347 | 674.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1550 | 844,512 | 1,443,334 | 673.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1551 | 844,552 | 1,443,336 | 676.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1552 | 844,580 | 1,443,350 | 678.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1553 | 844,547 | 1,443,392 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1554 | 844,546 | 1,443,413 | 676.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1555 | 844,513 | 1,443,408 | 674.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1556 | 844,592 | 1,443,389 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1557 | 844,587 | 1,443,404 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1558 | 844,585 | 1,443,409 | 678.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1559 | 844,600 | 1,443,444 | 677.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1560 | 844,630 | 1,443,415 | 680.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1561 | 844,616 | 1,443,383 | 680.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1562 | 844,635 | 1,443,359 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1563 | 844,626 | 1,443,367 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1564 | 844,615 | 1,443,344 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1565 | 844,687 | 1,443,367 | 685.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1566 | 844,708 | 1,443,378 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1567 | 844,719 | 1,443,386 | 686.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1568 | 844,735 | 1,443,386 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1569 | 844,771 | 1,443,434 | 692.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1570 | 844,745 | 1,443,444 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1571 | 844,712 | 1,443,440 | 684.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1572 | 844,722 | 1,443,475 | 683.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1573 | 844,740 | 1,443,485 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1574 | 844,750 | 1,443,478 | 686.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1575 | 844,759 | 1,443,492 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1576 | 844,752 | 1,443,381 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1577 | 844,813 | 1,443,398 | 695.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1578 | 844,832 | 1,443,390 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1579 | 844,857 | 1,443,400 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1580 | 844,860 | 1,443,400 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1581 | 844,870 | 1,443,404 | 696.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1582 | 844,899 | 1,443,402 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1583 | 844,869 | 1,443,382 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1584 | 844,845 | 1,443,457 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1585 | 844,835 | 1,443,454 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1586 | 844,836 | 1,443,484 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1587 | 844,801 | 1,443,485 | 686.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1588 | 844,874 | 1,443,498 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1589 | 844,876 | 1,443,507 | 687.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1590 | 844,935 | 1,443,413 | 697.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1591 | 844,930 | 1,443,506 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1592 | 844,958 | 1,443,522 | 691.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1593 | 844,977 | 1,443,526 | 692.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1594 | 844,983 | 1,443,523 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1595 | 845,003 | 1,443,527 | 692.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1596 | 845,028 | 1,443,533 | 690.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1597 | 845,007 | 1,443,482 | 696.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1598 | 844,961 | 1,443,419 | 699.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1599 | 844,975 | 1,443,425 | 699.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1600 | 844,998 | 1,443,425 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1601 | 845,016 | 1,443,419 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1602 | 845,044 | 1,443,423 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1603 | 845,070 | 1,443,429 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1604 | 845,049 | 1,443,534 | 689.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1605 | 845,044 | 1,443,537 | 688.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1606 | 845,081 | 1,443,532 | 689.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1607 | 845,151 | 1,443,471 | 701.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1608 | 845,161 | 1,443,470 | 701.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1609 | 845,176 | 1,443,474 | 703.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1610 | 845,174 | 1,443,500 | 699.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1611 | 845,241 | 1,443,496 | 699.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1612 | 845,251 | 1,443,499 | 697.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1613 | 845,265 | 1,443,501 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1614 | 845,487 | 1,443,559 | 689.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1615 | 845,461 | 1,443,532 | 691.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1616 | 845,535 | 1,443,548 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1617 | 845,534 | 1,443,558 | 691.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1618 | 845,552 | 1,443,575 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1619 | 845,591 | 1,443,575 | 688.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1620 | 845,677 | 1,443,587 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1621 | 845,699 | 1,443,593 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1622 | 845,783 | 1,443,652 | 689.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1623 | 845,805 | 1,443,660 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1624 | 845,810 | 1,443,666 | 690.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1625 | 845,835 | 1,443,682 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1626 | 845,845 | 1,443,700 | 693.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1627 | 845,865 | 1,443,720 | 695.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1628 | 845,873 | 1,443,719 | 696.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1629 | 845,887 | 1,443,731 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1630 | 845,899 | 1,443,744 | 701.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1631 | 845,913 | 1,443,756 | 704.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1632 | 845,948 | 1,443,795 | 707.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1633 | 845,965 | 1,443,800 | 709.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1634 | 845,723 | 1,443,554 | 689.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1635 | 845,726 | 1,443,570 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1636 | 845,684 | 1,443,554 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1637 | 845,650 | 1,443,514 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1638 | 845,650 | 1,443,509 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1639 | 845,637 | 1,443,501 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1640 | 845,610 | 1,443,502 | 693.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1641 | 845,570 | 1,443,488 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1642 | 845,556 | 1,443,498 | 691.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1643 | 845,562 | 1,443,499 | 691.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1644 | 845,532 | 1,443,483 | 693.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1645 | 845,547 | 1,443,480 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1646 | 845,507 | 1,443,482 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1647 | 845,493 | 1,443,473 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1648 | 845,468 | 1,443,425 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1649 | 845,539 | 1,443,428 | 690.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1650 | 845,549 | 1,443,433 | 691.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1651 | 845,532 | 1,443,429 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1652 | 845,421 | 1,443,476 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1653 | 845,398 | 1,443,468 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1654 | 845,360 | 1,443,467 | 696.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1655 | 845,305 | 1,443,447 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1656 | 845,294 | 1,443,440 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1657 | 845,394 | 1,443,418 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1658 | 845,129 | 1,443,416 | 697.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1659 | 845,108 | 1,443,413 | 698.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1660 | 845,072 | 1,443,400 | 698.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1661 | 845,074 | 1,443,388 | 697.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1662 | 845,057 | 1,443,388 | 698.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1663 | 845,046 | 1,443,389 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1664 | 845,033 | 1,443,380 | 700.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1665 | 845,026 | 1,443,363 | 700.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1666 | 845,008 | 1,443,369 | 701.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1667 | 844,945 | 1,443,365 | 695.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1668 | 844,954 | 1,443,348 | 696.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1669 | 844,907 | 1,443,332 | 696.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1670 | 844,896 | 1,443,328 | 697.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1671 | 844,857 | 1,443,322 | 695.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1672 | 844,848 | 1,443,320 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1673 | 844,827 | 1,443,316 | 694.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1674 | 844,837 | 1,443,294 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1675 | 844,785 | 1,443,307 | 694.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1676 | 844,768 | 1,443,287 | 694.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1677 | 844,755 | 1,443,305 | 691.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1678 | 844,750 | 1,443,279 | 691.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1679 | 844,743 | 1,443,276 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1680 | 844,694 | 1,443,264 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1681 | 844,688 | 1,443,260 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1682 | 844,653 | 1,443,282 | 685.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1683 | 844,659 | 1,443,306 | 685.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1684 | 844,616 | 1,443,297 | 680.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1685 | 844,590 | 1,443,279 | 679.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1686 | 844,576 | 1,443,265 | 678.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1687 | 844,590 | 1,443,240 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1688 | 844,606 | 1,443,244 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1689 | 844,616 | 1,443,252 | 681.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1690 | 844,621 | 1,443,242 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1691 | 844,615 | 1,443,257 | 681.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1692 | 844,640 | 1,443,270 | 683.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1693 | 844,572 | 1,443,227 | 679.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1694 | 844,567 | 1,443,236 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1695 | 844,564 | 1,443,269 | 677.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1696 | 844,547 | 1,443,272 | 675.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1697 | 844,532 | 1,443,280 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1698 | 844,523 | 1,443,275 | 673.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1699 | 844,498 | 1,443,278 | 671.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1700 | 844,508 | 1,443,249 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1701 | 844,516 | 1,443,238 | 674.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1702 | 844,537 | 1,443,231 | 676.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1703 | 844,485 | 1,443,230 | 672.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1704 | 844,477 | 1,443,227 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1705 | 844,469 | 1,443,229 | 671.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1706 | 844,458 | 1,443,237 | 670.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1707 | 844,447 | 1,443,240 | 670.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1708 | 844,436 | 1,443,238 | 670.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1709 | 844,414 | 1,443,239 | 670.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1710 | 844,404 | 1,443,242 | 670.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1711 | 844,388 | 1,443,241 | 669.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1712 | 844,379 | 1,443,244 | 668.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1713 | 844,331 | 1,443,242 | 667.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1714 | 844,303 | 1,443,279 | 665.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1715 | 844,296 | 1,443,276 | 665.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1716 | 844,292 | 1,443,288 | 665.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1717 | 844,325 | 1,443,285 | 664.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1718 | 844,312 | 1,443,304 | 664.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1719 | 844,213 | 1,443,342 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1720 | 844,225 | 1,443,348 | 660.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1721 | 844,224 | 1,443,301 | 662.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1722 | 844,214 | 1,443,262 | 664.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1723 | 844,190 | 1,443,267 | 662.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1724 | 844,181 | 1,443,262 | 662.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1725 | 844,176 | 1,443,267 | 661.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1726 | 844,169 | 1,443,273 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1727 | 844,153 | 1,443,278 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1728 | 844,145 | 1,443,276 | 661.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1729 | 844,134 | 1,443,286 | 660.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1730 | 844,118 | 1,443,286 | 660.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1731 | 844,107 | 1,443,298 | 659.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1732 | 844,105 | 1,443,353 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1733 | 844,004 | 1,443,324 | 655.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1734 | 843,920 | 1,443,400 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1735 | 843,905 | 1,443,399 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1736 | 843,880 | 1,443,408 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1737 | 843,847 | 1,443,403 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1738 | 843,821 | 1,443,373 | 648.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1739 | 843,813 | 1,443,374 | 647.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1740 | 843,761 | 1,443,399 | 646.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1741 | 843,754 | 1,443,397 | 646.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1742 | 843,751 | 1,443,400 | 646.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1743 | 844,677 | 1,443,312 | 686.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1744 | 844,304 | 1,443,163 | 674.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1745 | 844,318 | 1,443,178 | 673.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1746 | 844,345 | 1,443,179 | 674.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1747 | 844,350 | 1,443,143 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1748 | 844,333 | 1,443,109 | 674.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1749 | 844,367 | 1,443,189 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1750 | 844,384 | 1,443,199 | 673.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1751 | 844,404 | 1,443,202 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1752 | 844,409 | 1,443,166 | 676.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1753 | 844,356 | 1,443,088 | 675.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1754 | 844,344 | 1,443,094 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1755 | 844,298 | 1,443,051 | 674.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1756 | 844,304 | 1,443,031 | 672.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1757 | 844,277 | 1,443,026 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1758 | 844,364 | 1,443,037 | 673.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1759 | 844,407 | 1,443,050 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1760 | 844,440 | 1,443,103 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1761 | 844,413 | 1,443,204 | 673.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1762 | 844,424 | 1,443,200 | 673.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1763 | 844,436 | 1,443,207 | 672.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1764 | 844,473 | 1,443,196 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1765 | 844,511 | 1,443,179 | 678.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1766 | 844,531 | 1,443,186 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1767 | 844,573 | 1,443,194 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1768 | 844,582 | 1,443,194 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1769 | 844,598 | 1,443,192 | 681.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1770 | 844,612 | 1,443,183 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1771 | 844,619 | 1,443,207 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1772 | 844,627 | 1,443,206 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1773 | 844,636 | 1,443,200 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1774 | 844,701 | 1,443,225 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1775 | 844,711 | 1,443,226 | 687.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1776 | 844,721 | 1,443,230 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1777 | 844,737 | 1,443,236 | 689.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1778 | 844,747 | 1,443,232 | 690.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1779 | 844,775 | 1,443,232 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1780 | 844,784 | 1,443,224 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1781 | 844,802 | 1,443,246 | 695.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1782 | 844,806 | 1,443,244 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1783 | 844,827 | 1,443,251 | 692.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1784 | 844,833 | 1,443,258 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1785 | 844,868 | 1,443,242 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1786 | 844,880 | 1,443,245 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1787 | 844,894 | 1,443,254 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1788 | 844,917 | 1,443,269 | 691.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1789 | 844,929 | 1,443,284 | 695.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1790 | 844,967 | 1,443,302 | 696.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1791 | 844,978 | 1,443,310 | 697.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1792 | 845,008 | 1,443,297 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1793 | 845,045 | 1,443,338 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1794 | 845,052 | 1,443,343 | 697.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1795 | 845,061 | 1,443,347 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1796 | 845,080 | 1,443,349 | 695.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1797 | 845,375 | 1,443,360 | 686.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1798 | 845,379 | 1,443,374 | 687.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1799 | 845,237 | 1,443,396 | 690.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1800 | 845,266 | 1,443,433 | 691.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1801 | 844,346 | 1,442,983 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1802 | 844,435 | 1,443,055 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1803 | 844,460 | 1,443,072 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1804 | 844,464 | 1,443,055 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1805 | 844,456 | 1,443,042 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1806 | 844,501 | 1,443,045 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1807 | 844,493 | 1,443,041 | 681.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1808 | 844,516 | 1,443,076 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1809 | 844,531 | 1,443,085 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1810 | 844,538 | 1,443,078 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1811 | 844,546 | 1,443,083 | 689.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1812 | 844,546 | 1,443,058 | 688.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1813 | 844,546 | 1,443,052 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1814 | 844,527 | 1,443,023 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1815 | 844,533 | 1,443,016 | 680.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1816 | 844,540 | 1,443,022 | 681.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1817 | 844,476 | 1,443,016 | 675.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1818 | 844,459 | 1,443,018 | 675.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1819 | 844,496 | 1,443,007 | 675.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1820 | 844,500 | 1,442,993 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1821 | 844,558 | 1,443,013 | 680.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1822 | 844,566 | 1,443,018 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1823 | 844,580 | 1,443,024 | 681.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1824 | 844,598 | 1,443,028 | 680.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1825 | 844,587 | 1,443,061 | 685.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1826 | 844,584 | 1,443,067 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1827 | 844,579 | 1,443,081 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1828 | 844,602 | 1,443,087 | 684.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1829 | 844,617 | 1,443,084 | 683.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1830 | 844,630 | 1,443,085 | 683.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1831 | 844,588 | 1,443,127 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1832 | 844,568 | 1,443,138 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1833 | 844,616 | 1,443,146 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1834 | 844,623 | 1,443,148 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1835 | 844,649 | 1,443,136 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1836 | 844,667 | 1,443,137 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1837 | 844,675 | 1,443,150 | 686.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1838 | 844,647 | 1,443,181 | 683.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1839 | 844,720 | 1,443,156 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1840 | 844,760 | 1,443,160 | 688.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1841 | 844,772 | 1,443,163 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1842 | 844,781 | 1,443,186 | 686.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1843 | 844,805 | 1,443,186 | 684.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1844 | 844,818 | 1,443,163 | 683.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1845 | 844,846 | 1,443,179 | 685.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1846 | 844,878 | 1,443,189 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1847 | 844,901 | 1,443,216 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1848 | 844,919 | 1,443,195 | 685.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1849 | 844,948 | 1,443,245 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1850 | 844,958 | 1,443,251 | 692.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1851 | 844,974 | 1,443,252 | 694.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1852 | 844,969 | 1,443,223 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1853 | 844,984 | 1,443,222 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1854 | 845,050 | 1,443,253 | 693.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1855 | 845,056 | 1,443,289 | 696.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1856 | 845,066 | 1,443,291 | 695.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1857 | 845,136 | 1,443,297 | 689.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1858 | 845,153 | 1,443,307 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1859 | 845,143 | 1,443,244 | 686.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1860 | 845,195 | 1,443,263 | 684.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1861 | 845,106 | 1,443,228 | 688.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1862 | 845,098 | 1,443,221 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1863 | 845,084 | 1,443,212 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1864 | 845,013 | 1,443,195 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1865 | 845,006 | 1,443,192 | 687.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1866 | 844,999 | 1,443,187 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1867 | 844,988 | 1,443,187 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1868 | 844,978 | 1,443,183 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1869 | 844,969 | 1,443,178 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1870 | 844,941 | 1,443,166 | 681.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1871 | 844,911 | 1,443,149 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1872 | 844,882 | 1,443,140 | 678.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1873 | 844,892 | 1,443,148 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1874 | 844,888 | 1,443,111 | 675.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1875 | 844,924 | 1,443,108 | 673.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1876 | 844,810 | 1,443,113 | 683.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1877 | 844,844 | 1,443,140 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1878 | 844,837 | 1,443,080 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1879 | 844,805 | 1,443,059 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1880 | 844,791 | 1,443,062 | 680.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1881 | 844,759 | 1,443,055 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1882 | 844,736 | 1,443,051 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1883 | 844,751 | 1,443,113 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1884 | 844,783 | 1,443,125 | 685.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1885 | 844,741 | 1,443,105 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1886 | 844,729 | 1,443,104 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1887 | 844,701 | 1,443,098 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1888 | 844,694 | 1,443,096 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1889 | 844,671 | 1,443,087 | 686.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1890 | 844,660 | 1,443,085 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1891 | 844,704 | 1,443,049 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1892 | 844,680 | 1,443,039 | 677.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1893 | 844,655 | 1,443,038 | 676.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1894 | 844,632 | 1,443,045 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1895 | 844,573 | 1,442,984 | 673.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1896 | 844,559 | 1,442,981 | 674.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1897 | 844,541 | 1,442,978 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1898 | 844,509 | 1,442,962 | 673.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1899 | 844,502 | 1,442,959 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1900 | 844,497 | 1,442,943 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1901 | 844,466 | 1,442,953 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1902 | 844,453 | 1,442,943 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1903 | 844,421 | 1,442,985 | 672.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1904 | 844,400 | 1,442,977 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1905 | 844,392 | 1,442,988 | 670.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1906 | 844,430 | 1,442,935 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1907 | 844,407 | 1,442,933 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1908 | 844,385 | 1,442,937 | 669.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1909 | 844,386 | 1,442,911 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1910 | 844,386 | 1,442,871 | 666.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1911 | 845,109 | 1,443,142 | 677.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1912 | 845,093 | 1,443,136 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1913 | 845,073 | 1,443,131 | 679.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1914 | 845,060 | 1,443,128 | 679.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1915 | 845,089 | 1,443,104 | 674.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1916 | 845,109 | 1,443,115 | 674.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1917 | 845,164 | 1,443,058 | 667.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1918 | 844,408 | 1,443,119 | 678.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1919 | 844,403 | 1,443,116 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1920 | 844,409 | 1,443,115 | 678.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1921 | 844,455 | 1,443,126 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1922 | 844,463 | 1,443,129 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1923 | 844,453 | 1,443,137 | 677.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1924 | 844,448 | 1,443,146 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1925 | 844,437 | 1,443,148 | 676.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1926 | 844,450 | 1,443,164 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1927 | 844,436 | 1,443,159 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1928 | 844,429 | 1,443,164 | 676.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1929 | 844,479 | 1,443,136 | 679.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1930 | 844,494 | 1,443,117 | 682.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1931 | 844,523 | 1,443,117 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1932 | 844,543 | 1,443,138 | 684.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1933 | 843,782 | 1,443,140 | 665.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1934 | 843,765 | 1,443,113 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1935 | 843,743 | 1,443,109 | 668.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1936 | 843,800 | 1,443,118 | 667.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1937 | 843,716 | 1,443,117 | 669.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1938 | 843,686 | 1,443,114 | 667.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1939 | 843,649 | 1,443,097 | 665.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1940 | 843,636 | 1,443,096 | 665.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1941 | 843,616 | 1,443,067 | 662.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1942 | 843,571 | 1,443,099 | 661.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1943 | 843,525 | 1,443,005 | 658.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1944 | 843,515 | 1,443,050 | 658.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1945 | 843,479 | 1,443,023 | 656.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1946 | 843,446 | 1,443,027 | 655.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1947 | 843,485 | 1,442,954 | 657.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1948 | 843,468 | 1,442,933 | 656.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1949 | 843,462 | 1,442,913 | 654.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1950 | 843,450 | 1,442,911 | 654.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1951 | 843,435 | 1,442,890 | 652.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1952 | 843,412 | 1,442,860 | 648.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1953 | 843,397 | 1,442,874 | 648.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1954 | 843,376 | 1,442,834 | 642.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1955 | 843,349 | 1,442,804 | 640.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1956 | 843,348 | 1,442,828 | 641.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1957 | 843,231 | 1,442,790 | 635.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1958 | 843,222 | 1,442,675 | 626.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1959 | 842,873 | 1,442,667 | 635.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1960 | 842,958 | 1,442,519 | 635.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1961 | 842,718 | 1,442,568 | 647.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1962 | 842,688 | 1,442,560 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1963 | 842,693 | 1,442,471 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1964 | 842,578 | 1,442,466 | 655.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1965 | 842,556 | 1,442,453 | 655.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1966 | 842,566 | 1,442,456 | 655.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1967 | 842,529 | 1,442,372 | 655.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1968 | 842,487 | 1,442,375 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1969 | 842,491 | 1,442,323 | 652.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1970 | 842,451 | 1,442,366 | 653.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1971 | 842,450 | 1,442,353 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1972 | 842,442 | 1,442,343 | 653.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1973 | 842,432 | 1,442,324 | 652.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1974 | 842,418 | 1,442,317 | 650.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1975 | 842,392 | 1,442,288 | 650.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1976 | 842,353 | 1,442,272 | 652.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1977 | 842,347 | 1,442,252 | 655.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1978 | 842,346 | 1,442,228 | 656.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1979 | 842,398 | 1,442,166 | 656.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1980 | 842,363 | 1,442,162 | 657.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1981 | 842,354 | 1,442,158 | 658.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1982 | 842,366 | 1,442,153 | 658.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1983 | 842,344 | 1,442,139 | 659.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1984 | 842,341 | 1,442,123 | 658.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1985 | 842,343 | 1,442,110 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1986 | 842,355 | 1,442,117 | 658.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1987 | 842,346 | 1,442,093 | 658.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1988 | 842,367 | 1,442,095 | 657.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1989 | 842,404 | 1,442,115 | 657.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1990 | 842,384 | 1,442,120 | 658.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1991 | 842,403 | 1,442,084 | 656.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1992 | 842,387 | 1,442,060 | 653.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1993 | 842,411 | 1,442,046 | 650.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1994 | 842,400 | 1,442,038 | 649.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1995 | 842,345 | 1,442,044 | 653.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1996 | 842,330 | 1,441,978 | 643.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1997 | 842,326 | 1,441,938 | 640.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1998 | 842,326 | 1,441,926 | 639.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1999 | 842,324 | 1,441,865 | 636.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2000 | 842,339 | 1,441,856 | 636.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2001 | 842,384 | 1,441,831 | 634.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2002 | 842,318 | 1,441,928 | 639.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2003 | 842,372 | 1,441,813 | 632.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2004 | 842,365 | 1,441,767 | 626.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2005 | 842,327 | 1,441,771 | 626.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2006 | 842,316 | 1,441,772 | 626.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2007 | 842,371 | 1,441,725 | 623.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2008 | 842,411 | 1,441,750 | 626.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2009 | 842,425 | 1,441,786 | 632.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2010 | 842,370 | 1,441,651 | 618.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2011 | 842,374 | 1,441,640 | 618.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2012 | 842,378 | 1,441,604 | 615.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2013 | 842,334 | 1,441,579 | 609.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2014 | 842,332 | 1,441,624 | 609.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2015 | 842,396 | 1,441,478 | 605.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2016 | 842,384 | 1,441,476 | 606.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2017 | 842,177 | 1,441,388 | 610.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2018 | 842,171 | 1,441,400 | 612.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2019 | 842,163 | 1,441,393 | 611.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2020 | 842,236 | 1,441,313 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2021 | 842,048 | 1,440,945 | 577.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2022 | 842,038 | 1,440,957 | 578.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2023 | 842,038 | 1,440,897 | 579.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2024 | 842,025 | 1,440,914 | 580.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2025 | 842,021 | 1,440,880 | 582.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2026 | 842,017 | 1,440,864 | 582.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2027 | 842,036 | 1,440,866 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2028 | 842,020 | 1,440,843 | 581.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2029 | 842,030 | 1,440,843 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2030 | 842,010 | 1,440,845 | 581.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2031 | 842,055 | 1,440,856 | 579.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2032 | 842,068 | 1,440,827 | 582.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2033 | 842,076 | 1,440,823 | 582.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2034 | 842,080 | 1,440,835 | 581.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2035 | 842,097 | 1,440,841 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2036 | 842,104 | 1,440,836 | 580.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2037 | 842,107 | 1,440,834 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2038 | 842,073 | 1,440,797 | 585.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2039 | 842,055 | 1,440,784 | 585.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2040 | 842,047 | 1,440,794 | 583.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2041 | 841,990 | 1,440,717 | 589.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2042 | 842,066 | 1,440,728 | 592.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2043 | 842,123 | 1,440,775 | 586.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2044 | 842,386 | 1,440,799 | 592.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2045 | 842,360 | 1,440,795 | 586.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2046 | 842,343 | 1,440,800 | 584.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2047 | 842,334 | 1,440,780 | 583.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2048 | 842,327 | 1,440,779 | 583.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2049 | 842,318 | 1,440,784 | 582.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2050 | 842,294 | 1,440,780 | 579.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2051 | 842,291 | 1,440,777 | 579.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2052 | 842,283 | 1,440,770 | 579.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2053 | 842,271 | 1,440,769 | 579.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2054 | 842,256 | 1,440,772 | 580.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2055 | 842,246 | 1,440,808 | 581.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2056 | 842,229 | 1,440,819 | 581.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2057 | 842,210 | 1,440,826 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2058 | 842,231 | 1,440,843 | 581.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2059 | 842,239 | 1,440,855 | 581.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2060 | 842,285 | 1,440,864 | 584.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2061 | 842,279 | 1,440,834 | 583.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2062 | 842,302 | 1,440,830 | 583.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2063 | 842,318 | 1,440,831 | 584.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2064 | 842,323 | 1,440,840 | 585.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2065 | 842,295 | 1,440,870 | 584.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2066 | 842,320 | 1,440,888 | 588.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2067 | 842,403 | 1,440,796 | 595.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2068 | 842,352 | 1,440,901 | 592.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2069 | 842,367 | 1,440,879 | 594.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2070 | 842,399 | 1,440,896 | 598.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2071 | 842,379 | 1,440,912 | 596.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2072 | 842,402 | 1,440,920 | 597.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2073 | 842,434 | 1,440,893 | 600.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2074 | 842,437 | 1,440,897 | 600.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2075 | 842,430 | 1,440,854 | 600.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2076 | 842,459 | 1,440,867 | 602.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2077 | 842,361 | 1,440,949 | 589.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2078 | 842,336 | 1,440,919 | 589.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2079 | 842,328 | 1,440,918 | 588.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2080 | 842,390 | 1,440,946 | 592.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2081 | 842,397 | 1,441,022 | 595.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2082 | 842,420 | 1,441,000 | 599.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2083 | 842,448 | 1,441,022 | 602.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2084 | 842,476 | 1,440,951 | 603.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2085 | 842,496 | 1,440,980 | 606.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2086 | 842,471 | 1,441,012 | 603.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2087 | 842,464 | 1,441,017 | 603.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2088 | 842,475 | 1,441,036 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2089 | 842,498 | 1,441,026 | 605.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2090 | 842,558 | 1,440,956 | 611.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2091 | 842,491 | 1,440,907 | 605.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2092 | 842,501 | 1,440,852 | 606.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2093 | 842,511 | 1,440,862 | 608.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2094 | 842,586 | 1,440,983 | 611.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2095 | 842,592 | 1,440,976 | 611.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2096 | 842,610 | 1,440,998 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2097 | 842,560 | 1,440,864 | 613.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2098 | 842,568 | 1,440,809 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2099 | 842,555 | 1,440,810 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2100 | 842,538 | 1,440,809 | 609.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2101 | 842,537 | 1,440,787 | 607.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2102 | 842,515 | 1,440,786 | 606.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2103 | 842,485 | 1,440,788 | 604.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2104 | 842,496 | 1,440,804 | 605.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2105 | 842,459 | 1,440,790 | 601.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2106 | 842,455 | 1,440,744 | 596.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2107 | 842,489 | 1,440,759 | 602.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2108 | 842,469 | 1,440,690 | 594.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2109 | 842,571 | 1,440,758 | 608.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2110 | 842,554 | 1,440,747 | 607.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2111 | 842,535 | 1,440,755 | 606.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2112 | 842,565 | 1,440,723 | 607.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2113 | 842,596 | 1,440,694 | 608.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2114 | 842,611 | 1,440,705 | 610.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2115 | 842,646 | 1,440,699 | 611.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2116 | 842,658 | 1,440,696 | 610.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2117 | 842,684 | 1,440,696 | 610.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2118 | 842,694 | 1,440,806 | 616.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2119 | 842,685 | 1,440,811 | 615.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2120 | 842,674 | 1,440,805 | 615.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2121 | 842,668 | 1,440,808 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2122 | 842,658 | 1,440,803 | 614.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2123 | 842,649 | 1,440,806 | 614.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2124 | 842,637 | 1,440,801 | 614.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2125 | 842,625 | 1,440,787 | 613.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2126 | 842,603 | 1,440,806 | 614.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2127 | 842,590 | 1,440,801 | 612.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2128 | 842,608 | 1,440,701 | 609.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2129 | 842,711 | 1,440,693 | 610.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2130 | 842,628 | 1,440,871 | 614.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2131 | 842,655 | 1,440,848 | 613.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2132 | 842,677 | 1,440,854 | 614.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2133 | 842,705 | 1,440,851 | 614.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2134 | 842,721 | 1,440,895 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2135 | 842,720 | 1,440,931 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2136 | 842,754 | 1,440,901 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2137 | 842,770 | 1,440,923 | 618.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2138 | 842,781 | 1,440,927 | 618.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2139 | 842,794 | 1,440,933 | 620.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2140 | 842,806 | 1,440,929 | 622.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2141 | 842,767 | 1,440,814 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2142 | 842,756 | 1,440,802 | 616.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2143 | 842,820 | 1,440,799 | 614.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2144 | 842,775 | 1,440,671 | 611.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2145 | 842,780 | 1,440,662 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2146 | 842,775 | 1,440,640 | 608.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2147 | 842,766 | 1,440,624 | 607.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2148 | 842,726 | 1,440,588 | 604.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2149 | 842,782 | 1,440,552 | 610.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2150 | 842,743 | 1,440,487 | 609.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2151 | 842,729 | 1,440,523 | 607.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2152 | 842,724 | 1,440,533 | 606.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2153 | 842,769 | 1,440,489 | 610.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2154 | 842,786 | 1,440,500 | 611.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2155 | 842,784 | 1,440,482 | 610.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2156 | 842,794 | 1,440,476 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2157 | 842,813 | 1,440,497 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2158 | 842,836 | 1,440,485 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2159 | 842,845 | 1,440,488 | 615.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2160 | 842,805 | 1,440,535 | 611.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2161 | 842,818 | 1,440,530 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2162 | 842,842 | 1,440,547 | 613.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2163 | 842,854 | 1,440,548 | 614.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2164 | 842,834 | 1,440,571 | 611.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2165 | 842,840 | 1,440,602 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2166 | 842,871 | 1,440,487 | 618.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2167 | 842,889 | 1,440,495 | 619.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2168 | 842,874 | 1,440,533 | 616.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2169 | 842,929 | 1,440,527 | 622.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2170 | 842,959 | 1,440,541 | 619.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2171 | 842,945 | 1,440,578 | 617.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2172 | 842,917 | 1,440,591 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2173 | 842,924 | 1,440,501 | 621.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2174 | 842,941 | 1,440,500 | 620.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2175 | 842,936 | 1,440,489 | 620.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2176 | 842,956 | 1,440,482 | 618.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2177 | 842,990 | 1,440,494 | 616.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2178 | 842,995 | 1,440,483 | 615.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2179 | 843,030 | 1,440,510 | 615.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2180 | 843,051 | 1,440,500 | 616.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2181 | 843,090 | 1,440,504 | 620.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2182 | 842,911 | 1,440,435 | 614.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2183 | 842,940 | 1,440,439 | 614.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2184 | 842,963 | 1,440,376 | 610.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2185 | 842,997 | 1,440,420 | 612.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2186 | 842,962 | 1,440,426 | 612.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2187 | 842,945 | 1,440,417 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2188 | 842,913 | 1,440,417 | 612.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2189 | 842,905 | 1,440,418 | 612.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2190 | 842,894 | 1,440,383 | 609.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2191 | 842,889 | 1,440,371 | 607.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2192 | 842,732 | 1,440,593 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2193 | 842,820 | 1,440,711 | 610.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2194 | 842,868 | 1,440,671 | 614.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2195 | 842,842 | 1,440,635 | 611.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2196 | 842,836 | 1,440,639 | 610.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2197 | 842,872 | 1,440,728 | 614.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2198 | 843,063 | 1,440,385 | 614.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2199 | 843,069 | 1,440,449 | 616.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2200 | 843,047 | 1,440,451 | 616.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2201 | 843,034 | 1,440,446 | 616.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2202 | 842,931 | 1,440,262 | 597.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2203 | 842,949 | 1,440,264 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2204 | 842,892 | 1,440,265 | 597.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2205 | 842,888 | 1,440,307 | 601.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2206 | 843,104 | 1,440,342 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2207 | 843,126 | 1,440,328 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2208 | 843,150 | 1,440,353 | 616.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2209 | 843,186 | 1,440,345 | 620.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2210 | 843,128 | 1,440,378 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2211 | 843,149 | 1,440,437 | 618.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2212 | 843,144 | 1,440,433 | 617.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2213 | 843,144 | 1,440,481 | 622.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2214 | 843,138 | 1,440,479 | 622.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2215 | 843,130 | 1,440,484 | 621.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2216 | 843,220 | 1,440,456 | 623.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2217 | 843,201 | 1,440,450 | 622.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2218 | 843,228 | 1,440,477 | 623.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2219 | 843,273 | 1,440,445 | 626.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2220 | 843,159 | 1,440,516 | 626.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2221 | 843,227 | 1,440,398 | 622.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2222 | 843,248 | 1,440,365 | 625.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2223 | 843,278 | 1,440,360 | 626.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2224 | 843,305 | 1,440,354 | 626.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2225 | 843,428 | 1,440,484 | 636.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2226 | 842,010 | 1,440,524 | 613.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2227 | 842,113 | 1,440,531 | 608.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2228 | 842,142 | 1,440,533 | 604.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2229 | 842,142 | 1,440,571 | 602.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2230 | 842,144 | 1,440,580 | 602.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2231 | 842,178 | 1,440,586 | 601.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2232 | 842,167 | 1,440,537 | 600.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2233 | 842,181 | 1,440,534 | 598.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2234 | 842,191 | 1,440,538 | 598.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2235 | 842,222 | 1,440,534 | 596.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2236 | 842,230 | 1,440,536 | 596.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2237 | 842,217 | 1,440,578 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2238 | 842,218 | 1,440,599 | 598.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2239 | 842,266 | 1,440,598 | 595.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2240 | 842,230 | 1,440,475 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2241 | 842,136 | 1,440,480 | 608.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2242 | 842,145 | 1,440,508 | 605.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2243 | 842,273 | 1,440,433 | 603.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2244 | 842,265 | 1,440,432 | 604.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2245 | 842,253 | 1,440,434 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2246 | 842,242 | 1,440,444 | 603.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2247 | 842,299 | 1,440,451 | 599.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2248 | 842,321 | 1,440,468 | 597.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2249 | 842,292 | 1,440,501 | 596.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2250 | 842,338 | 1,440,471 | 597.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2251 | 842,350 | 1,440,470 | 597.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2252 | 842,372 | 1,440,522 | 593.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2253 | 842,385 | 1,440,473 | 596.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2254 | 842,399 | 1,440,467 | 595.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2255 | 842,406 | 1,440,428 | 598.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2256 | 842,400 | 1,440,413 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2257 | 842,347 | 1,440,412 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2258 | 842,345 | 1,440,425 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2259 | 842,316 | 1,440,415 | 601.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2260 | 842,312 | 1,440,407 | 602.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2261 | 842,294 | 1,440,401 | 605.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2262 | 842,257 | 1,440,392 | 609.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2263 | 842,356 | 1,440,367 | 600.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2264 | 842,427 | 1,440,328 | 601.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2265 | 842,429 | 1,440,315 | 601.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2266 | 842,495 | 1,440,343 | 599.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2267 | 842,483 | 1,440,360 | 598.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2268 | 842,467 | 1,440,429 | 594.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2269 | 842,451 | 1,440,438 | 595.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2270 | 842,463 | 1,440,385 | 598.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2271 | 842,447 | 1,440,377 | 599.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2272 | 842,621 | 1,440,338 | 593.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2273 | 842,600 | 1,440,310 | 600.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2274 | 842,581 | 1,440,302 | 602.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2275 | 842,573 | 1,440,299 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2276 | 842,659 | 1,440,281 | 598.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2277 | 841,909 | 1,440,778 | 583.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2278 | 841,900 | 1,440,764 | 585.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2279 | 841,939 | 1,440,765 | 586.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2280 | 849,741 | 1,447,067 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2281 | 849,725 | 1,447,111 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2282 | 849,777 | 1,447,077 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2283 | 849,812 | 1,447,092 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2284 | 849,808 | 1,447,127 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2285 | 843,428 | 1,443,637 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2286 | 843,361 | 1,443,629 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2287 | 843,442 | 1,443,559 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2288 | 843,391 | 1,443,357 | 660.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2289 | 843,255 | 1,443,331 | 658.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2290 | 843,251 | 1,443,444 | 663.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2291 | 843,449 | 1,443,160 | 664.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2292 | 843,562 | 1,445,792 | 657.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2293 | 843,512 | 1,445,188 | 645.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2294 | 843,599 | 1,445,158 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2295 | 843,632 | 1,445,191 | 651.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2296 | 843,618 | 1,445,109 | 648.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2297 | 843,641 | 1,445,063 | 647.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2298 | 843,772 | 1,445,124 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2299 | 843,727 | 1,445,170 | 656.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2300 | 843,813 | 1,445,166 | 656.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2301 | 844,024 | 1,445,058 | 652.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2302 | 844,008 | 1,445,049 | 651.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2303 | 843,971 | 1,444,990 | 647.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2304 | 844,104 | 1,444,958 | 647.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2305 | 844,212 | 1,444,995 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2306 | 844,965 | 1,444,806 | 652.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2307 | 845,033 | 1,444,726 | 652.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2308 | 845,139 | 1,444,554 | 660.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2309 | 845,336 | 1,444,616 | 663.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2310 | 845,085 | 1,444,393 | 660.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2311 | 845,329 | 1,444,091 | 679.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2312 | 845,415 | 1,444,117 | 681.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2313 | 845,594 | 1,444,036 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2314 | 845,492 | 1,444,234 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2315 | 845,700 | 1,444,327 | 682.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2316 | 846,640 | 1,444,704 | 689.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2317 | 846,166 | 1,444,756 | 676.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2318 | 846,141 | 1,444,914 | 671.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2319 | 846,131 | 1,444,933 | 669.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2320 | 845,950 | 1,444,754 | 660.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2321 | 845,876 | 1,444,882 | 663.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2322 | 846,065 | 1,444,979 | 664.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2323 | 845,904 | 1,445,091 | 660.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2324 | 845,688 | 1,444,950 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2325 | 845,592 | 1,445,390 | 637.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2326 | 845,449 | 1,445,401 | 630.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2327 | 845,412 | 1,445,508 | 624.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2328 | 845,489 | 1,445,463 | 632.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2329 | 845,288 | 1,445,564 | 598.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2330 | 847,080 | 1,444,645 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2331 | 847,119 | 1,444,628 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2332 | 847,049 | 1,444,750 | 683.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2333 | 846,993 | 1,444,823 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2334 | 846,931 | 1,445,014 | 675.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2335 | 846,968 | 1,445,117 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2336 | 846,745 | 1,445,250 | 671.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2337 | 846,728 | 1,445,216 | 666.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2338 | 846,700 | 1,445,173 | 660.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2339 | 846,802 | 1,445,309 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2340 | 846,775 | 1,445,325 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2341 | 846,758 | 1,445,360 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2342 | 846,616 | 1,445,456 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2343 | 846,418 | 1,445,548 | 684.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2344 | 846,357 | 1,445,628 | 671.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2345 | 845,879 | 1,445,636 | 636.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2346 | 845,856 | 1,445,691 | 633.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2347 | 845,822 | 1,445,698 | 626.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2348 | 845,812 | 1,445,784 | 632.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2349 | 845,783 | 1,445,853 | 641.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2350 | 845,389 | 1,445,950 | 636.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2351 | 845,422 | 1,446,019 | 636.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2352 | 845,213 | 1,446,161 | 631.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2353 | 845,228 | 1,446,203 | 628.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2354 | 845,248 | 1,446,194 | 628.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2355 | 845,107 | 1,446,245 | 627.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2356 | 845,079 | 1,446,253 | 625.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2357 | 845,142 | 1,446,316 | 623.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2358 | 844,958 | 1,446,440 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2359 | 845,122 | 1,446,563 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2360 | 844,829 | 1,446,462 | 624.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2361 | 844,934 | 1,446,541 | 613.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2362 | 844,710 | 1,446,513 | 619.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2363 | 844,558 | 1,446,502 | 612.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2364 | 844,198 | 1,446,501 | 571.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2365 | 844,171 | 1,446,634 | 564.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2366 | 844,335 | 1,446,875 | 561.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2367 | 844,148 | 1,447,000 | 568.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2368 | 844,130 | 1,446,987 | 568.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2369 | 844,035 | 1,447,008 | 574.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2370 | 843,938 | 1,446,891 | 561.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2371 | 843,828 | 1,446,949 | 561.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2372 | 844,432 | 1,446,966 | 575.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2373 | 844,478 | 1,446,913 | 566.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2374 | 844,498 | 1,447,008 | 576.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2375 | 844,511 | 1,447,028 | 576.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2376 | 844,097 | 1,447,293 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2377 | 843,908 | 1,447,347 | 590.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2378 | 844,649 | 1,446,941 | 559.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2379 | 844,614 | 1,446,984 | 560.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2380 | 844,669 | 1,446,874 | 564.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2381 | 844,745 | 1,447,115 | 562.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2382 | 844,888 | 1,446,827 | 573.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2383 | 844,941 | 1,446,930 | 567.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2384 | 844,897 | 1,447,068 | 567.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2385 | 845,577 | 1,446,922 | 593.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2386 | 845,233 | 1,446,865 | 596.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2387 | 845,321 | 1,446,819 | 595.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2388 | 845,374 | 1,446,859 | 600.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2389 | 845,407 | 1,446,894 | 605.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2390 | 845,391 | 1,446,923 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2391 | 845,497 | 1,446,813 | 592.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2392 | 845,653 | 1,446,941 | 595.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2393 | 845,799 | 1,446,847 | 591.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2394 | 845,848 | 1,446,817 | 588.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2395 | 846,000 | 1,446,848 | 590.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2396 | 846,110 | 1,446,943 | 617.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2397 | 846,116 | 1,447,026 | 627.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2398 | 846,356 | 1,446,948 | 632.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2399 | 846,303 | 1,446,963 | 638.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2400 | 846,399 | 1,447,115 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2401 | 846,625 | 1,447,199 | 676.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2402 | 846,674 | 1,446,956 | 664.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2403 | 847,014 | 1,447,423 | 704.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2404 | 847,163 | 1,447,203 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2405 | 847,290 | 1,447,292 | 699.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2406 | 847,407 | 1,447,352 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2407 | 848,384 | 1,445,011 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2408 | 848,484 | 1,442,337 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2409 | 848,478 | 1,442,322 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2410 | 848,579 | 1,442,608 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2411 | 848,478 | 1,442,508 | 798.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2412 | 848,156 | 1,442,543 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2413 | 848,208 | 1,442,486 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2414 | 847,763 | 1,442,523 | 748.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2415 | 847,335 | 1,442,712 | 713.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2416 | 847,289 | 1,442,634 | 712.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2417 | 847,984 | 1,440,844 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2418 | 847,316 | 1,440,659 | 666.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2419 | 847,308 | 1,440,650 | 667.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2420 | 847,312 | 1,440,688 | 665.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2421 | 847,378 | 1,440,689 | 664.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2422 | 847,380 | 1,440,705 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2423 | 847,229 | 1,440,498 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2424 | 847,241 | 1,440,330 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2425 | 847,129 | 1,440,482 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2426 | 846,610 | 1,439,962 | 655.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2427 | 846,701 | 1,439,969 | 652.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2428 | 846,575 | 1,439,880 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2429 | 846,505 | 1,439,961 | 660.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2430 | 846,551 | 1,440,103 | 643.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2431 | 846,339 | 1,440,072 | 647.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2432 | 846,310 | 1,439,954 | 662.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2433 | 846,157 | 1,440,056 | 650.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2434 | 845,877 | 1,443,571 | 690.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2435 | 845,965 | 1,443,445 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2436 | 845,994 | 1,443,414 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2437 | 846,194 | 1,443,239 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2438 | 846,115 | 1,443,080 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2439 | 845,993 | 1,443,164 | 681.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2440 | 845,715 | 1,442,955 | 655.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2441 | 847,108 | 1,446,141 | 609.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2442 | 847,162 | 1,446,092 | 616.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2443 | 848,744 | 1,446,651 | 737.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2444 | 848,726 | 1,446,652 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2445 | 848,722 | 1,446,651 | 735.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2446 | 848,691 | 1,446,642 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2447 | 848,700 | 1,446,658 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2448 | 848,726 | 1,446,617 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2449 | 848,611 | 1,446,594 | 734.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2450 | 848,601 | 1,446,619 | 732.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2451 | 849,049 | 1,446,745 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2452 | 849,033 | 1,446,738 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2453 | 848,976 | 1,446,383 | 732.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2454 | 848,324 | 1,442,167 | 787.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2455 | 847,552 | 1,441,852 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2456 | 847,442 | 1,441,790 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2457 | 847,422 | 1,441,782 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2458 | 847,256 | 1,441,361 | 667.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2459 | 846,667 | 1,440,642 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2460 | 846,725 | 1,440,654 | 651.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2461 | 847,155 | 1,440,682 | 668.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2462 | 844,195 | 1,442,469 | 651.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2463 | 844,106 | 1,442,290 | 644.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2464 | 844,098 | 1,442,322 | 645.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2465 | 843,862 | 1,442,701 | 640.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2466 | 843,230 | 1,441,803 | 615.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2467 | 843,017 | 1,441,072 | 620.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2468 | 843,235 | 1,441,057 | 630.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2469 | 846,642 | 1,442,652 | 687.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2470 | 846,714 | 1,442,470 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2471 | 846,719 | 1,442,317 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2472 | 846,772 | 1,442,292 | 699.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2473 | 846,513 | 1,442,098 | 695.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2474 | 846,567 | 1,442,203 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2475 | 846,527 | 1,441,988 | 690.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2476 | 846,417 | 1,441,922 | 690.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2477 | 846,232 | 1,441,461 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2478 | 845,795 | 1,441,419 | 659.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2479 | 846,392 | 1,441,616 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2480 | 855,530 | 1,452,119 | 819.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2481 | 855,676 | 1,452,149 | 817.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2482 | 855,826 | 1,452,201 | 812.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2483 | 855,815 | 1,452,243 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2484 | 855,985 | 1,452,111 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2485 | 855,909 | 1,452,083 | 812.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2486 | 856,108 | 1,452,030 | 790.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2487 | 855,173 | 1,451,878 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2488 | 855,014 | 1,451,914 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2489 | 853,068 | 1,450,756 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2490 | 853,094 | 1,450,745 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2491 | 853,191 | 1,450,722 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2492 | 853,163 | 1,450,720 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2493 | 855,851 | 1,449,897 | 760.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2494 | 853,507 | 1,447,205 | 771.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2495 | 853,660 | 1,447,061 | 771.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2496 | 853,805 | 1,447,014 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2497 | 854,023 | 1,446,973 | 776.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2498 | 853,803 | 1,446,717 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2499 | 853,775 | 1,446,664 | 772.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2500 | 853,774 | 1,446,578 | 776.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2501 | 853,415 | 1,446,365 | 770.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2502 | 853,664 | 1,446,195 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2503 | 853,218 | 1,445,910 | 770.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2504 | 852,970 | 1,445,880 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2505 | 852,989 | 1,445,762 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2506 | 853,145 | 1,445,782 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2507 | 853,119 | 1,445,670 | 767.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2508 | 852,983 | 1,445,580 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2509 | 852,621 | 1,445,708 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2510 | 852,593 | 1,445,629 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2511 | 852,336 | 1,445,681 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2512 | 852,352 | 1,445,684 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2513 | 852,287 | 1,445,517 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2514 | 852,192 | 1,445,748 | 746.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2515 | 852,433 | 1,445,830 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2516 | 852,303 | 1,445,787 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2517 | 852,207 | 1,445,755 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2518 | 852,269 | 1,445,438 | 753.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2519 | 852,221 | 1,445,429 | 750.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2520 | 852,298 | 1,445,322 | 749.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2521 | 852,102 | 1,445,307 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2522 | 851,830 | 1,445,260 | 718.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2523 | 852,810 | 1,444,222 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2524 | 852,807 | 1,444,227 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2525 | 852,778 | 1,444,220 | 719.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2526 | 852,883 | 1,444,220 | 728.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2527 | 853,001 | 1,444,153 | 731.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2528 | 853,221 | 1,444,706 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2529 | 854,464 | 1,444,434 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2530 | 854,601 | 1,444,292 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2531 | 855,548 | 1,446,694 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2532 | 855,637 | 1,446,691 | 803.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2533 | 855,164 | 1,448,511 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2534 | 854,945 | 1,448,538 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2535 | 855,249 | 1,448,426 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2536 | 855,344 | 1,448,357 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2537 | 855,292 | 1,448,665 | 778.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2538 | 855,738 | 1,447,439 | 801.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2539 | 855,701 | 1,447,541 | 799.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2540 | 855,720 | 1,447,523 | 801.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2541 | 855,845 | 1,447,579 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2542 | 855,823 | 1,447,639 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2543 | 855,745 | 1,447,763 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2544 | 855,740 | 1,447,725 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2545 | 855,734 | 1,447,724 | 793.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2546 | 855,726 | 1,447,750 | 794.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2547 | 855,718 | 1,447,713 | 792.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2548 | 855,771 | 1,447,893 | 791.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2549 | 855,822 | 1,447,908 | 791.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2550 | 855,695 | 1,448,082 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2551 | 855,536 | 1,448,145 | 787.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2552 | 855,709 | 1,448,492 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2553 | 855,777 | 1,448,698 | 785.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2554 | 855,797 | 1,448,803 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2555 | 855,899 | 1,448,801 | 777.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2556 | 855,968 | 1,448,361 | 790.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2557 | 855,980 | 1,448,379 | 790.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2558 | 855,774 | 1,448,327 | 790.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2559 | 855,979 | 1,448,032 | 790.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2560 | 856,036 | 1,448,059 | 786.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2561 | 856,155 | 1,448,044 | 777.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2562 | 854,875 | 1,447,505 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2563 | 844,817 | 1,441,289 | 642.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2564 | 845,014 | 1,441,463 | 662.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2565 | 844,611 | 1,441,114 | 634.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2566 | 844,505 | 1,440,967 | 627.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2567 | 845,385 | 1,441,237 | 630.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2568 | 845,366 | 1,441,320 | 644.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2569 | 844,615 | 1,442,157 | 618.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2570 | 841,893 | 1,443,025 | 630.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2571 | 842,007 | 1,442,776 | 626.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2572 | 841,940 | 1,442,610 | 615.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2573 | 841,757 | 1,442,448 | 585.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2574 | 842,087 | 1,442,718 | 618.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2575 | 842,357 | 1,442,455 | 656.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2576 | 842,311 | 1,442,455 | 653.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2577 | 842,303 | 1,442,410 | 650.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2578 | 842,309 | 1,442,414 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2579 | 842,321 | 1,442,401 | 649.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2580 | 842,300 | 1,442,446 | 651.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2581 | 843,147 | 1,443,146 | 644.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2582 | 843,158 | 1,443,068 | 642.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2583 | 847,483 | 1,446,697 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2584 | 847,420 | 1,446,790 | 695.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2585 | 847,398 | 1,446,821 | 693.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2586 | 847,443 | 1,446,891 | 702.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2587 | 847,384 | 1,446,924 | 690.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2588 | 847,424 | 1,446,989 | 691.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2589 | 847,818 | 1,446,972 | 718.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2590 | 847,832 | 1,446,892 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2591 | 848,194 | 1,445,018 | 755.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2592 | 848,186 | 1,445,052 | 756.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2593 | 848,393 | 1,444,999 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2594 | 848,375 | 1,444,965 | 763.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2595 | 848,411 | 1,445,174 | 738.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2596 | 848,218 | 1,445,137 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2597 | 848,079 | 1,445,326 | 731.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2598 | 846,127 | 1,439,364 | 670.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2599 | 846,081 | 1,439,366 | 672.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2600 | 846,301 | 1,439,493 | 669.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2601 | 847,645 | 1,439,577 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2602 | 847,806 | 1,439,638 | 672.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2603 | 847,900 | 1,439,635 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2604 | 847,280 | 1,439,802 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2605 | 848,017 | 1,441,153 | 697.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2606 | 848,032 | 1,441,147 | 695.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2607 | 848,021 | 1,441,135 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2608 | 853,523 | 1,444,650 | 723.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2609 | 853,559 | 1,444,654 | 719.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2610 | 853,656 | 1,445,612 | 730.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2611 | 853,575 | 1,445,602 | 740.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2612 | 853,833 | 1,445,880 | 734.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2613 | 853,631 | 1,445,995 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2614 | 853,964 | 1,446,101 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2615 | 854,547 | 1,446,409 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 5:08 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2616 | 854,642 | 1,446,393 | 755.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2617 | 854,681 | 1,446,448 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2618 | 855,442 | 1,446,473 | 778.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2619 | 845,199 | 1,447,921 | 683.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2620 | 845,195 | 1,447,748 | 649.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2621 | 845,324 | 1,447,844 | 666.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2622 | 844,996 | 1,447,944 | 667.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2623 | 844,952 | 1,447,814 | 663.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2624 | 844,577 | 1,447,898 | 647.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2625 | 844,402 | 1,447,876 | 639.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2626 | 844,449 | 1,447,871 | 641.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2627 | 844,497 | 1,447,746 | 653.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2628 | 844,203 | 1,447,779 | 612.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2629 | 844,232 | 1,447,790 | 619.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2630 | 848,822 | 1,447,504 | 749.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2631 | 848,820 | 1,447,673 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2632 | 845,867 | 1,447,894 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2633 | 844,531 | 1,443,297 | 673.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2634 | 844,441 | 1,443,268 | 668.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2635 | 844,425 | 1,443,238 | 670.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2636 | 844,661 | 1,443,294 | 686.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2637 | 844,649 | 1,443,344 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2638 | 844,619 | 1,443,446 | 678.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2639 | 844,673 | 1,443,455 | 681.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2640 | 844,636 | 1,443,470 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2641 | 844,859 | 1,443,603 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2642 | 844,616 | 1,443,615 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2643 | 845,373 | 1,443,473 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2644 | 845,386 | 1,443,465 | 693.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2645 | 845,032 | 1,444,140 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2646 | 844,892 | 1,444,109 | 669.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2647 | 844,885 | 1,444,136 | 669.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2648 | 844,686 | 1,444,492 | 661.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2649 | 844,402 | 1,444,399 | 665.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2650 | 844,413 | 1,444,602 | 647.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2651 | 844,492 | 1,444,517 | 660.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2652 | 844,188 | 1,444,172 | 680.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2653 | 844,512 | 1,444,136 | 679.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2654 | 844,027 | 1,444,611 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2655 | 844,173 | 1,444,633 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2656 | 844,447 | 1,444,855 | 649.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2657 | 843,977 | 1,444,207 | 677.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2658 | 843,877 | 1,443,723 | 640.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2659 | 845,018 | 1,443,373 | 701.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2660 | 844,721 | 1,443,295 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2661 | 845,860 | 1,443,668 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2662 | 847,351 | 1,443,766 | 710.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2663 | 847,176 | 1,443,753 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2664 | 847,166 | 1,443,765 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2665 | 845,842 | 1,444,588 | 664.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2666 | 846,915 | 1,438,916 | 650.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2667 | 846,768 | 1,438,918 | 640.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2668 | 856,018 | 1,446,794 | 807.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2669 | 856,022 | 1,446,781 | 807.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2670 | 856,072 | 1,446,767 | 805.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2671 | 850,453 | 1,448,499 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2672 | 850,459 | 1,448,496 | 741.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2673 | 850,459 | 1,448,496 | 741.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2674 | 850,483 | 1,448,550 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2675 | 850,455 | 1,448,560 | 746.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2676 | 850,447 | 1,448,548 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2677 | 850,477 | 1,448,467 | 740.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2678 | 850,481 | 1,448,470 | 740.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2679 | 850,418 | 1,448,692 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2680 | 850,431 | 1,448,734 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2681 | 850,426 | 1,448,869 | 752.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2682 | 850,438 | 1,448,954 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2683 | 850,457 | 1,449,050 | 747.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2684 | 850,462 | 1,449,017 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2685 | 850,514 | 1,449,049 | 737.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2686 | 849,232 | 1,444,951 | 763.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2687 | 849,216 | 1,444,969 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2688 | 849,252 | 1,444,931 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2689 | 849,243 | 1,444,897 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2690 | 849,242 | 1,444,886 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

### Calculation Results

Shadow receptor

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1 | 0:00 | 0 | 0:00 | 0:00 |
| 2 | 0:00 | 0 | 0:00 | 0:00 |
| 3 | 0:00 | 0 | 0:00 | 0:00 |
| 4 | 0:00 | 0 | 0:00 | 0:00 |
| 5 | 0:00 | 0 | 0:00 | 0:00 |
| 6 | 0:00 | 0 | 0:00 | 0:00 |
| 7 | 0:00 | 0 | 0:00 | 0:00 |
| 8 | 0:00 | 0 | 0:00 | 0:00 |
| 9 | 0:00 | 0 | 0:00 | 0:00 |
| 10 | 0:00 | 0 | 0:00 | 0:00 |
| 11 | 0:00 | 0 | 0:00 | 0:00 |
| 12 | 3:43 | 24 | 0:11 | 1:18 |
| 13 | 1:00 | 12 | 0:06 | 0:21 |
| 14 | 0:00 | 0 | 0:00 | 0:00 |
| 15 | 7:24 | 32 | 0:17 | 2:31 |
| 16 | 0:00 | 0 | 0:00 | 0:00 |
| 17 | 0:00 | 0 | 0:00 | 0:00 |
| 18 | 0:00 | 0 | 0:00 | 0:00 |
| 19 | 0:00 | 0 | 0:00 | 0:00 |
| 20 | 0:00 | 0 | 0:00 | 0:00 |
| 21 | 0:00 | 0 | 0:00 | 0:00 |
| 22 | 0:00 | 0 | 0:00 | 0:00 |
| 23 | 0:00 | 0 | 0:00 | 0:00 |
| 24 | 0:00 | 0 | 0:00 | 0:00 |
| 25 | 0:00 | 0 | 0:00 | 0:00 |
| 26 | 0:00 | 0 | 0:00 | 0:00 |
| 27 | 0:00 | 0 | 0:00 | 0:00 |
| 28 | 0:00 | 0 | 0:00 | 0:00 |
| 29 | 0:00 | 0 | 0:00 | 0:00 |
| 30 | 0:00 | 0 | 0:00 | 0:00 |
| 31 | 0:00 | 0 | 0:00 | 0:00 |
| 32 | 0:00 | 0 | 0:00 | 0:00 |
| 33 | 0:00 | 0 | 0:00 | 0:00 |
| 34 | 0:00 | 0 | 0:00 | 0:00 |
| 35 | 0:00 | 0 | 0:00 | 0:00 |
| 36 | 2:59 | 26 | 0:08 | 1:47 |
| 37 | 4:00 | 32 | 0:09 | 2:19 |
| 38 | 6:17 | 48 | 0:09 | 3:26 |
| 39 | 2:34 | 34 | 0:06 | 1:13 |
| 40 | 0:00 | 0 | 0:00 | 0:00 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 41 | 0:00 | 0 | 0:00 | 0:00 |
| 42 | 0:00 | 0 | 0:00 | 0:00 |
| 43 | 0:00 | 0 | 0:00 | 0:00 |
| 44 | 0:00 | 0 | 0:00 | 0:00 |
| 45 | 0:00 | 0 | 0:00 | 0:00 |
| 46 | 9:27 | 34 | 0:21 | 4:25 |
| 47 | 10:46 | 34 | 0:24 | 4:55 |
| 48 | 12:34 | 38 | 0:26 | 5:47 |
| 49 | 13:02 | 36 | 0:27 | 5:53 |
| 50 | 13:19 | 38 | 0:28 | 6:07 |
| 51 | 15:16 | 76 | 0:16 | 8:07 |
| 52 | 40:06 | 97 | 0:39 | 20:55 |
| 53 | 22:01 | 60 | 0:29 | 10:27 |
| 54 | 11:11 | 72 | 0:13 | 6:01 |
| 55 | 9:12 | 36 | 0:19 | 5:20 |
| 56 | 6:56 | 30 | 0:17 | 4:06 |
| 57 | 4:38 | 24 | 0:15 | 2:50 |
| 58 | 0:00 | 0 | 0:00 | 0:00 |
| 59 | 0:00 | 0 | 0:00 | 0:00 |
| 60 | 0:00 | 0 | 0:00 | 0:00 |
| 61 | 56:50 | 82 | 0:48 | 17:10 |
| 62 | 22:08 | 60 | 0:29 | 6:54 |
| 63 | 28:54 | 85 | 0:29 | 9:38 |
| 64 | 14:51 | 50 | 0:23 | 4:33 |
| 65 | 29:53 | 107 | 0:23 | 9:50 |
| 66 | 24:21 | 90 | 0:25 | 7:37 |
| 67 | 2:28 | 18 | 0:10 | 0:50 |
| 68 | 2:40 | 18 | 0:11 | 0:55 |
| 69 | 3:16 | 20 | 0:12 | 1:08 |
| 70 | 3:34 | 20 | 0:13 | 1:13 |
| 71 | 3:37 | 19 | 0:14 | 1:13 |
| 72 | 4:01 | 21 | 0:14 | 1:25 |
| 73 | 3:44 | 20 | 0:13 | 1:20 |
| 74 | 3:58 | 21 | 0:14 | 1:23 |
| 75 | 4:28 | 22 | 0:15 | 1:34 |
| 76 | 10:30 | 55 | 0:18 | 3:36 |
| 77 | 4:33 | 23 | 0:15 | 1:32 |
| 78 | 11:16 | 65 | 0:17 | 3:41 |
| 79 | 7:02 | 27 | 0:20 | 2:27 |
| 80 | 11:13 | 52 | 0:20 | 3:52 |
| 81 | 13:58 | 56 | 0:23 | 4:50 |
| 82 | 30:46 | 135 | 0:29 | 10:38 |
| 83 | 34:23 | 138 | 0:31 | 11:55 |
| 84 | 32:53 | 104 | 0:31 | 10:40 |
| 85 | 37:41 | 118 | 0:32 | 12:06 |
| 86 | 37:55 | 117 | 0:32 | 12:10 |
| 87 | 117:00 | 163 | 1:05 | 37:40 |
| 88 | 21:16 | 70 | 0:25 | 7:07 |
| 89 | 31:54 | 84 | 0:34 | 10:36 |
| 90 | 43:57 | 104 | 0:34 | 14:20 |
| 91 | 46:46 | 104 | 0:38 | 15:15 |
| 92 | 37:15 | 88 | 0:39 | 12:19 |
| 93 | 41:41 | 94 | 0:39 | 13:42 |
| 94 | 153:16 | 172 | 1:22 | 60:57 |
| 95 | 85:54 | 88 | 1:26 | 38:15 |
| 96 | 37:52 | 60 | 0:51 | 16:10 |
| 97 | 44:48 | 73 | 0:56 | 18:28 |
| 98 | 51:21 | 67 | 1:04 | 23:07 |
| 99 | 95:34 | 158 | 1:02 | 44:32 |
| 100 | 59:28 | 117 | 0:48 | 28:39 |
| 101 | 75:40 | 168 | 0:47 | 31:47 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 102 | 47:14 | 139 | 0:34 | 19:53 |
| 103 | 62:50 | 159 | 0:39 | 28:33 |
| 104 | 25:31 | 89 | 0:27 | 9:36 |
| 105 | 21:03 | 82 | 0:25 | 8:03 |
| 106 | 63:27 | 177 | 0:34 | 27:34 |
| 107 | 71:34 | 211 | 0:38 | 25:12 |
| 108 | 85:03 | 186 | 0:48 | 30:17 |
| 109 | 150:53 | 266 | 1:00 | 55:04 |
| 110 | 160:57 | 244 | 1:01 | 67:43 |
| 111 | 263:53 | 208 | 1:49 | 73:52 |
| 112 | 31:29 | 115 | 0:32 | 10:36 |
| 113 | 28:17 | 107 | 0:30 | 9:31 |
| 114 | 25:00 | 104 | 0:27 | 8:28 |
| 115 | 19:09 | 94 | 0:23 | 6:27 |
| 116 | 18:40 | 94 | 0:23 | 6:16 |
| 117 | 17:42 | 89 | 0:22 | 6:04 |
| 118 | 17:27 | 91 | 0:22 | 5:59 |
| 119 | 13:20 | 64 | 0:21 | 4:31 |
| 120 | 12:03 | 59 | 0:20 | 4:05 |
| 121 | 13:28 | 59 | 0:22 | 4:34 |
| 122 | 11:02 | 55 | 0:19 | 3:45 |
| 123 | 11:25 | 59 | 0:19 | 3:53 |
| 124 | 12:32 | 63 | 0:19 | 4:17 |
| 125 | 11:14 | 60 | 0:18 | 3:51 |
| 126 | 9:08 | 54 | 0:16 | 3:08 |
| 127 | 9:26 | 52 | 0:17 | 3:13 |
| 128 | 9:53 | 53 | 0:18 | 3:21 |
| 129 | 8:39 | 52 | 0:16 | 2:57 |
| 130 | 5:45 | 26 | 0:16 | 1:56 |
| 131 | 5:35 | 25 | 0:16 | 1:53 |
| 132 | 0:00 | 0 | 0:00 | 0:00 |
| 133 | 8:43 | 53 | 0:16 | 3:00 |
| 134 | 8:41 | 56 | 0:15 | 3:00 |
| 135 | 8:36 | 54 | 0:15 | 2:58 |
| 136 | 9:31 | 58 | 0:16 | 3:18 |
| 137 | 9:07 | 56 | 0:16 | 3:08 |
| 138 | 9:56 | 60 | 0:16 | 3:26 |
| 139 | 10:05 | 60 | 0:17 | 3:29 |
| 140 | 10:37 | 61 | 0:17 | 3:40 |
| 141 | 10:57 | 61 | 0:17 | 3:47 |
| 142 | 11:13 | 62 | 0:17 | 3:52 |
| 143 | 12:18 | 65 | 0:18 | 4:15 |
| 144 | 10:22 | 62 | 0:16 | 3:36 |
| 145 | 11:13 | 63 | 0:17 | 3:54 |
| 146 | 8:05 | 56 | 0:14 | 2:47 |
| 147 | 7:51 | 57 | 0:14 | 2:42 |
| 148 | 7:28 | 58 | 0:13 | 2:34 |
| 149 | 8:53 | 62 | 0:14 | 3:08 |
| 150 | 9:20 | 62 | 0:15 | 3:16 |
| 151 | 9:37 | 61 | 0:15 | 3:21 |
| 152 | 71:19 | 156 | 0:52 | 22:49 |
| 153 | 65:41 | 148 | 0:50 | 20:56 |
| 154 | 105:49 | 203 | 0:54 | 35:23 |
| 155 | 83:22 | 238 | 0:51 | 28:50 |
| 156 | 80:41 | 216 | 0:51 | 27:45 |
| 157 | 81:39 | 212 | 0:57 | 27:41 |
| 158 | 16:29 | 81 | 0:20 | 6:06 |
| 159 | 23:05 | 109 | 0:22 | 8:31 |
| 160 | 40:10 | 136 | 0:28 | 14:57 |
| 161 | 142:40 | 249 | 1:04 | 54:38 |
| 162 | 241:16 | 252 | 2:00 | 85:31 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 163 | 144:16 | 261 | 1:05 | 55:06 |
| 164 | 133:16 | 255 | 0:54 | 40:06 |
| 165 | 127:58 | 258 | 0:52 | 39:43 |
| 166 | 66:18 | 194 | 0:33 | 24:05 |
| 167 | 57:17 | 158 | 0:32 | 20:47 |
| 168 | 58:59 | 162 | 0:33 | 22:01 |
| 169 | 267:55 | 247 | 1:44 | 117:19 |
| 170 | 262:35 | 247 | 1:29 | 109:04 |
| 171 | 563:44 | 339 | 2:45 | 145:56 |
| 172 | 37:03 | 118 | 0:28 | 12:25 |
| 173 | 666:37 | 282 | 3:09 | 297:40 |
| 174 | 85:47 | 181 | 1:27 | 29:20 |
| 175 | 69:52 | 205 | 0:40 | 25:31 |
| 176 | 65:28 | 216 | 0:35 | 23:00 |
| 177 | 35:45 | 183 | 0:22 | 13:36 |
| 178 | 28:38 | 155 | 0:21 | 10:54 |
| 179 | 29:55 | 157 | 0:23 | 10:56 |
| 180 | 35:39 | 185 | 0:23 | 12:53 |
| 181 | 48:02 | 228 | 0:25 | 18:11 |
| 182 | 52:21 | 222 | 0:27 | 19:39 |
| 183 | 66:28 | 237 | 0:30 | 27:10 |
| 184 | 72:27 | 210 | 0:35 | 29:19 |
| 185 | 70:05 | 212 | 0:39 | 22:33 |
| 186 | 93:04 | 247 | 0:38 | 33:30 |
| 187 | 96:20 | 222 | 0:49 | 40:22 |
| 188 | 83:04 | 211 | 0:49 | 30:10 |
| 189 | 107:38 | 222 | 0:57 | 42:43 |
| 190 | 33:48 | 117 | 0:26 | 9:51 |
| 191 | 29:14 | 88 | 0:27 | 7:50 |
| 192 | 41:56 | 121 | 0:28 | 13:35 |
| 193 | 51:39 | 129 | 0:39 | 15:11 |
| 194 | 36:40 | 115 | 0:41 | 14:08 |
| 195 | 140:51 | 228 | 1:02 | 51:45 |
| 196 | 636:31 | 249 | 3:13 | 225:05 |
| 197 | 124:48 | 233 | 1:12 | 54:07 |
| 198 | 160:53 | 244 | 1:24 | 55:32 |
| 199 | 72:06 | 211 | 0:43 | 24:43 |
| 200 | 94:26 | 223 | 0:41 | 33:50 |
| 201 | 77:17 | 216 | 0:41 | 26:57 |
| 202 | 53:52 | 167 | 0:41 | 18:19 |
| 203 | 55:53 | 144 | 0:42 | 19:50 |
| 204 | 49:26 | 166 | 0:38 | 16:58 |
| 205 | 57:31 | 170 | 0:38 | 20:03 |
| 206 | 66:59 | 185 | 0:37 | 23:46 |
| 207 | 75:30 | 202 | 0:37 | 27:07 |
| 208 | 93:04 | 249 | 0:38 | 34:23 |
| 209 | 78:23 | 210 | 0:36 | 28:19 |
| 210 | 81:53 | 220 | 0:37 | 30:15 |
| 211 | 62:48 | 178 | 0:33 | 21:20 |
| 212 | 44:59 | 183 | 0:28 | 15:36 |
| 213 | 41:20 | 158 | 0:27 | 14:13 |
| 214 | 40:35 | 158 | 0:27 | 13:56 |
| 215 | 40:56 | 165 | 0:27 | 14:07 |
| 216 | 57:46 | 197 | 0:35 | 20:40 |
| 217 | 57:36 | 204 | 0:36 | 20:42 |
| 218 | 43:43 | 174 | 0:25 | 15:22 |
| 219 | 94:11 | 223 | 0:53 | 35:01 |
| 220 | 98:10 | 233 | 0:52 | 36:46 |
| 221 | 98:02 | 232 | 0:52 | 36:44 |
| 222 | 98:11 | 233 | 0:51 | 36:51 |
| 223 | 99:59 | 236 | 0:51 | 37:35 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 224 | 100:37 | 241 | 0:49 | 37:53 |
| 225 | 103:30 | 258 | 0:49 | 38:26 |
| 226 | 110:29 | 258 | 0:50 | 41:05 |
| 227 | 77:23 | 209 | 0:44 | 28:50 |
| 228 | 79:44 | 213 | 0:44 | 29:47 |
| 229 | 94:35 | 253 | 0:44 | 35:40 |
| 230 | 93:16 | 250 | 0:44 | 35:09 |
| 231 | 87:54 | 247 | 0:42 | 33:05 |
| 232 | 89:58 | 257 | 0:43 | 33:52 |
| 233 | 80:13 | 232 | 0:40 | 30:12 |
| 234 | 82:41 | 239 | 0:41 | 31:06 |
| 235 | 70:49 | 223 | 0:40 | 26:36 |
| 236 | 60:07 | 197 | 0:38 | 22:27 |
| 237 | 56:20 | 188 | 0:37 | 21:08 |
| 238 | 69:39 | 212 | 0:37 | 26:15 |
| 239 | 74:18 | 210 | 0:38 | 27:58 |
| 240 | 75:46 | 207 | 0:39 | 28:29 |
| 241 | 42:33 | 199 | 0:33 | 15:03 |
| 242 | 40:20 | 197 | 0:32 | 14:12 |
| 243 | 42:52 | 182 | 0:33 | 15:36 |
| 244 | 62:51 | 205 | 0:35 | 23:43 |
| 245 | 54:18 | 185 | 0:35 | 20:33 |
| 246 | 52:24 | 181 | 0:34 | 19:51 |
| 247 | 50:18 | 174 | 0:34 | 19:03 |
| 248 | 47:55 | 171 | 0:33 | 18:07 |
| 249 | 46:06 | 167 | 0:33 | 17:22 |
| 250 | 45:30 | 164 | 0:33 | 17:08 |
| 251 | 43:46 | 163 | 0:32 | 16:28 |
| 252 | 42:51 | 161 | 0:31 | 16:07 |
| 253 | 41:59 | 162 | 0:31 | 15:50 |
| 254 | 41:49 | 160 | 0:30 | 15:49 |
| 255 | 41:09 | 159 | 0:30 | 15:36 |
| 256 | 39:51 | 159 | 0:29 | 15:05 |
| 257 | 38:34 | 153 | 0:30 | 14:20 |
| 258 | 38:01 | 154 | 0:29 | 14:08 |
| 259 | 37:15 | 152 | 0:29 | 13:53 |
| 260 | 32:09 | 124 | 0:27 | 11:52 |
| 261 | 31:28 | 123 | 0:27 | 11:34 |
| 262 | 30:21 | 118 | 0:26 | 11:09 |
| 263 | 32:35 | 125 | 0:27 | 12:11 |
| 264 | 29:57 | 119 | 0:26 | 10:59 |
| 265 | 29:19 | 118 | 0:26 | 10:47 |
| 266 | 27:14 | 113 | 0:25 | 9:54 |
| 267 | 38:38 | 155 | 0:26 | 14:42 |
| 268 | 37:05 | 148 | 0:26 | 14:08 |
| 269 | 43:36 | 166 | 0:25 | 16:24 |
| 270 | 27:21 | 122 | 0:24 | 10:02 |
| 271 | 39:32 | 170 | 0:27 | 15:08 |
| 272 | 39:21 | 159 | 0:27 | 14:59 |
| 273 | 40:46 | 162 | 0:28 | 15:31 |
| 274 | 41:08 | 162 | 0:29 | 15:40 |
| 275 | 39:57 | 159 | 0:28 | 15:13 |
| 276 | 31:09 | 119 | 0:28 | 11:06 |
| 277 | 30:31 | 119 | 0:27 | 10:58 |
| 278 | 29:02 | 118 | 0:26 | 10:20 |
| 279 | 27:16 | 114 | 0:26 | 9:40 |
| 280 | 25:56 | 111 | 0:25 | 9:09 |
| 281 | 22:28 | 103 | 0:23 | 7:46 |
| 282 | 55:49 | 202 | 0:28 | 21:13 |
| 283 | 61:51 | 215 | 0:27 | 23:14 |
| 284 | 64:30 | 225 | 0:25 | 23:53 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 285 | 63:03 | 216 | 0:24 | 23:08 |
| 286 | 47:20 | 193 | 0:21 | 17:11 |
| 287 | 49:08 | 190 | 0:23 | 17:41 |
| 288 | 60:05 | 202 | 0:29 | 22:23 |
| 289 | 62:49 | 211 | 0:28 | 23:15 |
| 290 | 64:03 | 215 | 0:27 | 23:34 |
| 291 | 64:19 | 216 | 0:27 | 23:39 |
| 292 | 62:14 | 205 | 0:29 | 22:15 |
| 293 | 62:41 | 211 | 0:29 | 22:25 |
| 294 | 62:17 | 213 | 0:28 | 22:14 |
| 295 | 60:56 | 213 | 0:28 | 21:34 |
| 296 | 51:46 | 192 | 0:25 | 18:09 |
| 297 | 46:10 | 178 | 0:24 | 16:19 |
| 298 | 45:14 | 177 | 0:24 | 16:03 |
| 299 | 43:40 | 173 | 0:23 | 15:39 |
| 300 | 38:48 | 165 | 0:22 | 14:08 |
| 301 | 36:54 | 180 | 0:19 | 13:42 |
| 302 | 38:37 | 184 | 0:20 | 14:16 |
| 303 | 41:48 | 179 | 0:20 | 15:27 |
| 304 | 35:29 | 195 | 0:19 | 13:17 |
| 305 | 33:48 | 185 | 0:19 | 12:40 |
| 306 | 34:04 | 200 | 0:18 | 12:46 |
| 307 | 33:44 | 203 | 0:18 | 12:38 |
| 308 | 31:38 | 194 | 0:17 | 11:51 |
| 309 | 35:30 | 207 | 0:18 | 13:08 |
| 310 | 36:21 | 206 | 0:18 | 13:30 |
| 311 | 36:33 | 203 | 0:18 | 13:38 |
| 312 | 36:35 | 202 | 0:18 | 13:36 |
| 313 | 38:24 | 194 | 0:19 | 14:20 |
| 314 | 36:07 | 199 | 0:19 | 13:13 |
| 315 | 37:27 | 196 | 0:20 | 13:47 |
| 316 | 37:19 | 194 | 0:20 | 13:47 |
| 317 | 36:51 | 188 | 0:20 | 13:35 |
| 318 | 34:25 | 204 | 0:19 | 12:29 |
| 319 | 27:40 | 153 | 0:17 | 10:17 |
| 320 | 25:48 | 147 | 0:17 | 9:35 |
| 321 | 24:21 | 131 | 0:17 | 9:02 |
| 322 | 24:12 | 130 | 0:16 | 8:58 |
| 323 | 22:20 | 123 | 0:16 | 8:17 |
| 324 | 21:02 | 120 | 0:16 | 7:47 |
| 325 | 20:41 | 119 | 0:16 | 7:39 |
| 326 | 20:06 | 116 | 0:16 | 7:27 |
| 327 | 24:00 | 138 | 0:16 | 8:52 |
| 328 | 25:01 | 139 | 0:16 | 9:14 |
| 329 | 32:14 | 161 | 0:18 | 11:12 |
| 330 | 30:13 | 152 | 0:18 | 10:21 |
| 331 | 26:39 | 136 | 0:18 | 9:25 |
| 332 | 18:00 | 66 | 0:23 | 6:26 |
| 333 | 19:06 | 68 | 0:24 | 6:57 |
| 334 | 18:20 | 65 | 0:24 | 6:39 |
| 335 | 18:05 | 68 | 0:23 | 6:47 |
| 336 | 25:33 | 115 | 0:22 | 9:43 |
| 337 | 33:15 | 148 | 0:22 | 12:12 |
| 338 | 20:31 | 73 | 0:24 | 7:42 |
| 339 | 22:37 | 82 | 0:24 | 8:38 |
| 340 | 34:18 | 136 | 0:24 | 13:00 |
| 341 | 31:10 | 139 | 0:24 | 11:11 |
| 342 | 27:27 | 130 | 0:24 | 9:42 |
| 343 | 24:32 | 119 | 0:24 | 8:32 |
| 344 | 31:21 | 109 | 0:26 | 11:46 |
| 345 | 32:33 | 115 | 0:26 | 12:10 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case: Shadow hours per year [h/year] | Shadow, worst case: Shadow days per year [days/year] | Shadow, worst case: Max shadow hours per day [h/day] | Shadow, expected values: Shadow hours per year [h/year] |
|---|---|---|---|---|
| 346 | 23:44 | 89 | 0:26 | 8:08 |
| 347 | 24:34 | 94 | 0:26 | 8:25 |
| 348 | 18:41 | 78 | 0:25 | 6:13 |
| 349 | 16:05 | 77 | 0:24 | 5:24 |
| 350 | 16:21 | 71 | 0:24 | 5:28 |
| 351 | 17:11 | 85 | 0:23 | 5:54 |
| 352 | 25:43 | 96 | 0:26 | 8:49 |
| 353 | 27:00 | 95 | 0:27 | 9:17 |
| 354 | 27:56 | 97 | 0:28 | 9:35 |
| 355 | 28:04 | 94 | 0:28 | 9:40 |
| 356 | 29:44 | 92 | 0:30 | 10:18 |
| 357 | 20:02 | 76 | 0:26 | 6:39 |
| 358 | 21:58 | 82 | 0:27 | 7:18 |
| 359 | 19:26 | 70 | 0:26 | 6:28 |
| 360 | 19:41 | 72 | 0:27 | 6:35 |
| 361 | 21:50 | 76 | 0:27 | 7:14 |
| 362 | 27:23 | 91 | 0:30 | 9:04 |
| 363 | 23:07 | 77 | 0:29 | 7:47 |
| 364 | 18:24 | 70 | 0:25 | 6:08 |
| 365 | 17:39 | 70 | 0:25 | 5:53 |
| 366 | 16:19 | 67 | 0:24 | 5:28 |
| 367 | 15:30 | 66 | 0:24 | 5:12 |
| 368 | 14:45 | 64 | 0:23 | 4:58 |
| 369 | 14:54 | 62 | 0:24 | 5:05 |
| 370 | 13:53 | 60 | 0:23 | 4:44 |
| 371 | 15:22 | 66 | 0:24 | 5:11 |
| 372 | 28:45 | 105 | 0:28 | 9:47 |
| 373 | 16:54 | 66 | 0:25 | 5:50 |
| 374 | 14:10 | 58 | 0:23 | 4:54 |
| 375 | 20:30 | 72 | 0:27 | 7:00 |
| 376 | 27:28 | 84 | 0:31 | 9:18 |
| 377 | 30:30 | 88 | 0:32 | 10:22 |
| 378 | 33:54 | 99 | 0:33 | 11:19 |
| 379 | 33:24 | 94 | 0:33 | 11:54 |
| 380 | 30:46 | 86 | 0:32 | 10:58 |
| 381 | 27:22 | 83 | 0:31 | 9:37 |
| 382 | 27:47 | 82 | 0:30 | 10:12 |
| 383 | 26:38 | 81 | 0:30 | 9:47 |
| 384 | 22:58 | 74 | 0:28 | 8:18 |
| 385 | 20:25 | 69 | 0:27 | 7:16 |
| 386 | 16:54 | 62 | 0:25 | 5:53 |
| 387 | 15:33 | 61 | 0:24 | 5:21 |
| 388 | 15:01 | 60 | 0:23 | 5:10 |
| 389 | 14:04 | 58 | 0:22 | 4:48 |
| 390 | 13:55 | 58 | 0:23 | 4:49 |
| 391 | 49:53 | 132 | 0:34 | 19:13 |
| 392 | 37:04 | 103 | 0:32 | 14:24 |
| 393 | 35:11 | 98 | 0:31 | 13:40 |
| 394 | 34:32 | 100 | 0:31 | 13:24 |
| 395 | 25:07 | 78 | 0:29 | 9:25 |
| 396 | 25:30 | 82 | 0:28 | 9:42 |
| 397 | 25:27 | 81 | 0:28 | 9:45 |
| 398 | 18:51 | 67 | 0:26 | 6:46 |
| 399 | 17:35 | 65 | 0:25 | 6:16 |
| 400 | 17:19 | 64 | 0:25 | 6:11 |
| 401 | 17:46 | 65 | 0:25 | 6:26 |
| 402 | 18:05 | 66 | 0:25 | 6:23 |
| 403 | 17:31 | 65 | 0:24 | 6:30 |
| 404 | 13:53 | 58 | 0:19 | 5:07 |
| 405 | 5:51 | 25 | 0:18 | 2:04 |
| 406 | 5:17 | 25 | 0:16 | 1:51 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 407 | 5:36 | 26 | 0:16 | 1:57 |
| 408 | 5:21 | 24 | 0:16 | 1:51 |
| 409 | 6:18 | 26 | 0:18 | 2:12 |
| 410 | 5:59 | 25 | 0:17 | 2:03 |
| 411 | 6:01 | 25 | 0:17 | 2:03 |
| 412 | 5:34 | 25 | 0:16 | 1:54 |
| 413 | 6:48 | 28 | 0:18 | 2:21 |
| 414 | 6:46 | 27 | 0:18 | 2:19 |
| 415 | 7:21 | 28 | 0:19 | 2:30 |
| 416 | 7:44 | 28 | 0:20 | 2:38 |
| 417 | 7:32 | 29 | 0:20 | 2:37 |
| 418 | 7:06 | 28 | 0:19 | 2:27 |
| 419 | 7:11 | 27 | 0:20 | 2:30 |
| 420 | 7:50 | 28 | 0:21 | 2:41 |
| 421 | 7:42 | 28 | 0:21 | 2:37 |
| 422 | 7:13 | 27 | 0:20 | 2:28 |
| 423 | 6:53 | 26 | 0:20 | 2:22 |
| 424 | 7:14 | 27 | 0:20 | 2:29 |
| 425 | 7:23 | 27 | 0:21 | 2:36 |
| 426 | 7:51 | 28 | 0:21 | 2:41 |
| 427 | 8:06 | 28 | 0:22 | 2:47 |
| 428 | 8:21 | 29 | 0:23 | 2:50 |
| 429 | 8:26 | 28 | 0:23 | 2:56 |
| 430 | 9:12 | 31 | 0:23 | 3:11 |
| 431 | 9:17 | 30 | 0:24 | 3:15 |
| 432 | 9:15 | 31 | 0:24 | 3:14 |
| 433 | 9:16 | 30 | 0:24 | 3:12 |
| 434 | 12:09 | 49 | 0:25 | 4:10 |
| 435 | 9:55 | 31 | 0:25 | 3:25 |
| 436 | 12:18 | 51 | 0:25 | 4:14 |
| 437 | 12:30 | 51 | 0:25 | 4:17 |
| 438 | 10:01 | 32 | 0:25 | 3:31 |
| 439 | 10:04 | 32 | 0:25 | 3:30 |
| 440 | 12:45 | 52 | 0:25 | 4:24 |
| 441 | 9:34 | 31 | 0:24 | 3:18 |
| 442 | 9:42 | 31 | 0:24 | 3:24 |
| 443 | 9:19 | 31 | 0:24 | 3:16 |
| 444 | 9:26 | 32 | 0:24 | 3:13 |
| 445 | 13:14 | 53 | 0:25 | 4:29 |
| 446 | 9:53 | 31 | 0:24 | 3:22 |
| 447 | 16:21 | 72 | 0:27 | 5:38 |
| 448 | 18:02 | 75 | 0:28 | 6:15 |
| 449 | 8:45 | 29 | 0:23 | 3:02 |
| 450 | 8:53 | 30 | 0:22 | 3:01 |
| 451 | 11:11 | 48 | 0:24 | 3:50 |
| 452 | 11:24 | 49 | 0:24 | 3:54 |
| 453 | 11:56 | 49 | 0:25 | 4:05 |
| 454 | 8:57 | 30 | 0:22 | 3:01 |
| 455 | 8:19 | 30 | 0:20 | 2:48 |
| 456 | 8:05 | 30 | 0:19 | 2:44 |
| 457 | 7:53 | 30 | 0:19 | 2:40 |
| 458 | 8:25 | 30 | 0:20 | 2:51 |
| 459 | 8:59 | 32 | 0:21 | 3:02 |
| 460 | 11:46 | 51 | 0:23 | 4:01 |
| 461 | 12:10 | 50 | 0:24 | 4:09 |
| 462 | 12:29 | 53 | 0:24 | 4:17 |
| 463 | 11:28 | 52 | 0:22 | 3:56 |
| 464 | 9:14 | 32 | 0:21 | 3:08 |
| 465 | 8:23 | 32 | 0:20 | 2:50 |
| 466 | 7:10 | 30 | 0:17 | 2:26 |
| 467 | 9:21 | 31 | 0:24 | 3:11 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 468 | 9:39 | 31 | 0:24 | 3:21 |
| 469 | 9:39 | 30 | 0:24 | 3:19 |
| 470 | 11:49 | 49 | 0:24 | 4:01 |
| 471 | 14:45 | 56 | 0:26 | 5:02 |
| 472 | 14:44 | 54 | 0:27 | 5:01 |
| 473 | 10:36 | 37 | 0:21 | 3:54 |
| 474 | 9:46 | 35 | 0:21 | 3:26 |
| 475 | 9:20 | 36 | 0:19 | 3:25 |
| 476 | 9:34 | 37 | 0:19 | 3:36 |
| 477 | 11:03 | 41 | 0:20 | 4:19 |
| 478 | 11:35 | 41 | 0:21 | 4:29 |
| 479 | 11:43 | 42 | 0:20 | 4:37 |
| 480 | 12:03 | 45 | 0:20 | 4:49 |
| 481 | 14:38 | 54 | 0:21 | 5:56 |
| 482 | 0:00 | 0 | 0:00 | 0:00 |
| 483 | 10:29 | 39 | 0:20 | 4:09 |
| 484 | 22:01 | 71 | 0:21 | 8:30 |
| 485 | 21:58 | 66 | 0:22 | 8:25 |
| 486 | 23:20 | 80 | 0:23 | 8:53 |
| 487 | 12:21 | 44 | 0:20 | 4:36 |
| 488 | 9:59 | 38 | 0:19 | 3:43 |
| 489 | 31:20 | 109 | 0:34 | 10:51 |
| 490 | 31:01 | 112 | 0:34 | 10:44 |
| 491 | 23:31 | 68 | 0:34 | 8:04 |
| 492 | 22:14 | 82 | 0:31 | 7:37 |
| 493 | 20:59 | 100 | 0:19 | 7:42 |
| 494 | 23:29 | 113 | 0:20 | 8:38 |
| 495 | 26:51 | 129 | 0:20 | 9:52 |
| 496 | 26:15 | 112 | 0:21 | 9:34 |
| 497 | 25:33 | 113 | 0:20 | 9:20 |
| 498 | 25:51 | 115 | 0:20 | 9:32 |
| 499 | 21:15 | 108 | 0:20 | 7:50 |
| 500 | 12:22 | 52 | 0:22 | 4:20 |
| 501 | 19:28 | 87 | 0:22 | 6:59 |
| 502 | 25:07 | 105 | 0:22 | 9:00 |
| 503 | 24:55 | 106 | 0:21 | 8:59 |
| 504 | 23:22 | 101 | 0:23 | 8:14 |
| 505 | 23:10 | 99 | 0:23 | 8:09 |
| 506 | 21:35 | 92 | 0:24 | 7:29 |
| 507 | 22:00 | 91 | 0:26 | 7:32 |
| 508 | 18:09 | 66 | 0:27 | 6:00 |
| 509 | 19:58 | 72 | 0:28 | 6:36 |
| 510 | 24:56 | 88 | 0:30 | 8:18 |
| 511 | 30:23 | 104 | 0:32 | 10:23 |
| 512 | 31:24 | 103 | 0:32 | 10:48 |
| 513 | 32:37 | 127 | 0:27 | 11:28 |
| 514 | 28:31 | 113 | 0:24 | 10:08 |
| 515 | 23:12 | 109 | 0:20 | 8:30 |
| 516 | 33:01 | 134 | 0:24 | 12:27 |
| 517 | 36:13 | 137 | 0:29 | 12:52 |
| 518 | 36:13 | 128 | 0:31 | 12:57 |
| 519 | 33:55 | 121 | 0:32 | 12:12 |
| 520 | 43:04 | 145 | 0:30 | 15:52 |
| 521 | 44:15 | 147 | 0:28 | 16:22 |
| 522 | 30:35 | 92 | 0:35 | 10:44 |
| 523 | 30:43 | 90 | 0:37 | 10:48 |
| 524 | 28:21 | 81 | 0:39 | 9:59 |
| 525 | 28:27 | 95 | 0:36 | 10:01 |
| 526 | 29:28 | 71 | 0:40 | 9:58 |
| 527 | 33:47 | 80 | 0:39 | 11:19 |
| 528 | 61:59 | 161 | 0:37 | 21:53 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 529 | 30:00 | 139 | 0:22 | 11:01 |
| 530 | 45:33 | 192 | 0:25 | 16:49 |
| 531 | 38:35 | 152 | 0:26 | 14:16 |
| 532 | 62:25 | 181 | 0:34 | 19:20 |
| 533 | 84:24 | 206 | 0:37 | 25:49 |
| 534 | 95:29 | 239 | 0:51 | 29:32 |
| 535 | 80:10 | 209 | 0:59 | 26:09 |
| 536 | 107:46 | 225 | 1:02 | 35:40 |
| 537 | 96:48 | 198 | 0:58 | 31:22 |
| 538 | 86:55 | 182 | 0:52 | 28:32 |
| 539 | 50:22 | 116 | 1:04 | 17:23 |
| 540 | 63:40 | 152 | 0:51 | 23:06 |
| 541 | 74:43 | 144 | 0:59 | 28:17 |
| 542 | 98:59 | 187 | 0:46 | 35:37 |
| 543 | 107:15 | 220 | 0:49 | 37:40 |
| 544 | 112:12 | 217 | 0:43 | 40:44 |
| 545 | 117:34 | 259 | 0:42 | 43:10 |
| 546 | 73:16 | 164 | 0:53 | 25:01 |
| 547 | 91:46 | 166 | 1:05 | 31:13 |
| 548 | 161:58 | 292 | 1:02 | 60:51 |
| 549 | 168:10 | 232 | 1:13 | 58:37 |
| 550 | 250:36 | 280 | 1:23 | 91:15 |
| 551 | 160:53 | 193 | 1:24 | 56:55 |
| 552 | 112:52 | 157 | 1:27 | 40:35 |
| 553 | 102:17 | 182 | 1:23 | 37:08 |
| 554 | 101:18 | 184 | 1:23 | 36:46 |
| 555 | 100:02 | 187 | 1:22 | 36:15 |
| 556 | 91:25 | 137 | 1:21 | 32:47 |
| 557 | 90:45 | 135 | 1:21 | 32:32 |
| 558 | 88:45 | 134 | 1:21 | 31:56 |
| 559 | 87:59 | 130 | 1:21 | 31:40 |
| 560 | 114:54 | 222 | 1:22 | 40:36 |
| 561 | 115:55 | 220 | 1:23 | 40:41 |
| 562 | 84:14 | 127 | 1:17 | 30:18 |
| 563 | 77:04 | 120 | 1:13 | 28:05 |
| 564 | 75:13 | 119 | 1:12 | 27:30 |
| 565 | 73:23 | 115 | 1:10 | 26:59 |
| 566 | 71:04 | 116 | 1:09 | 26:30 |
| 567 | 70:13 | 117 | 1:08 | 26:20 |
| 568 | 67:51 | 122 | 1:06 | 25:51 |
| 569 | 65:06 | 131 | 1:03 | 25:26 |
| 570 | 63:34 | 126 | 1:04 | 24:36 |
| 571 | 75:30 | 159 | 1:00 | 30:46 |
| 572 | 77:30 | 154 | 1:00 | 31:46 |
| 573 | 78:18 | 150 | 0:59 | 32:03 |
| 574 | 75:38 | 147 | 0:57 | 31:13 |
| 575 | 74:17 | 146 | 0:56 | 30:39 |
| 576 | 73:46 | 158 | 0:54 | 30:10 |
| 577 | 89:08 | 164 | 1:01 | 34:54 |
| 578 | 86:09 | 148 | 1:04 | 33:58 |
| 579 | 81:30 | 178 | 0:39 | 36:19 |
| 580 | 84:21 | 178 | 0:41 | 37:46 |
| 581 | 96:59 | 183 | 0:52 | 42:49 |
| 582 | 90:22 | 174 | 0:57 | 31:50 |
| 583 | 100:45 | 212 | 0:54 | 36:12 |
| 584 | 103:46 | 195 | 0:53 | 33:59 |
| 585 | 52:49 | 165 | 0:30 | 20:02 |
| 586 | 26:26 | 118 | 0:28 | 9:21 |
| 587 | 28:48 | 143 | 0:28 | 10:05 |
| 588 | 21:10 | 91 | 0:26 | 7:25 |
| 589 | 21:37 | 95 | 0:26 | 7:35 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 590 | 41:56 | 198 | 0:25 | 15:17 |
| 591 | 32:31 | 162 | 0:24 | 11:50 |
| 592 | 16:55 | 102 | 0:20 | 6:10 |
| 593 | 20:21 | 121 | 0:21 | 7:08 |
| 594 | 17:17 | 111 | 0:20 | 6:05 |
| 595 | 63:54 | 212 | 0:25 | 23:13 |
| 596 | 65:03 | 225 | 0:25 | 23:44 |
| 597 | 65:18 | 225 | 0:26 | 23:50 |
| 598 | 65:29 | 221 | 0:26 | 23:58 |
| 599 | 58:14 | 197 | 0:29 | 20:44 |
| 600 | 49:24 | 169 | 0:30 | 16:38 |
| 601 | 47:07 | 177 | 0:29 | 15:48 |
| 602 | 40:39 | 161 | 0:29 | 13:30 |
| 603 | 58:08 | 200 | 0:29 | 20:20 |
| 604 | 46:25 | 191 | 0:26 | 15:58 |
| 605 | 46:06 | 189 | 0:27 | 15:47 |
| 606 | 43:07 | 183 | 0:25 | 14:59 |
| 607 | 39:01 | 159 | 0:24 | 13:40 |
| 608 | 36:53 | 156 | 0:24 | 13:06 |
| 609 | 35:14 | 150 | 0:24 | 12:34 |
| 610 | 33:57 | 146 | 0:27 | 11:16 |
| 611 | 32:36 | 141 | 0:27 | 10:53 |
| 612 | 31:09 | 137 | 0:27 | 10:29 |
| 613 | 29:26 | 133 | 0:26 | 10:01 |
| 614 | 26:09 | 143 | 0:24 | 9:06 |
| 615 | 26:19 | 139 | 0:24 | 9:12 |
| 616 | 27:15 | 147 | 0:23 | 9:41 |
| 617 | 25:55 | 131 | 0:24 | 9:07 |
| 618 | 25:25 | 129 | 0:24 | 8:56 |
| 619 | 26:06 | 131 | 0:25 | 9:11 |
| 620 | 30:46 | 136 | 0:27 | 10:37 |
| 621 | 32:25 | 141 | 0:27 | 11:01 |
| 622 | 33:38 | 143 | 0:28 | 11:20 |
| 623 | 35:35 | 145 | 0:29 | 12:22 |
| 624 | 33:31 | 139 | 0:29 | 11:36 |
| 625 | 29:38 | 134 | 0:27 | 10:19 |
| 626 | 30:03 | 131 | 0:28 | 10:30 |
| 627 | 31:58 | 138 | 0:28 | 11:09 |
| 628 | 29:52 | 144 | 0:27 | 10:30 |
| 629 | 30:33 | 147 | 0:27 | 10:47 |
| 630 | 30:45 | 150 | 0:27 | 10:50 |
| 631 | 28:46 | 145 | 0:26 | 10:08 |
| 632 | 30:36 | 154 | 0:26 | 10:43 |
| 633 | 28:00 | 139 | 0:25 | 9:52 |
| 634 | 28:10 | 141 | 0:25 | 9:51 |
| 635 | 29:48 | 151 | 0:26 | 10:24 |
| 636 | 28:25 | 159 | 0:24 | 9:49 |
| 637 | 28:29 | 150 | 0:25 | 9:51 |
| 638 | 29:55 | 163 | 0:23 | 10:40 |
| 639 | 28:51 | 133 | 0:26 | 9:59 |
| 640 | 28:03 | 130 | 0:26 | 9:38 |
| 641 | 25:59 | 122 | 0:25 | 9:03 |
| 642 | 25:14 | 120 | 0:24 | 8:48 |
| 643 | 30:08 | 98 | 0:26 | 10:28 |
| 644 | 99:57 | 206 | 0:49 | 33:55 |
| 645 | 76:51 | 164 | 0:49 | 22:55 |
| 646 | 73:18 | 191 | 0:37 | 24:34 |
| 647 | 16:14 | 80 | 0:21 | 4:53 |
| 648 | 16:59 | 81 | 0:21 | 5:06 |
| 649 | 17:55 | 79 | 0:23 | 5:24 |
| 650 | 20:42 | 83 | 0:25 | 6:15 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 651 | 22:53 | 110 | 0:27 | 7:11 |
| 652 | 24:17 | 115 | 0:28 | 7:47 |
| 653 | 29:38 | 139 | 0:31 | 9:54 |
| 654 | 30:58 | 132 | 0:32 | 10:40 |
| 655 | 31:24 | 128 | 0:33 | 10:51 |
| 656 | 40:41 | 142 | 0:35 | 14:03 |
| 657 | 45:14 | 155 | 0:36 | 15:41 |
| 658 | 46:43 | 157 | 0:36 | 16:12 |
| 659 | 47:33 | 156 | 0:36 | 16:37 |
| 660 | 50:05 | 118 | 0:50 | 17:05 |
| 661 | 47:28 | 124 | 0:40 | 17:11 |
| 662 | 51:45 | 168 | 0:38 | 19:00 |
| 663 | 59:04 | 198 | 0:39 | 22:05 |
| 664 | 54:35 | 171 | 0:42 | 20:49 |
| 665 | 133:11 | 236 | 0:55 | 56:47 |
| 666 | 32:55 | 155 | 0:20 | 12:50 |
| 667 | 34:19 | 190 | 0:17 | 12:12 |
| 668 | 45:12 | 190 | 0:25 | 19:12 |
| 669 | 27:59 | 166 | 0:17 | 12:12 |
| 670 | 24:02 | 155 | 0:15 | 10:46 |
| 671 | 11:19 | 90 | 0:12 | 4:15 |
| 672 | 10:20 | 97 | 0:12 | 3:43 |
| 673 | 5:58 | 38 | 0:12 | 2:05 |
| 674 | 7:16 | 55 | 0:10 | 3:15 |
| 675 | 8:43 | 60 | 0:12 | 3:54 |
| 676 | 7:48 | 56 | 0:12 | 3:22 |
| 677 | 15:16 | 79 | 0:23 | 5:16 |
| 678 | 6:57 | 78 | 0:09 | 2:01 |
| 679 | 6:20 | 63 | 0:10 | 1:56 |
| 680 | 6:04 | 57 | 0:10 | 1:58 |
| 681 | 18:00 | 113 | 0:15 | 4:52 |
| 682 | 19:01 | 117 | 0:15 | 5:09 |
| 683 | 20:09 | 121 | 0:15 | 5:29 |
| 684 | 19:08 | 125 | 0:14 | 5:15 |
| 685 | 17:49 | 99 | 0:18 | 5:32 |
| 686 | 14:43 | 91 | 0:16 | 4:35 |
| 687 | 9:01 | 56 | 0:15 | 2:31 |
| 688 | 3:29 | 30 | 0:11 | 1:04 |
| 689 | 3:37 | 34 | 0:11 | 1:05 |
| 690 | 3:37 | 32 | 0:11 | 1:06 |
| 691 | 3:48 | 32 | 0:11 | 1:10 |
| 692 | 3:43 | 32 | 0:11 | 1:11 |
| 693 | 4:07 | 42 | 0:12 | 1:21 |
| 694 | 4:22 | 44 | 0:12 | 1:23 |
| 695 | 5:16 | 53 | 0:13 | 1:44 |
| 696 | 5:45 | 59 | 0:14 | 1:53 |
| 697 | 6:22 | 72 | 0:14 | 2:18 |
| 698 | 6:58 | 72 | 0:15 | 2:20 |
| 699 | 8:22 | 91 | 0:16 | 3:13 |
| 700 | 9:52 | 112 | 0:17 | 3:37 |
| 701 | 9:23 | 85 | 0:18 | 3:32 |
| 702 | 11:31 | 112 | 0:19 | 4:25 |
| 703 | 12:43 | 121 | 0:20 | 4:43 |
| 704 | 7:50 | 49 | 0:18 | 2:50 |
| 705 | 9:27 | 68 | 0:19 | 3:36 |
| 706 | 14:58 | 91 | 0:19 | 4:44 |
| 707 | 11:05 | 78 | 0:18 | 3:37 |
| 708 | 18:24 | 103 | 0:17 | 5:30 |
| 709 | 21:46 | 125 | 0:17 | 6:37 |
| 710 | 21:49 | 126 | 0:17 | 6:42 |
| 711 | 22:01 | 121 | 0:17 | 6:37 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 712 | 23:10 | 127 | 0:19 | 6:33 |
| 713 | 30:23 | 140 | 0:22 | 8:22 |
| 714 | 14:02 | 87 | 0:16 | 4:55 |
| 715 | 12:08 | 82 | 0:22 | 4:28 |
| 716 | 14:04 | 94 | 0:23 | 5:00 |
| 717 | 14:25 | 94 | 0:23 | 5:06 |
| 718 | 13:12 | 82 | 0:23 | 4:57 |
| 719 | 16:11 | 104 | 0:25 | 5:45 |
| 720 | 15:24 | 78 | 0:26 | 5:18 |
| 721 | 16:12 | 81 | 0:27 | 5:38 |
| 722 | 18:16 | 108 | 0:27 | 6:39 |
| 723 | 18:48 | 112 | 0:27 | 6:46 |
| 724 | 17:21 | 96 | 0:26 | 6:43 |
| 725 | 19:57 | 105 | 0:29 | 7:54 |
| 726 | 27:24 | 131 | 0:34 | 10:33 |
| 727 | 27:44 | 110 | 0:36 | 9:43 |
| 728 | 27:32 | 90 | 0:36 | 9:17 |
| 729 | 27:32 | 98 | 0:35 | 8:48 |
| 730 | 35:04 | 153 | 0:38 | 13:48 |
| 731 | 39:36 | 167 | 0:40 | 15:07 |
| 732 | 48:47 | 191 | 0:43 | 19:32 |
| 733 | 48:54 | 164 | 0:43 | 21:11 |
| 734 | 53:03 | 166 | 0:45 | 23:11 |
| 735 | 65:41 | 181 | 0:46 | 29:08 |
| 736 | 84:44 | 195 | 0:54 | 36:29 |
| 737 | 116:20 | 192 | 1:02 | 55:14 |
| 738 | 87:53 | 195 | 0:59 | 40:53 |
| 739 | 109:03 | 187 | 1:06 | 52:01 |
| 740 | 94:21 | 177 | 1:06 | 44:40 |
| 741 | 78:40 | 167 | 1:00 | 36:28 |
| 742 | 110:51 | 169 | 1:13 | 54:20 |
| 743 | 42:10 | 131 | 0:35 | 17:31 |
| 744 | 35:52 | 117 | 0:22 | 11:40 |
| 745 | 38:47 | 125 | 0:22 | 12:44 |
| 746 | 102:47 | 139 | 1:24 | 45:47 |
| 747 | 96:35 | 146 | 1:21 | 40:01 |
| 748 | 143:24 | 169 | 1:39 | 55:34 |
| 749 | 146:39 | 236 | 1:12 | 44:24 |
| 750 | 334:48 | 284 | 1:49 | 106:01 |
| 751 | 306:21 | 165 | 2:09 | 151:47 |
| 752 | 173:58 | 134 | 1:47 | 89:11 |
| 753 | 42:06 | 129 | 0:24 | 14:06 |
| 754 | 47:01 | 141 | 0:25 | 15:59 |
| 755 | 31:56 | 102 | 0:26 | 12:11 |
| 756 | 46:12 | 132 | 0:27 | 18:35 |
| 757 | 55:55 | 142 | 0:27 | 20:54 |
| 758 | 48:52 | 122 | 0:28 | 18:00 |
| 759 | 35:50 | 96 | 0:30 | 17:29 |
| 760 | 45:59 | 115 | 0:29 | 17:13 |
| 761 | 51:41 | 131 | 0:28 | 19:07 |
| 762 | 29:19 | 78 | 0:32 | 13:34 |
| 763 | 14:36 | 54 | 0:27 | 8:10 |
| 764 | 42:31 | 106 | 0:30 | 12:04 |
| 765 | 50:34 | 126 | 0:29 | 16:30 |
| 766 | 50:29 | 145 | 0:26 | 18:25 |
| 767 | 36:16 | 128 | 0:21 | 14:42 |
| 768 | 15:25 | 63 | 0:20 | 4:21 |
| 769 | 25:26 | 56 | 0:32 | 5:54 |
| 770 | 16:05 | 52 | 0:29 | 9:06 |
| 771 | 18:56 | 45 | 0:30 | 4:14 |
| 772 | 1:44 | 39 | 0:04 | 0:42 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 773 | 1:16 | 24 | 0:04 | 0:35 |
| 774 | 1:22 | 26 | 0:04 | 0:38 |
| 775 | 1:44 | 28 | 0:05 | 0:48 |
| 776 | 11:47 | 68 | 0:23 | 4:41 |
| 777 | 2:31 | 35 | 0:06 | 1:11 |
| 778 | 11:39 | 72 | 0:21 | 4:41 |
| 779 | 55:57 | 127 | 0:38 | 22:22 |
| 780 | 25:22 | 116 | 0:27 | 10:17 |
| 781 | 80:27 | 155 | 0:43 | 30:15 |
| 782 | 92:55 | 191 | 0:36 | 34:05 |
| 783 | 91:45 | 176 | 0:38 | 33:59 |
| 784 | 68:18 | 187 | 0:36 | 25:49 |
| 785 | 56:27 | 143 | 0:31 | 21:07 |
| 786 | 54:14 | 142 | 0:31 | 20:19 |
| 787 | 59:05 | 153 | 0:31 | 22:10 |
| 788 | 48:09 | 137 | 0:28 | 17:59 |
| 789 | 35:30 | 117 | 0:26 | 13:20 |
| 790 | 56:58 | 168 | 0:41 | 20:05 |
| 791 | 87:28 | 200 | 0:54 | 29:30 |
| 792 | 89:30 | 199 | 0:53 | 30:03 |
| 793 | 96:25 | 211 | 0:52 | 32:30 |
| 794 | 38:23 | 83 | 0:42 | 11:52 |
| 795 | 98:10 | 216 | 0:50 | 33:19 |
| 796 | 78:01 | 172 | 0:48 | 26:04 |
| 797 | 78:42 | 172 | 0:45 | 26:25 |
| 798 | 80:19 | 208 | 0:46 | 27:26 |
| 799 | 67:09 | 180 | 0:44 | 23:16 |
| 800 | 78:36 | 182 | 0:43 | 26:47 |
| 801 | 58:26 | 158 | 0:41 | 19:54 |
| 802 | 54:58 | 161 | 0:41 | 19:28 |
| 803 | 56:26 | 165 | 0:41 | 19:58 |
| 804 | 51:14 | 146 | 0:40 | 17:50 |
| 805 | 53:27 | 150 | 0:40 | 18:30 |
| 806 | 56:26 | 137 | 0:40 | 18:40 |
| 807 | 43:57 | 133 | 0:37 | 15:24 |
| 808 | 40:19 | 131 | 0:36 | 14:16 |
| 809 | 38:42 | 126 | 0:35 | 13:40 |
| 810 | 39:18 | 135 | 0:35 | 14:00 |
| 811 | 42:51 | 145 | 0:37 | 15:11 |
| 812 | 28:01 | 141 | 0:17 | 10:17 |
| 813 | 31:05 | 160 | 0:17 | 11:27 |
| 814 | 34:57 | 211 | 0:18 | 12:53 |
| 815 | 37:43 | 200 | 0:19 | 14:03 |
| 816 | 18:59 | 114 | 0:21 | 6:51 |
| 817 | 15:57 | 92 | 0:20 | 5:45 |
| 818 | 21:50 | 134 | 0:21 | 7:51 |
| 819 | 22:01 | 120 | 0:22 | 7:59 |
| 820 | 34:55 | 113 | 0:34 | 12:21 |
| 821 | 33:29 | 123 | 0:33 | 12:07 |
| 822 | 30:38 | 111 | 0:31 | 10:53 |
| 823 | 27:36 | 98 | 0:31 | 9:47 |
| 824 | 31:40 | 111 | 0:32 | 11:05 |
| 825 | 29:13 | 105 | 0:31 | 10:12 |
| 826 | 24:59 | 92 | 0:29 | 8:48 |
| 827 | 26:19 | 95 | 0:30 | 9:17 |
| 828 | 31:34 | 116 | 0:30 | 11:10 |
| 829 | 36:41 | 130 | 0:30 | 13:09 |
| 830 | 25:28 | 91 | 0:29 | 8:49 |
| 831 | 29:09 | 114 | 0:28 | 10:17 |
| 832 | 22:29 | 87 | 0:28 | 7:53 |
| 833 | 26:11 | 98 | 0:30 | 9:31 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 834 | 25:23 | 95 | 0:29 | 9:12 |
| 835 | 25:24 | 96 | 0:29 | 9:11 |
| 836 | 23:56 | 89 | 0:28 | 8:43 |
| 837 | 25:24 | 93 | 0:29 | 9:15 |
| 838 | 27:21 | 101 | 0:30 | 9:56 |
| 839 | 29:13 | 107 | 0:31 | 10:36 |
| 840 | 33:27 | 122 | 0:32 | 12:06 |
| 841 | 37:57 | 138 | 0:33 | 13:47 |
| 842 | 33:48 | 128 | 0:32 | 12:19 |
| 843 | 29:02 | 104 | 0:31 | 10:32 |
| 844 | 41:09 | 147 | 0:34 | 14:58 |
| 845 | 42:58 | 140 | 0:36 | 15:31 |
| 846 | 40:57 | 137 | 0:33 | 14:02 |
| 847 | 40:08 | 123 | 0:34 | 13:39 |
| 848 | 40:08 | 123 | 0:34 | 13:39 |
| 849 | 60:01 | 147 | 0:38 | 19:53 |
| 850 | 43:20 | 122 | 0:37 | 14:26 |
| 851 | 67:51 | 186 | 0:35 | 23:27 |
| 852 | 65:09 | 173 | 0:36 | 22:16 |
| 853 | 74:59 | 184 | 0:35 | 27:05 |
| 854 | 63:22 | 171 | 0:34 | 24:02 |
| 855 | 81:50 | 202 | 0:33 | 29:45 |
| 856 | 75:44 | 211 | 0:31 | 27:09 |
| 857 | 77:01 | 215 | 0:31 | 27:56 |
| 858 | 66:41 | 194 | 0:30 | 24:00 |
| 859 | 53:19 | 158 | 0:30 | 19:27 |
| 860 | 58:29 | 171 | 0:29 | 21:23 |
| 861 | 53:19 | 175 | 0:28 | 19:25 |
| 862 | 57:14 | 180 | 0:28 | 20:17 |
| 863 | 45:16 | 156 | 0:27 | 15:33 |
| 864 | 42:11 | 144 | 0:27 | 15:26 |
| 865 | 51:19 | 169 | 0:27 | 19:05 |
| 866 | 49:54 | 168 | 0:27 | 18:34 |
| 867 | 48:09 | 155 | 0:27 | 17:48 |
| 868 | 42:13 | 143 | 0:27 | 15:23 |
| 869 | 45:09 | 145 | 0:28 | 16:32 |
| 870 | 43:55 | 142 | 0:29 | 15:59 |
| 871 | 33:55 | 128 | 0:27 | 12:09 |
| 872 | 32:15 | 123 | 0:27 | 11:30 |
| 873 | 35:02 | 130 | 0:26 | 12:38 |
| 874 | 29:57 | 124 | 0:25 | 10:49 |
| 875 | 33:57 | 136 | 0:24 | 12:27 |
| 876 | 39:03 | 149 | 0:24 | 14:23 |
| 877 | 30:44 | 125 | 0:24 | 11:24 |
| 878 | 34:27 | 137 | 0:24 | 12:47 |
| 879 | 33:37 | 131 | 0:24 | 12:32 |
| 880 | 34:20 | 129 | 0:25 | 12:45 |
| 881 | 35:09 | 130 | 0:25 | 13:02 |
| 882 | 34:28 | 130 | 0:25 | 12:33 |
| 883 | 25:26 | 114 | 0:22 | 9:18 |
| 884 | 24:54 | 107 | 0:22 | 9:01 |
| 885 | 23:25 | 108 | 0:22 | 8:24 |
| 886 | 30:16 | 121 | 0:24 | 11:07 |
| 887 | 24:16 | 112 | 0:21 | 8:52 |
| 888 | 20:50 | 105 | 0:20 | 7:34 |
| 889 | 22:53 | 112 | 0:20 | 8:27 |
| 890 | 24:18 | 115 | 0:21 | 9:02 |
| 891 | 25:25 | 119 | 0:21 | 9:27 |
| 892 | 25:52 | 120 | 0:22 | 9:35 |
| 893 | 26:36 | 122 | 0:22 | 9:52 |
| 894 | 29:42 | 131 | 0:23 | 11:01 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 895 | 30:29 | 133 | 0:23 | 11:17 |
| 896 | 33:28 | 144 | 0:23 | 12:23 |
| 897 | 34:09 | 137 | 0:23 | 12:36 |
| 898 | 33:22 | 142 | 0:22 | 12:22 |
| 899 | 32:02 | 140 | 0:22 | 11:52 |
| 900 | 22:13 | 112 | 0:20 | 8:18 |
| 901 | 33:28 | 135 | 0:24 | 12:19 |
| 902 | 22:32 | 99 | 0:27 | 7:59 |
| 903 | 21:45 | 84 | 0:27 | 7:36 |
| 904 | 21:43 | 88 | 0:27 | 7:48 |
| 905 | 19:21 | 79 | 0:26 | 7:01 |
| 906 | 17:44 | 79 | 0:25 | 6:21 |
| 907 | 19:47 | 97 | 0:24 | 7:10 |
| 908 | 26:48 | 118 | 0:24 | 9:45 |
| 909 | 27:12 | 120 | 0:24 | 9:53 |
| 910 | 25:30 | 114 | 0:24 | 9:15 |
| 911 | 26:48 | 118 | 0:23 | 9:46 |
| 912 | 17:47 | 89 | 0:23 | 6:26 |
| 913 | 22:01 | 109 | 0:22 | 8:02 |
| 914 | 30:24 | 124 | 0:27 | 10:55 |
| 915 | 24:31 | 102 | 0:23 | 8:51 |
| 916 | 33:35 | 133 | 0:24 | 12:29 |
| 917 | 39:42 | 137 | 0:27 | 14:07 |
| 918 | 40:46 | 141 | 0:27 | 14:27 |
| 919 | 38:56 | 105 | 0:30 | 12:59 |
| 920 | 33:02 | 119 | 0:28 | 11:48 |
| 921 | 42:16 | 130 | 0:30 | 14:29 |
| 922 | 41:26 | 128 | 0:33 | 14:28 |
| 923 | 48:18 | 139 | 0:34 | 16:40 |
| 924 | 40:38 | 113 | 0:30 | 13:24 |
| 925 | 37:12 | 142 | 0:29 | 12:51 |
| 926 | 54:44 | 180 | 0:32 | 18:46 |
| 927 | 46:42 | 166 | 0:31 | 15:41 |
| 928 | 69:45 | 171 | 0:46 | 28:06 |
| 929 | 92:02 | 165 | 1:16 | 38:01 |
| 930 | 125:07 | 160 | 1:36 | 54:10 |
| 931 | 66:57 | 151 | 1:04 | 24:37 |
| 932 | 89:34 | 150 | 1:27 | 35:51 |
| 933 | 58:42 | 163 | 0:35 | 20:01 |
| 934 | 58:03 | 170 | 0:34 | 19:52 |
| 935 | 54:22 | 162 | 0:36 | 18:53 |
| 936 | 20:23 | 82 | 0:27 | 7:24 |
| 937 | 22:25 | 89 | 0:28 | 8:07 |
| 938 | 21:54 | 89 | 0:28 | 7:55 |
| 939 | 38:54 | 143 | 0:32 | 14:03 |
| 940 | 49:47 | 146 | 0:38 | 17:21 |
| 941 | 86:41 | 139 | 1:30 | 35:24 |
| 942 | 164:25 | 135 | 1:57 | 72:10 |
| 943 | 25:34 | 93 | 0:32 | 9:06 |
| 944 | 29:40 | 109 | 0:32 | 10:40 |
| 945 | 38:23 | 133 | 0:36 | 13:52 |
| 946 | 25:29 | 124 | 0:21 | 9:30 |
| 947 | 48:14 | 167 | 0:38 | 17:07 |
| 948 | 43:29 | 141 | 0:37 | 15:23 |
| 949 | 49:38 | 155 | 0:39 | 17:37 |
| 950 | 58:17 | 159 | 0:40 | 19:45 |
| 951 | 57:38 | 157 | 0:39 | 19:24 |
| 952 | 84:51 | 202 | 0:45 | 29:08 |
| 953 | 104:19 | 176 | 1:09 | 37:54 |
| 954 | 95:44 | 168 | 1:06 | 34:43 |
| 955 | 83:53 | 159 | 1:01 | 30:11 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case: Shadow hours per year [h/year] | Shadow, worst case: Shadow days per year [days/year] | Shadow, worst case: Max shadow hours per day [h/day] | Shadow, expected values: Shadow hours per year [h/year] |
|---|---|---|---|---|
| 956 | 79:24 | 155 | 0:59 | 28:29 |
| 957 | 73:02 | 142 | 0:59 | 25:05 |
| 958 | 76:49 | 147 | 1:01 | 26:22 |
| 959 | 80:33 | 148 | 1:03 | 27:48 |
| 960 | 85:42 | 154 | 1:05 | 29:35 |
| 961 | 94:02 | 163 | 1:08 | 32:36 |
| 962 | 105:17 | 182 | 1:01 | 35:42 |
| 963 | 89:37 | 168 | 1:01 | 30:04 |
| 964 | 80:04 | 156 | 0:57 | 26:56 |
| 965 | 72:36 | 147 | 0:54 | 24:33 |
| 966 | 88:06 | 175 | 0:51 | 29:49 |
| 967 | 95:52 | 170 | 0:53 | 32:30 |
| 968 | 100:29 | 167 | 0:55 | 34:03 |
| 969 | 67:41 | 172 | 0:45 | 24:54 |
| 970 | 65:14 | 173 | 0:45 | 24:07 |
| 971 | 36:00 | 148 | 0:30 | 12:50 |
| 972 | 27:12 | 121 | 0:21 | 9:49 |
| 973 | 26:48 | 119 | 0:21 | 9:42 |
| 974 | 36:58 | 147 | 0:30 | 13:01 |
| 975 | 40:25 | 144 | 0:36 | 13:40 |
| 976 | 24:56 | 114 | 0:21 | 8:54 |
| 977 | 96:23 | 206 | 0:52 | 31:52 |
| 978 | 64:23 | 115 | 0:50 | 20:43 |
| 979 | 59:43 | 115 | 0:47 | 19:12 |
| 980 | 43:35 | 107 | 0:40 | 14:03 |
| 981 | 42:44 | 120 | 0:39 | 13:48 |
| 982 | 60:17 | 141 | 0:41 | 19:33 |
| 983 | 33:46 | 99 | 0:35 | 10:54 |
| 984 | 30:19 | 81 | 0:34 | 9:45 |
| 985 | 22:36 | 54 | 0:32 | 7:22 |
| 986 | 24:33 | 76 | 0:31 | 7:56 |
| 987 | 20:05 | 68 | 0:29 | 6:43 |
| 988 | 18:56 | 66 | 0:28 | 6:22 |
| 989 | 19:33 | 71 | 0:27 | 6:30 |
| 990 | 18:49 | 64 | 0:27 | 6:07 |
| 991 | 16:26 | 63 | 0:25 | 5:36 |
| 992 | 14:36 | 69 | 0:22 | 5:04 |
| 993 | 13:06 | 62 | 0:20 | 4:35 |
| 994 | 13:16 | 68 | 0:20 | 4:40 |
| 995 | 12:47 | 62 | 0:20 | 4:08 |
| 996 | 12:17 | 58 | 0:20 | 4:00 |
| 997 | 20:22 | 70 | 0:26 | 6:52 |
| 998 | 24:49 | 81 | 0:26 | 8:16 |
| 999 | 9:41 | 50 | 0:19 | 3:28 |
| 1000 | 6:08 | 43 | 0:11 | 2:09 |
| 1001 | 0:00 | 0 | 0:00 | 0:00 |
| 1002 | 7:23 | 33 | 0:17 | 2:45 |
| 1003 | 12:42 | 90 | 0:13 | 4:36 |
| 1004 | 0:00 | 0 | 0:00 | 0:00 |
| 1005 | 0:00 | 0 | 0:00 | 0:00 |
| 1006 | 0:00 | 0 | 0:00 | 0:00 |
| 1007 | 0:00 | 0 | 0:00 | 0:00 |
| 1008 | 0:00 | 0 | 0:00 | 0:00 |
| 1009 | 0:00 | 0 | 0:00 | 0:00 |
| 1010 | 0:00 | 0 | 0:00 | 0:00 |
| 1011 | 0:00 | 0 | 0:00 | 0:00 |
| 1012 | 31:47 | 86 | 0:31 | 10:40 |
| 1013 | 119:33 | 157 | 1:07 | 46:35 |
| 1014 | 45:11 | 120 | 0:37 | 14:45 |
| 1015 | 82:35 | 205 | 1:06 | 26:27 |
| 1016 | 425:41 | 278 | 2:53 | 116:40 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1017 | 13:26 | 56 | 0:21 | 4:35 |
| 1018 | 27:41 | 126 | 0:26 | 9:28 |
| 1019 | 32:18 | 154 | 0:27 | 11:12 |
| 1020 | 58:27 | 214 | 0:37 | 20:58 |
| 1021 | 44:28 | 167 | 0:37 | 16:14 |
| 1022 | 449:51 | 256 | 2:29 | 172:16 |
| 1023 | 29:59 | 143 | 0:18 | 10:20 |
| 1024 | 112:53 | 153 | 1:19 | 45:47 |
| 1025 | 88:52 | 117 | 1:26 | 29:10 |
| 1026 | 131:27 | 186 | 1:11 | 43:01 |
| 1027 | 118:47 | 189 | 1:10 | 39:39 |
| 1028 | 107:38 | 197 | 1:07 | 36:13 |
| 1029 | 137:04 | 143 | 1:40 | 46:07 |
| 1030 | 39:42 | 124 | 0:39 | 13:21 |
| 1031 | 47:51 | 122 | 0:44 | 15:50 |
| 1032 | 67:59 | 141 | 0:52 | 24:45 |
| 1033 | 171:28 | 158 | 1:34 | 65:47 |
| 1034 | 23:43 | 135 | 0:16 | 6:58 |
| 1035 | 13:21 | 102 | 0:13 | 3:55 |
| 1036 | 8:40 | 68 | 0:12 | 2:44 |
| 1037 | 9:39 | 92 | 0:11 | 2:53 |
| 1038 | 9:14 | 77 | 0:12 | 2:39 |
| 1039 | 6:09 | 47 | 0:10 | 1:50 |
| 1040 | 4:03 | 31 | 0:10 | 1:08 |
| 1041 | 39:59 | 88 | 0:44 | 15:01 |
| 1042 | 41:46 | 90 | 0:47 | 15:27 |
| 1043 | 33:16 | 80 | 0:41 | 12:12 |
| 1044 | 28:48 | 75 | 0:38 | 10:23 |
| 1045 | 63:12 | 130 | 0:39 | 24:20 |
| 1046 | 62:42 | 125 | 0:51 | 23:56 |
| 1047 | 82:09 | 131 | 0:56 | 31:34 |
| 1048 | 37:31 | 77 | 0:49 | 12:49 |
| 1049 | 27:14 | 111 | 0:28 | 9:33 |
| 1050 | 21:26 | 73 | 0:28 | 8:18 |
| 1051 | 37:16 | 114 | 0:28 | 14:14 |
| 1052 | 17:31 | 83 | 0:17 | 6:43 |
| 1053 | 15:17 | 66 | 0:18 | 5:54 |
| 1054 | 11:54 | 64 | 0:14 | 4:17 |
| 1055 | 14:27 | 75 | 0:13 | 5:18 |
| 1056 | 3:33 | 21 | 0:12 | 1:12 |
| 1057 | 3:04 | 29 | 0:09 | 1:17 |
| 1058 | 0:00 | 0 | 0:00 | 0:00 |
| 1059 | 3:09 | 31 | 0:09 | 1:20 |
| 1060 | 0:00 | 0 | 0:00 | 0:00 |
| 1061 | 0:00 | 0 | 0:00 | 0:00 |
| 1062 | 47:03 | 146 | 0:34 | 19:36 |
| 1063 | 52:15 | 155 | 0:36 | 21:46 |
| 1064 | 49:18 | 148 | 0:36 | 19:59 |
| 1065 | 43:44 | 141 | 0:34 | 16:53 |
| 1066 | 32:01 | 119 | 0:29 | 12:27 |
| 1067 | 30:06 | 116 | 0:28 | 11:32 |
| 1068 | 31:39 | 116 | 0:30 | 11:57 |
| 1069 | 33:04 | 121 | 0:30 | 12:24 |
| 1070 | 34:14 | 127 | 0:31 | 12:14 |
| 1071 | 36:44 | 138 | 0:31 | 12:33 |
| 1072 | 36:16 | 133 | 0:31 | 12:51 |
| 1073 | 40:07 | 149 | 0:32 | 13:12 |
| 1074 | 44:55 | 158 | 0:33 | 14:12 |
| 1075 | 44:04 | 154 | 0:33 | 13:40 |
| 1076 | 45:06 | 149 | 0:34 | 13:44 |
| 1077 | 44:17 | 146 | 0:35 | 13:18 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1078 | 41:12 | 141 | 0:34 | 12:13 |
| 1079 | 30:56 | 99 | 0:30 | 11:09 |
| 1080 | 30:02 | 97 | 0:30 | 10:52 |
| 1081 | 26:46 | 92 | 0:28 | 9:41 |
| 1082 | 25:25 | 88 | 0:27 | 9:02 |
| 1083 | 25:41 | 82 | 0:32 | 9:13 |
| 1084 | 35:52 | 139 | 0:30 | 11:39 |
| 1085 | 33:22 | 134 | 0:29 | 10:54 |
| 1086 | 29:56 | 122 | 0:28 | 10:11 |
| 1087 | 27:11 | 116 | 0:27 | 9:14 |
| 1088 | 26:54 | 112 | 0:27 | 9:08 |
| 1089 | 27:07 | 114 | 0:27 | 9:09 |
| 1090 | 28:04 | 119 | 0:27 | 9:13 |
| 1091 | 29:10 | 122 | 0:27 | 9:32 |
| 1092 | 17:35 | 52 | 0:27 | 6:24 |
| 1093 | 25:47 | 84 | 0:31 | 9:08 |
| 1094 | 27:30 | 115 | 0:26 | 8:40 |
| 1095 | 31:30 | 151 | 0:27 | 9:39 |
| 1096 | 36:53 | 147 | 0:29 | 11:02 |
| 1097 | 37:31 | 144 | 0:30 | 11:09 |
| 1098 | 38:37 | 147 | 0:30 | 11:33 |
| 1099 | 38:53 | 142 | 0:31 | 11:34 |
| 1100 | 31:52 | 137 | 0:26 | 9:14 |
| 1101 | 32:34 | 151 | 0:26 | 9:20 |
| 1102 | 34:54 | 133 | 0:30 | 10:05 |
| 1103 | 34:14 | 133 | 0:30 | 9:52 |
| 1104 | 40:27 | 138 | 0:34 | 11:55 |
| 1105 | 36:46 | 129 | 0:34 | 10:42 |
| 1106 | 34:07 | 121 | 0:33 | 9:52 |
| 1107 | 30:21 | 95 | 0:33 | 8:44 |
| 1108 | 31:34 | 79 | 0:34 | 8:56 |
| 1109 | 32:47 | 77 | 0:35 | 9:14 |
| 1110 | 35:22 | 73 | 0:36 | 9:57 |
| 1111 | 39:32 | 78 | 0:37 | 11:11 |
| 1112 | 45:38 | 91 | 0:37 | 12:53 |
| 1113 | 52:55 | 115 | 0:37 | 14:39 |
| 1114 | 59:06 | 112 | 0:37 | 16:00 |
| 1115 | 55:53 | 103 | 0:36 | 14:46 |
| 1116 | 47:05 | 80 | 0:41 | 11:38 |
| 1117 | 31:49 | 61 | 0:38 | 7:23 |
| 1118 | 49:29 | 90 | 0:38 | 12:35 |
| 1119 | 48:31 | 91 | 0:36 | 12:25 |
| 1120 | 49:50 | 96 | 0:35 | 12:57 |
| 1121 | 47:58 | 96 | 0:34 | 12:28 |
| 1122 | 50:44 | 110 | 0:33 | 13:46 |
| 1123 | 36:56 | 86 | 0:32 | 10:24 |
| 1124 | 32:45 | 79 | 0:31 | 9:15 |
| 1125 | 34:05 | 84 | 0:30 | 9:33 |
| 1126 | 47:51 | 98 | 0:33 | 12:34 |
| 1127 | 41:40 | 118 | 0:32 | 10:53 |
| 1128 | 29:49 | 75 | 0:29 | 8:26 |
| 1129 | 28:49 | 82 | 0:29 | 8:11 |
| 1130 | 25:40 | 81 | 0:28 | 7:18 |
| 1131 | 23:57 | 79 | 0:28 | 6:46 |
| 1132 | 24:24 | 110 | 0:27 | 7:16 |
| 1133 | 31:54 | 140 | 0:28 | 9:24 |
| 1134 | 31:14 | 143 | 0:28 | 9:17 |
| 1135 | 23:05 | 77 | 0:27 | 6:42 |
| 1136 | 15:18 | 169 | 0:12 | 4:52 |
| 1137 | 18:22 | 182 | 0:14 | 5:39 |
| 1138 | 17:44 | 165 | 0:15 | 5:32 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1139 | 15:46 | 125 | 0:15 | 4:45 |
| 1140 | 15:03 | 140 | 0:14 | 4:42 |
| 1141 | 13:34 | 132 | 0:12 | 4:15 |
| 1142 | 13:31 | 115 | 0:12 | 4:19 |
| 1143 | 34:36 | 114 | 0:29 | 12:10 |
| 1144 | 34:38 | 116 | 0:28 | 12:06 |
| 1145 | 13:06 | 57 | 0:19 | 4:31 |
| 1146 | 15:42 | 89 | 0:20 | 5:09 |
| 1147 | 15:44 | 61 | 0:21 | 5:45 |
| 1148 | 15:35 | 75 | 0:21 | 5:16 |
| 1149 | 13:02 | 57 | 0:19 | 4:45 |
| 1150 | 19:14 | 77 | 0:21 | 7:19 |
| 1151 | 40:05 | 76 | 0:37 | 9:50 |
| 1152 | 27:39 | 78 | 0:32 | 6:36 |
| 1153 | 17:26 | 83 | 0:26 | 4:18 |
| 1154 | 2:39 | 50 | 0:05 | 1:19 |
| 1155 | 5:32 | 86 | 0:06 | 1:56 |
| 1156 | 22:46 | 92 | 0:29 | 5:42 |
| 1157 | 13:21 | 88 | 0:22 | 3:18 |
| 1158 | 32:58 | 122 | 0:30 | 8:29 |
| 1159 | 14:57 | 89 | 0:22 | 4:24 |
| 1160 | 10:09 | 76 | 0:13 | 5:30 |
| 1161 | 5:46 | 80 | 0:10 | 2:53 |
| 1162 | 4:29 | 82 | 0:04 | 1:51 |
| 1163 | 5:13 | 87 | 0:05 | 1:58 |
| 1164 | 8:46 | 82 | 0:18 | 2:29 |
| 1165 | 13:45 | 87 | 0:23 | 3:35 |
| 1166 | 30:14 | 108 | 0:29 | 7:40 |
| 1167 | 41:35 | 141 | 0:29 | 11:16 |
| 1168 | 21:18 | 141 | 0:19 | 7:44 |
| 1169 | 2:31 | 44 | 0:05 | 1:12 |
| 1170 | 4:26 | 56 | 0:09 | 2:24 |
| 1171 | 8:20 | 67 | 0:13 | 4:36 |
| 1172 | 11:09 | 76 | 0:14 | 6:03 |
| 1173 | 12:47 | 82 | 0:14 | 6:51 |
| 1174 | 13:26 | 84 | 0:15 | 7:09 |
| 1175 | 14:18 | 88 | 0:14 | 7:29 |
| 1176 | 14:10 | 94 | 0:13 | 7:13 |
| 1177 | 14:16 | 98 | 0:14 | 7:12 |
| 1178 | 12:00 | 102 | 0:13 | 5:51 |
| 1179 | 9:45 | 76 | 0:13 | 4:36 |
| 1180 | 13:00 | 99 | 0:13 | 6:30 |
| 1181 | 11:51 | 99 | 0:13 | 5:52 |
| 1182 | 10:40 | 100 | 0:12 | 5:12 |
| 1183 | 8:55 | 78 | 0:12 | 4:14 |
| 1184 | 7:10 | 61 | 0:12 | 3:23 |
| 1185 | 6:42 | 55 | 0:12 | 3:10 |
| 1186 | 6:12 | 38 | 0:13 | 2:56 |
| 1187 | 6:42 | 55 | 0:12 | 3:11 |
| 1188 | 0:00 | 0 | 0:00 | 0:00 |
| 1189 | 0:00 | 0 | 0:00 | 0:00 |
| 1190 | 7:08 | 55 | 0:12 | 3:07 |
| 1191 | 8:40 | 60 | 0:13 | 4:09 |
| 1192 | 11:52 | 66 | 0:13 | 6:09 |
| 1193 | 11:43 | 103 | 0:13 | 5:02 |
| 1194 | 0:00 | 0 | 0:00 | 0:00 |
| 1195 | 5:45 | 38 | 0:12 | 2:45 |
| 1196 | 5:31 | 34 | 0:13 | 2:38 |
| 1197 | 7:13 | 52 | 0:13 | 3:02 |
| 1198 | 5:41 | 34 | 0:13 | 2:34 |
| 1199 | 5:27 | 34 | 0:13 | 2:25 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1200 | 5:37 | 34 | 0:13 | 2:35 |
| 1201 | 5:04 | 32 | 0:13 | 2:08 |
| 1202 | 6:48 | 54 | 0:14 | 2:57 |
| 1203 | 6:53 | 55 | 0:14 | 3:02 |
| 1204 | 7:12 | 56 | 0:14 | 3:10 |
| 1205 | 8:10 | 66 | 0:15 | 3:40 |
| 1206 | 7:57 | 62 | 0:15 | 3:32 |
| 1207 | 8:57 | 76 | 0:15 | 4:12 |
| 1208 | 5:50 | 38 | 0:13 | 2:24 |
| 1209 | 5:46 | 33 | 0:14 | 2:23 |
| 1210 | 5:29 | 32 | 0:13 | 2:16 |
| 1211 | 5:20 | 32 | 0:13 | 2:11 |
| 1212 | 5:28 | 31 | 0:14 | 2:13 |
| 1213 | 5:36 | 32 | 0:14 | 2:15 |
| 1214 | 5:44 | 35 | 0:14 | 2:20 |
| 1215 | 5:47 | 39 | 0:14 | 2:21 |
| 1216 | 5:53 | 40 | 0:14 | 2:23 |
| 1217 | 6:12 | 42 | 0:14 | 2:30 |
| 1218 | 5:57 | 39 | 0:14 | 2:26 |
| 1219 | 6:27 | 43 | 0:14 | 2:40 |
| 1220 | 7:11 | 55 | 0:14 | 3:00 |
| 1221 | 6:15 | 45 | 0:13 | 2:36 |
| 1222 | 6:33 | 48 | 0:14 | 2:44 |
| 1223 | 6:34 | 50 | 0:14 | 2:45 |
| 1224 | 6:24 | 41 | 0:14 | 2:27 |
| 1225 | 5:56 | 36 | 0:14 | 2:15 |
| 1226 | 6:04 | 40 | 0:14 | 2:12 |
| 1227 | 5:57 | 38 | 0:14 | 2:11 |
| 1228 | 12:16 | 67 | 0:21 | 4:52 |
| 1229 | 11:20 | 60 | 0:20 | 4:20 |
| 1230 | 10:26 | 58 | 0:19 | 3:36 |
| 1231 | 11:58 | 62 | 0:21 | 3:59 |
| 1232 | 8:41 | 56 | 0:16 | 2:26 |
| 1233 | 8:22 | 56 | 0:16 | 2:22 |
| 1234 | 8:38 | 57 | 0:16 | 2:26 |
| 1235 | 8:23 | 53 | 0:16 | 2:23 |
| 1236 | 8:35 | 54 | 0:16 | 2:27 |
| 1237 | 7:25 | 55 | 0:14 | 2:04 |
| 1238 | 7:13 | 47 | 0:15 | 2:10 |
| 1239 | 6:44 | 34 | 0:15 | 2:02 |
| 1240 | 6:52 | 34 | 0:15 | 2:05 |
| 1241 | 6:43 | 34 | 0:15 | 2:02 |
| 1242 | 6:21 | 33 | 0:15 | 1:56 |
| 1243 | 6:16 | 45 | 0:14 | 1:55 |
| 1244 | 5:51 | 42 | 0:14 | 1:49 |
| 1245 | 5:46 | 42 | 0:13 | 1:47 |
| 1246 | 5:54 | 41 | 0:14 | 1:53 |
| 1247 | 6:02 | 44 | 0:14 | 1:56 |
| 1248 | 6:09 | 34 | 0:14 | 1:56 |
| 1249 | 6:21 | 32 | 0:15 | 2:00 |
| 1250 | 5:34 | 42 | 0:13 | 1:45 |
| 1251 | 5:32 | 41 | 0:13 | 1:46 |
| 1252 | 5:42 | 43 | 0:14 | 1:51 |
| 1253 | 5:28 | 42 | 0:13 | 1:35 |
| 1254 | 5:47 | 44 | 0:13 | 1:40 |
| 1255 | 5:48 | 43 | 0:13 | 1:41 |
| 1256 | 6:08 | 46 | 0:13 | 1:47 |
| 1257 | 6:24 | 46 | 0:14 | 1:52 |
| 1258 | 6:33 | 47 | 0:14 | 1:55 |
| 1259 | 7:01 | 51 | 0:14 | 2:02 |
| 1260 | 6:53 | 38 | 0:15 | 1:59 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1261 | 7:13 | 50 | 0:15 | 2:06 |
| 1262 | 6:14 | 45 | 0:14 | 2:07 |
| 1263 | 6:21 | 45 | 0:14 | 2:10 |
| 1264 | 6:43 | 45 | 0:15 | 2:16 |
| 1265 | 6:53 | 46 | 0:15 | 2:21 |
| 1266 | 6:04 | 44 | 0:14 | 2:02 |
| 1267 | 5:45 | 42 | 0:14 | 2:00 |
| 1268 | 5:45 | 43 | 0:14 | 1:58 |
| 1269 | 5:40 | 45 | 0:14 | 1:55 |
| 1270 | 5:37 | 41 | 0:14 | 1:52 |
| 1271 | 5:30 | 41 | 0:14 | 1:50 |
| 1272 | 5:24 | 40 | 0:13 | 1:39 |
| 1273 | 5:38 | 32 | 0:14 | 2:02 |
| 1274 | 5:50 | 41 | 0:14 | 2:05 |
| 1275 | 5:27 | 31 | 0:14 | 1:58 |
| 1276 | 5:56 | 42 | 0:14 | 2:04 |
| 1277 | 6:07 | 45 | 0:14 | 2:09 |
| 1278 | 6:14 | 43 | 0:15 | 2:10 |
| 1279 | 5:21 | 29 | 0:14 | 1:54 |
| 1280 | 5:00 | 29 | 0:14 | 1:57 |
| 1281 | 5:03 | 29 | 0:14 | 2:01 |
| 1282 | 5:45 | 45 | 0:13 | 2:24 |
| 1283 | 4:46 | 29 | 0:13 | 1:59 |
| 1284 | 4:53 | 29 | 0:13 | 2:01 |
| 1285 | 0:00 | 0 | 0:00 | 0:00 |
| 1286 | 0:00 | 0 | 0:00 | 0:00 |
| 1287 | 0:00 | 0 | 0:00 | 0:00 |
| 1288 | 0:00 | 0 | 0:00 | 0:00 |
| 1289 | 0:00 | 0 | 0:00 | 0:00 |
| 1290 | 6:59 | 50 | 0:12 | 2:47 |
| 1291 | 7:03 | 53 | 0:13 | 2:48 |
| 1292 | 0:00 | 0 | 0:00 | 0:00 |
| 1293 | 0:00 | 0 | 0:00 | 0:00 |
| 1294 | 4:56 | 28 | 0:14 | 2:00 |
| 1295 | 4:59 | 29 | 0:13 | 2:02 |
| 1296 | 5:06 | 30 | 0:13 | 2:05 |
| 1297 | 5:06 | 29 | 0:14 | 2:03 |
| 1298 | 5:13 | 29 | 0:14 | 2:04 |
| 1299 | 5:10 | 29 | 0:14 | 2:00 |
| 1300 | 5:07 | 29 | 0:14 | 1:54 |
| 1301 | 4:14 | 37 | 0:10 | 1:09 |
| 1302 | 7:02 | 36 | 0:15 | 2:12 |
| 1303 | 7:07 | 35 | 0:16 | 2:16 |
| 1304 | 7:09 | 34 | 0:16 | 2:19 |
| 1305 | 7:24 | 49 | 0:16 | 2:33 |
| 1306 | 6:51 | 48 | 0:15 | 2:25 |
| 1307 | 15:22 | 89 | 0:16 | 8:09 |
| 1308 | 8:39 | 67 | 0:14 | 2:26 |
| 1309 | 7:52 | 63 | 0:13 | 2:13 |
| 1310 | 6:01 | 53 | 0:11 | 1:41 |
| 1311 | 5:27 | 44 | 0:11 | 1:30 |
| 1312 | 6:26 | 52 | 0:13 | 1:46 |
| 1313 | 8:50 | 80 | 0:11 | 2:24 |
| 1314 | 8:25 | 90 | 0:11 | 2:02 |
| 1315 | 3:25 | 65 | 0:05 | 0:54 |
| 1316 | 14:19 | 106 | 0:13 | 3:38 |
| 1317 | 14:31 | 109 | 0:13 | 3:46 |
| 1318 | 16:26 | 113 | 0:14 | 4:17 |
| 1319 | 17:11 | 115 | 0:14 | 4:29 |
| 1320 | 13:12 | 103 | 0:14 | 3:16 |
| 1321 | 14:21 | 105 | 0:14 | 3:34 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1322 | 14:38 | 104 | 0:15 | 3:38 |
| 1323 | 16:53 | 112 | 0:16 | 4:14 |
| 1324 | 8:06 | 90 | 0:09 | 2:15 |
| 1325 | 1:25 | 24 | 0:05 | 0:29 |
| 1326 | 1:53 | 26 | 0:06 | 0:38 |
| 1327 | 5:50 | 70 | 0:08 | 1:31 |
| 1328 | 2:47 | 47 | 0:07 | 0:51 |
| 1329 | 1:26 | 23 | 0:06 | 0:26 |
| 1330 | 0:00 | 0 | 0:00 | 0:00 |
| 1331 | 1:36 | 24 | 0:06 | 0:28 |
| 1332 | 1:14 | 32 | 0:04 | 0:21 |
| 1333 | 5:55 | 78 | 0:07 | 1:30 |
| 1334 | 4:30 | 77 | 0:06 | 1:14 |
| 1335 | 4:39 | 73 | 0:06 | 1:16 |
| 1336 | 6:27 | 93 | 0:07 | 1:40 |
| 1337 | 9:22 | 98 | 0:11 | 2:20 |
| 1338 | 0:00 | 0 | 0:00 | 0:00 |
| 1339 | 7:05 | 61 | 0:11 | 2:00 |
| 1340 | 7:59 | 54 | 0:15 | 2:14 |
| 1341 | 0:00 | 0 | 0:00 | 0:00 |
| 1342 | 0:00 | 0 | 0:00 | 0:00 |
| 1343 | 0:00 | 0 | 0:00 | 0:00 |
| 1344 | 5:45 | 73 | 0:07 | 2:12 |
| 1345 | 4:13 | 43 | 0:08 | 1:11 |
| 1346 | 2:29 | 28 | 0:07 | 0:47 |
| 1347 | 2:47 | 29 | 0:08 | 0:55 |
| 1348 | 3:32 | 33 | 0:09 | 1:07 |
| 1349 | 4:04 | 34 | 0:10 | 1:15 |
| 1350 | 4:05 | 35 | 0:10 | 1:12 |
| 1351 | 14:55 | 88 | 0:13 | 3:51 |
| 1352 | 14:29 | 81 | 0:15 | 3:33 |
| 1353 | 10:06 | 68 | 0:11 | 2:27 |
| 1354 | 7:28 | 61 | 0:10 | 1:46 |
| 1355 | 5:52 | 53 | 0:09 | 1:21 |
| 1356 | 4:23 | 45 | 0:08 | 0:59 |
| 1357 | 3:30 | 42 | 0:07 | 0:47 |
| 1358 | 1:43 | 29 | 0:05 | 0:22 |
| 1359 | 0:00 | 0 | 0:00 | 0:00 |
| 1360 | 0:00 | 0 | 0:00 | 0:00 |
| 1361 | 0:00 | 0 | 0:00 | 0:00 |
| 1362 | 0:00 | 0 | 0:00 | 0:00 |
| 1363 | 0:55 | 12 | 0:05 | 0:34 |
| 1364 | 5:08 | 32 | 0:11 | 3:00 |
| 1365 | 9:43 | 48 | 0:14 | 5:22 |
| 1366 | 7:49 | 44 | 0:13 | 4:23 |
| 1367 | 5:06 | 33 | 0:11 | 2:58 |
| 1368 | 0:46 | 11 | 0:05 | 0:28 |
| 1369 | 0:33 | 10 | 0:04 | 0:20 |
| 1370 | 0:00 | 0 | 0:00 | 0:00 |
| 1371 | 5:30 | 38 | 0:11 | 3:08 |
| 1372 | 6:51 | 46 | 0:11 | 3:49 |
| 1373 | 8:06 | 52 | 0:11 | 4:25 |
| 1374 | 4:15 | 59 | 0:08 | 2:03 |
| 1375 | 8:08 | 76 | 0:08 | 2:04 |
| 1376 | 5:39 | 50 | 0:10 | 1:35 |
| 1377 | 5:53 | 49 | 0:10 | 1:39 |
| 1378 | 8:29 | 74 | 0:10 | 4:16 |
| 1379 | 5:34 | 49 | 0:10 | 1:15 |
| 1380 | 0:23 | 15 | 0:02 | 0:05 |
| 1381 | 0:03 | 3 | 0:01 | 0:00 |
| 1382 | 0:00 | 0 | 0:00 | 0:00 |

To be continued on next page...

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1383 | 0:00 | 0 | 0:00 | 0:00 |
| 1384 | 4:56 | 42 | 0:10 | 2:21 |
| 1385 | 5:04 | 41 | 0:10 | 2:25 |
| 1386 | 5:08 | 40 | 0:11 | 2:23 |
| 1387 | 5:18 | 41 | 0:11 | 2:29 |
| 1388 | 5:32 | 42 | 0:11 | 2:39 |
| 1389 | 6:18 | 46 | 0:12 | 3:01 |
| 1390 | 6:57 | 48 | 0:12 | 3:19 |
| 1391 | 7:49 | 52 | 0:13 | 3:43 |
| 1392 | 7:49 | 50 | 0:13 | 3:43 |
| 1393 | 8:39 | 54 | 0:13 | 4:06 |
| 1394 | 9:22 | 58 | 0:14 | 4:26 |
| 1395 | 6:45 | 52 | 0:11 | 3:11 |
| 1396 | 7:24 | 56 | 0:11 | 3:29 |
| 1397 | 7:41 | 56 | 0:12 | 3:37 |
| 1398 | 7:58 | 60 | 0:11 | 3:46 |
| 1399 | 7:59 | 58 | 0:12 | 3:46 |
| 1400 | 8:12 | 60 | 0:12 | 3:52 |
| 1401 | 8:34 | 60 | 0:12 | 4:03 |
| 1402 | 8:52 | 64 | 0:12 | 4:11 |
| 1403 | 9:29 | 68 | 0:12 | 4:30 |
| 1404 | 9:25 | 66 | 0:13 | 4:27 |
| 1405 | 9:42 | 68 | 0:13 | 4:36 |
| 1406 | 10:16 | 74 | 0:13 | 4:54 |
| 1407 | 10:47 | 77 | 0:13 | 5:10 |
| 1408 | 11:44 | 84 | 0:13 | 5:44 |
| 1409 | 12:20 | 84 | 0:13 | 6:04 |
| 1410 | 12:39 | 84 | 0:14 | 6:13 |
| 1411 | 13:28 | 82 | 0:14 | 6:41 |
| 1412 | 13:56 | 82 | 0:14 | 6:56 |
| 1413 | 9:44 | 60 | 0:14 | 4:37 |
| 1414 | 10:20 | 64 | 0:14 | 4:54 |
| 1415 | 11:50 | 70 | 0:15 | 5:37 |
| 1416 | 12:16 | 72 | 0:15 | 5:50 |
| 1417 | 14:06 | 90 | 0:15 | 6:49 |
| 1418 | 15:15 | 88 | 0:16 | 7:27 |
| 1419 | 16:40 | 88 | 0:16 | 8:14 |
| 1420 | 17:19 | 86 | 0:16 | 8:38 |
| 1421 | 18:09 | 86 | 0:17 | 9:03 |
| 1422 | 18:19 | 84 | 0:17 | 9:11 |
| 1423 | 18:30 | 84 | 0:17 | 9:17 |
| 1424 | 19:13 | 80 | 0:17 | 9:47 |
| 1425 | 20:49 | 84 | 0:18 | 10:32 |
| 1426 | 21:00 | 78 | 0:19 | 10:50 |
| 1427 | 21:02 | 81 | 0:18 | 10:45 |
| 1428 | 19:22 | 78 | 0:17 | 9:55 |
| 1429 | 15:37 | 74 | 0:15 | 8:02 |
| 1430 | 15:52 | 72 | 0:15 | 8:13 |
| 1431 | 15:48 | 74 | 0:15 | 8:08 |
| 1432 | 16:21 | 76 | 0:15 | 8:23 |
| 1433 | 16:38 | 72 | 0:16 | 8:38 |
| 1434 | 16:32 | 72 | 0:16 | 8:36 |
| 1435 | 16:56 | 72 | 0:16 | 8:47 |
| 1436 | 16:48 | 70 | 0:16 | 8:46 |
| 1437 | 17:05 | 70 | 0:16 | 8:55 |
| 1438 | 16:54 | 70 | 0:17 | 8:51 |
| 1439 | 16:52 | 68 | 0:17 | 8:52 |
| 1440 | 17:21 | 68 | 0:17 | 9:06 |
| 1441 | 17:08 | 66 | 0:17 | 9:03 |
| 1442 | 16:32 | 62 | 0:18 | 8:49 |
| 1443 | 16:18 | 60 | 0:19 | 8:46 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1444 | 18:17 | 67 | 0:20 | 9:46 |
| 1445 | 17:27 | 72 | 0:21 | 9:24 |
| 1446 | 24:49 | 95 | 0:21 | 12:39 |
| 1447 | 21:22 | 77 | 0:19 | 11:05 |
| 1448 | 23:12 | 90 | 0:21 | 12:06 |
| 1449 | 17:12 | 81 | 0:22 | 9:20 |
| 1450 | 9:36 | 70 | 0:21 | 5:23 |
| 1451 | 10:33 | 119 | 0:17 | 4:36 |
| 1452 | 5:13 | 93 | 0:05 | 1:41 |
| 1453 | 6:02 | 104 | 0:06 | 1:57 |
| 1454 | 5:29 | 101 | 0:05 | 1:59 |
| 1455 | 6:27 | 111 | 0:06 | 2:12 |
| 1456 | 4:15 | 63 | 0:06 | 2:13 |
| 1457 | 4:00 | 47 | 0:06 | 2:12 |
| 1458 | 7:14 | 71 | 0:10 | 3:28 |
| 1459 | 9:10 | 78 | 0:11 | 4:31 |
| 1460 | 9:27 | 68 | 0:10 | 4:54 |
| 1461 | 8:55 | 62 | 0:10 | 4:43 |
| 1462 | 8:42 | 58 | 0:10 | 4:40 |
| 1463 | 3:47 | 30 | 0:09 | 2:14 |
| 1464 | 13:40 | 58 | 0:16 | 7:21 |
| 1465 | 12:45 | 54 | 0:16 | 6:55 |
| 1466 | 11:44 | 52 | 0:16 | 6:26 |
| 1467 | 9:13 | 44 | 0:15 | 5:10 |
| 1468 | 14:53 | 82 | 0:15 | 7:28 |
| 1469 | 5:55 | 46 | 0:11 | 2:49 |
| 1470 | 7:35 | 51 | 0:13 | 3:37 |
| 1471 | 5:05 | 38 | 0:11 | 2:20 |
| 1472 | 4:30 | 36 | 0:10 | 1:57 |
| 1473 | 4:17 | 35 | 0:10 | 1:50 |
| 1474 | 4:07 | 34 | 0:10 | 1:44 |
| 1475 | 3:55 | 32 | 0:10 | 1:38 |
| 1476 | 4:13 | 33 | 0:11 | 1:46 |
| 1477 | 4:06 | 33 | 0:10 | 1:43 |
| 1478 | 3:58 | 31 | 0:11 | 1:39 |
| 1479 | 3:38 | 31 | 0:10 | 1:31 |
| 1480 | 4:02 | 31 | 0:10 | 1:40 |
| 1481 | 3:55 | 31 | 0:10 | 1:37 |
| 1482 | 3:24 | 30 | 0:09 | 1:24 |
| 1483 | 2:38 | 27 | 0:08 | 1:05 |
| 1484 | 2:21 | 26 | 0:07 | 0:58 |
| 1485 | 2:29 | 27 | 0:08 | 1:01 |
| 1486 | 2:13 | 26 | 0:07 | 0:54 |
| 1487 | 2:14 | 26 | 0:07 | 0:55 |
| 1488 | 2:33 | 27 | 0:08 | 1:02 |
| 1489 | 2:31 | 27 | 0:08 | 1:01 |
| 1490 | 2:47 | 28 | 0:09 | 1:07 |
| 1491 | 3:53 | 43 | 0:10 | 1:14 |
| 1492 | 3:53 | 44 | 0:10 | 1:14 |
| 1493 | 4:10 | 42 | 0:10 | 1:21 |
| 1494 | 5:00 | 57 | 0:10 | 1:34 |
| 1495 | 9:15 | 77 | 0:11 | 2:36 |
| 1496 | 13:56 | 94 | 0:16 | 3:43 |
| 1497 | 14:01 | 93 | 0:16 | 3:46 |
| 1498 | 14:49 | 95 | 0:17 | 4:00 |
| 1499 | 7:57 | 68 | 0:14 | 2:34 |
| 1500 | 7:37 | 68 | 0:14 | 2:21 |
| 1501 | 8:59 | 68 | 0:15 | 2:58 |
| 1502 | 9:57 | 71 | 0:16 | 3:18 |
| 1503 | 11:51 | 75 | 0:18 | 3:54 |
| 1504 | 12:21 | 54 | 0:20 | 4:12 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1505 | 12:45 | 55 | 0:21 | 4:18 |
| 1506 | 13:03 | 58 | 0:21 | 4:28 |
| 1507 | 14:06 | 60 | 0:22 | 4:37 |
| 1508 | 14:37 | 61 | 0:22 | 4:50 |
| 1509 | 13:19 | 80 | 0:20 | 4:18 |
| 1510 | 10:22 | 33 | 0:24 | 3:45 |
| 1511 | 17:51 | 65 | 0:25 | 5:55 |
| 1512 | 22:00 | 71 | 0:28 | 7:09 |
| 1513 | 77:55 | 213 | 0:47 | 22:46 |
| 1514 | 72:34 | 192 | 0:47 | 21:00 |
| 1515 | 113:13 | 222 | 1:02 | 34:05 |
| 1516 | 119:14 | 222 | 1:04 | 36:13 |
| 1517 | 140:55 | 240 | 1:10 | 42:29 |
| 1518 | 94:10 | 188 | 1:00 | 30:11 |
| 1519 | 69:22 | 159 | 0:51 | 22:42 |
| 1520 | 75:39 | 167 | 0:52 | 24:18 |
| 1521 | 78:27 | 168 | 0:54 | 25:17 |
| 1522 | 87:28 | 223 | 0:46 | 25:39 |
| 1523 | 118:34 | 230 | 0:45 | 34:38 |
| 1524 | 140:05 | 233 | 0:51 | 40:20 |
| 1525 | 139:59 | 236 | 0:53 | 40:33 |
| 1526 | 230:22 | 259 | 1:29 | 65:58 |
| 1527 | 231:47 | 257 | 1:34 | 65:47 |
| 1528 | 244:58 | 263 | 1:34 | 70:28 |
| 1529 | 160:33 | 244 | 1:17 | 49:19 |
| 1530 | 339:34 | 291 | 2:00 | 109:08 |
| 1531 | 403:33 | 280 | 2:27 | 117:52 |
| 1532 | 343:36 | 241 | 3:03 | 80:03 |
| 1533 | 33:53 | 100 | 0:35 | 11:41 |
| 1534 | 42:22 | 115 | 0:37 | 15:49 |
| 1535 | 80:05 | 145 | 1:03 | 27:16 |
| 1536 | 65:20 | 131 | 0:56 | 22:23 |
| 1537 | 72:37 | 189 | 0:51 | 25:42 |
| 1538 | 217:49 | 236 | 1:29 | 79:17 |
| 1539 | 56:12 | 159 | 0:43 | 20:04 |
| 1540 | 53:27 | 165 | 0:37 | 19:32 |
| 1541 | 6:27 | 26 | 0:19 | 2:14 |
| 1542 | 6:26 | 26 | 0:19 | 2:13 |
| 1543 | 6:31 | 26 | 0:19 | 2:15 |
| 1544 | 6:35 | 26 | 0:19 | 2:17 |
| 1545 | 6:24 | 25 | 0:19 | 2:14 |
| 1546 | 10:22 | 52 | 0:19 | 3:30 |
| 1547 | 10:53 | 57 | 0:19 | 3:40 |
| 1548 | 11:34 | 62 | 0:19 | 3:50 |
| 1549 | 11:33 | 60 | 0:20 | 3:53 |
| 1550 | 11:11 | 58 | 0:20 | 3:46 |
| 1551 | 11:48 | 60 | 0:20 | 3:58 |
| 1552 | 12:32 | 64 | 0:20 | 4:12 |
| 1553 | 12:33 | 67 | 0:20 | 4:10 |
| 1554 | 13:16 | 74 | 0:20 | 4:25 |
| 1555 | 12:13 | 67 | 0:20 | 4:02 |
| 1556 | 13:49 | 74 | 0:21 | 4:37 |
| 1557 | 14:43 | 89 | 0:21 | 4:59 |
| 1558 | 15:02 | 86 | 0:21 | 5:06 |
| 1559 | 15:46 | 78 | 0:21 | 5:26 |
| 1560 | 16:19 | 83 | 0:21 | 5:36 |
| 1561 | 14:25 | 79 | 0:21 | 4:51 |
| 1562 | 13:53 | 70 | 0:21 | 4:39 |
| 1563 | 14:05 | 73 | 0:21 | 4:43 |
| 1564 | 13:13 | 65 | 0:21 | 4:26 |
| 1565 | 16:46 | 88 | 0:22 | 5:45 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case: Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values: Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1566 | 21:36 | 120 | 0:22 | 7:27 |
| 1567 | 21:46 | 121 | 0:22 | 7:31 |
| 1568 | 21:46 | 119 | 0:23 | 7:33 |
| 1569 | 18:58 | 101 | 0:23 | 6:38 |
| 1570 | 17:08 | 84 | 0:23 | 6:02 |
| 1571 | 15:46 | 69 | 0:23 | 5:32 |
| 1572 | 11:40 | 51 | 0:23 | 4:02 |
| 1573 | 15:36 | 86 | 0:23 | 5:30 |
| 1574 | 15:58 | 89 | 0:23 | 5:38 |
| 1575 | 14:18 | 71 | 0:23 | 4:58 |
| 1576 | 22:18 | 120 | 0:23 | 7:44 |
| 1577 | 20:59 | 111 | 0:23 | 7:20 |
| 1578 | 21:27 | 112 | 0:24 | 7:31 |
| 1579 | 20:39 | 107 | 0:24 | 7:15 |
| 1580 | 20:41 | 106 | 0:24 | 7:16 |
| 1581 | 20:24 | 104 | 0:25 | 7:11 |
| 1582 | 20:17 | 100 | 0:26 | 7:08 |
| 1583 | 21:50 | 112 | 0:24 | 7:40 |
| 1584 | 15:53 | 73 | 0:25 | 5:28 |
| 1585 | 15:46 | 76 | 0:25 | 5:26 |
| 1586 | 13:46 | 53 | 0:25 | 4:46 |
| 1587 | 15:12 | 73 | 0:24 | 5:17 |
| 1588 | 14:32 | 55 | 0:26 | 5:04 |
| 1589 | 17:21 | 78 | 0:26 | 6:05 |
| 1590 | 18:00 | 79 | 0:27 | 6:10 |
| 1591 | 18:39 | 80 | 0:27 | 6:32 |
| 1592 | 19:58 | 83 | 0:29 | 6:58 |
| 1593 | 20:33 | 83 | 0:29 | 7:09 |
| 1594 | 20:38 | 84 | 0:29 | 7:11 |
| 1595 | 21:27 | 84 | 0:30 | 7:28 |
| 1596 | 23:02 | 89 | 0:31 | 7:58 |
| 1597 | 20:58 | 83 | 0:29 | 7:18 |
| 1598 | 18:33 | 80 | 0:27 | 6:22 |
| 1599 | 19:07 | 82 | 0:27 | 6:35 |
| 1600 | 20:04 | 83 | 0:28 | 6:54 |
| 1601 | 20:58 | 84 | 0:29 | 7:13 |
| 1602 | 22:03 | 86 | 0:30 | 7:36 |
| 1603 | 23:15 | 89 | 0:31 | 8:02 |
| 1604 | 23:57 | 90 | 0:32 | 8:16 |
| 1605 | 23:53 | 91 | 0:31 | 8:14 |
| 1606 | 25:34 | 94 | 0:33 | 8:48 |
| 1607 | 27:26 | 97 | 0:34 | 9:30 |
| 1608 | 28:07 | 97 | 0:35 | 9:44 |
| 1609 | 28:49 | 99 | 0:35 | 9:58 |
| 1610 | 29:40 | 101 | 0:36 | 10:13 |
| 1611 | 34:03 | 105 | 0:39 | 11:40 |
| 1612 | 35:18 | 108 | 0:39 | 12:04 |
| 1613 | 36:32 | 110 | 0:40 | 12:28 |
| 1614 | 75:55 | 168 | 0:53 | 25:10 |
| 1615 | 66:53 | 167 | 0:51 | 22:16 |
| 1616 | 86:29 | 173 | 0:58 | 28:36 |
| 1617 | 87:27 | 172 | 0:57 | 28:45 |
| 1618 | 98:58 | 165 | 0:59 | 31:59 |
| 1619 | 124:32 | 164 | 1:03 | 40:31 |
| 1620 | 139:27 | 150 | 1:23 | 42:52 |
| 1621 | 133:34 | 142 | 1:18 | 39:44 |
| 1622 | 13:43 | 47 | 0:23 | 4:48 |
| 1623 | 0:00 | 0 | 0:00 | 0:00 |
| 1624 | 0:00 | 0 | 0:00 | 0:00 |
| 1625 | 0:00 | 0 | 0:00 | 0:00 |
| 1626 | 7:19 | 30 | 0:18 | 1:37 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1627 | 15:50 | 49 | 0:23 | 3:39 |
| 1628 | 16:03 | 51 | 0:23 | 3:44 |
| 1629 | 19:59 | 60 | 0:24 | 4:46 |
| 1630 | 34:57 | 103 | 0:25 | 9:45 |
| 1631 | 36:57 | 110 | 0:24 | 10:23 |
| 1632 | 35:44 | 123 | 0:25 | 10:36 |
| 1633 | 31:52 | 109 | 0:25 | 9:42 |
| 1634 | 178:03 | 169 | 1:30 | 55:17 |
| 1635 | 160:50 | 156 | 1:29 | 48:22 |
| 1636 | 166:04 | 172 | 1:18 | 53:06 |
| 1637 | 123:52 | 193 | 1:11 | 40:47 |
| 1638 | 122:51 | 196 | 1:11 | 40:35 |
| 1639 | 115:17 | 192 | 1:09 | 38:18 |
| 1640 | 104:58 | 188 | 1:06 | 34:58 |
| 1641 | 89:58 | 186 | 1:01 | 29:55 |
| 1642 | 86:53 | 180 | 1:00 | 28:56 |
| 1643 | 88:45 | 182 | 1:00 | 29:34 |
| 1644 | 76:33 | 161 | 0:58 | 25:28 |
| 1645 | 80:34 | 167 | 0:59 | 26:47 |
| 1646 | 70:17 | 152 | 0:55 | 23:28 |
| 1647 | 66:39 | 148 | 0:54 | 22:23 |
| 1648 | 60:54 | 131 | 0:52 | 20:44 |
| 1649 | 75:17 | 144 | 0:58 | 25:31 |
| 1650 | 77:44 | 149 | 0:59 | 26:18 |
| 1651 | 73:38 | 143 | 0:58 | 24:57 |
| 1652 | 54:01 | 131 | 0:49 | 18:15 |
| 1653 | 50:23 | 124 | 0:47 | 17:07 |
| 1654 | 45:09 | 119 | 0:45 | 15:24 |
| 1655 | 39:48 | 111 | 0:42 | 13:40 |
| 1656 | 38:48 | 109 | 0:41 | 13:21 |
| 1657 | 49:41 | 120 | 0:47 | 17:01 |
| 1658 | 26:35 | 94 | 0:34 | 9:11 |
| 1659 | 25:20 | 90 | 0:33 | 8:45 |
| 1660 | 23:34 | 88 | 0:32 | 8:07 |
| 1661 | 23:57 | 89 | 0:32 | 8:14 |
| 1662 | 22:59 | 90 | 0:31 | 7:54 |
| 1663 | 22:10 | 87 | 0:30 | 7:37 |
| 1664 | 21:32 | 86 | 0:30 | 7:24 |
| 1665 | 22:08 | 93 | 0:29 | 7:40 |
| 1666 | 21:26 | 94 | 0:28 | 7:26 |
| 1667 | 24:11 | 110 | 0:27 | 8:31 |
| 1668 | 23:01 | 95 | 0:27 | 8:05 |
| 1669 | 26:01 | 120 | 0:26 | 9:04 |
| 1670 | 25:57 | 123 | 0:25 | 9:01 |
| 1671 | 25:14 | 126 | 0:25 | 8:44 |
| 1672 | 25:06 | 127 | 0:24 | 8:40 |
| 1673 | 24:11 | 128 | 0:24 | 8:19 |
| 1674 | 24:31 | 130 | 0:24 | 8:22 |
| 1675 | 21:09 | 122 | 0:23 | 7:08 |
| 1676 | 19:22 | 105 | 0:22 | 6:30 |
| 1677 | 19:51 | 109 | 0:22 | 6:40 |
| 1678 | 15:11 | 70 | 0:22 | 5:04 |
| 1679 | 9:42 | 33 | 0:22 | 3:18 |
| 1680 | 15:35 | 81 | 0:22 | 5:13 |
| 1681 | 15:07 | 78 | 0:21 | 5:04 |
| 1682 | 12:43 | 61 | 0:21 | 4:16 |
| 1683 | 13:24 | 64 | 0:21 | 4:29 |
| 1684 | 12:32 | 59 | 0:21 | 4:12 |
| 1685 | 12:00 | 57 | 0:20 | 4:02 |
| 1686 | 11:44 | 56 | 0:20 | 3:57 |
| 1687 | 11:46 | 57 | 0:20 | 3:58 |

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# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1688 | 12:05 | 58 | 0:20 | 4:04 |
| 1689 | 12:17 | 58 | 0:21 | 4:08 |
| 1690 | 12:12 | 58 | 0:21 | 4:06 |
| 1691 | 12:21 | 60 | 0:21 | 4:09 |
| 1692 | 12:42 | 60 | 0:21 | 4:15 |
| 1693 | 11:25 | 55 | 0:20 | 3:52 |
| 1694 | 11:13 | 54 | 0:20 | 3:48 |
| 1695 | 11:33 | 57 | 0:20 | 3:53 |
| 1696 | 11:25 | 54 | 0:20 | 3:51 |
| 1697 | 11:19 | 56 | 0:20 | 3:49 |
| 1698 | 11:00 | 55 | 0:20 | 3:43 |
| 1699 | 10:39 | 53 | 0:20 | 3:36 |
| 1700 | 10:49 | 54 | 0:20 | 3:40 |
| 1701 | 10:42 | 52 | 0:20 | 3:38 |
| 1702 | 10:57 | 52 | 0:20 | 3:43 |
| 1703 | 10:15 | 50 | 0:19 | 3:30 |
| 1704 | 10:10 | 50 | 0:19 | 3:29 |
| 1705 | 10:05 | 50 | 0:19 | 3:27 |
| 1706 | 10:04 | 50 | 0:19 | 3:27 |
| 1707 | 9:56 | 51 | 0:19 | 3:24 |
| 1708 | 6:32 | 26 | 0:19 | 2:13 |
| 1709 | 6:15 | 25 | 0:18 | 2:07 |
| 1710 | 6:17 | 26 | 0:18 | 2:08 |
| 1711 | 6:13 | 26 | 0:18 | 2:07 |
| 1712 | 6:00 | 24 | 0:18 | 2:02 |
| 1713 | 5:39 | 24 | 0:17 | 1:55 |
| 1714 | 5:25 | 24 | 0:17 | 1:52 |
| 1715 | 5:26 | 24 | 0:17 | 1:52 |
| 1716 | 5:22 | 24 | 0:17 | 1:51 |
| 1717 | 5:36 | 24 | 0:17 | 1:56 |
| 1718 | 5:31 | 24 | 0:17 | 1:55 |
| 1719 | 4:55 | 23 | 0:16 | 1:43 |
| 1720 | 4:56 | 23 | 0:16 | 1:43 |
| 1721 | 4:55 | 22 | 0:16 | 1:42 |
| 1722 | 4:54 | 25 | 0:16 | 1:41 |
| 1723 | 6:13 | 36 | 0:16 | 2:14 |
| 1724 | 8:13 | 43 | 0:15 | 3:01 |
| 1725 | 7:32 | 41 | 0:15 | 2:45 |
| 1726 | 6:53 | 39 | 0:15 | 2:30 |
| 1727 | 7:10 | 40 | 0:15 | 2:37 |
| 1728 | 8:17 | 43 | 0:15 | 3:02 |
| 1729 | 7:03 | 39 | 0:15 | 2:35 |
| 1730 | 8:17 | 44 | 0:15 | 3:02 |
| 1731 | 6:49 | 38 | 0:15 | 2:30 |
| 1732 | 4:17 | 20 | 0:15 | 1:29 |
| 1733 | 9:12 | 48 | 0:14 | 3:19 |
| 1734 | 3:25 | 19 | 0:13 | 1:10 |
| 1735 | 3:44 | 26 | 0:13 | 1:18 |
| 1736 | 7:59 | 52 | 0:13 | 2:54 |
| 1737 | 12:25 | 72 | 0:14 | 4:41 |
| 1738 | 13:00 | 78 | 0:13 | 4:41 |
| 1739 | 13:55 | 82 | 0:12 | 5:03 |
| 1740 | 19:46 | 101 | 0:16 | 7:21 |
| 1741 | 20:11 | 102 | 0:16 | 7:30 |
| 1742 | 20:24 | 103 | 0:16 | 7:35 |
| 1743 | 13:50 | 67 | 0:21 | 4:38 |
| 1744 | 15:56 | 68 | 0:16 | 5:31 |
| 1745 | 13:27 | 58 | 0:16 | 4:45 |
| 1746 | 11:38 | 54 | 0:16 | 4:11 |
| 1747 | 17:03 | 70 | 0:17 | 5:55 |
| 1748 | 21:13 | 84 | 0:17 | 7:12 |

To be continued on next page...

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1749 | 7:00 | 38 | 0:17 | 2:27 |
| 1750 | 5:52 | 24 | 0:17 | 1:59 |
| 1751 | 6:08 | 26 | 0:18 | 2:04 |
| 1752 | 8:42 | 43 | 0:17 | 3:07 |
| 1753 | 22:40 | 88 | 0:18 | 7:40 |
| 1754 | 22:19 | 88 | 0:17 | 7:33 |
| 1755 | 21:15 | 104 | 0:17 | 7:04 |
| 1756 | 19:15 | 88 | 0:17 | 6:16 |
| 1757 | 17:21 | 82 | 0:17 | 5:41 |
| 1758 | 25:03 | 104 | 0:18 | 8:25 |
| 1759 | 28:22 | 115 | 0:19 | 9:33 |
| 1760 | 19:22 | 73 | 0:19 | 6:42 |
| 1761 | 6:16 | 27 | 0:18 | 2:07 |
| 1762 | 6:29 | 26 | 0:18 | 2:11 |
| 1763 | 9:36 | 50 | 0:18 | 3:19 |
| 1764 | 9:54 | 48 | 0:19 | 3:25 |
| 1765 | 10:24 | 54 | 0:19 | 3:36 |
| 1766 | 10:39 | 52 | 0:19 | 3:40 |
| 1767 | 11:16 | 52 | 0:20 | 3:51 |
| 1768 | 11:27 | 53 | 0:20 | 3:55 |
| 1769 | 11:54 | 56 | 0:20 | 4:04 |
| 1770 | 11:56 | 54 | 0:20 | 4:05 |
| 1771 | 12:12 | 56 | 0:21 | 4:08 |
| 1772 | 12:17 | 56 | 0:21 | 4:10 |
| 1773 | 12:29 | 57 | 0:21 | 4:15 |
| 1774 | 15:17 | 80 | 0:22 | 5:08 |
| 1775 | 15:36 | 79 | 0:22 | 5:14 |
| 1776 | 17:34 | 90 | 0:22 | 5:54 |
| 1777 | 18:00 | 92 | 0:22 | 6:02 |
| 1778 | 18:10 | 92 | 0:22 | 6:06 |
| 1779 | 18:33 | 92 | 0:23 | 6:13 |
| 1780 | 19:16 | 93 | 0:23 | 6:28 |
| 1781 | 19:30 | 98 | 0:23 | 6:32 |
| 1782 | 19:41 | 98 | 0:23 | 6:35 |
| 1783 | 21:17 | 104 | 0:24 | 7:07 |
| 1784 | 21:49 | 105 | 0:24 | 7:18 |
| 1785 | 23:57 | 104 | 0:26 | 8:01 |
| 1786 | 24:50 | 108 | 0:27 | 8:18 |
| 1787 | 26:06 | 116 | 0:27 | 8:44 |
| 1788 | 28:43 | 128 | 0:27 | 9:49 |
| 1789 | 28:45 | 126 | 0:27 | 9:54 |
| 1790 | 29:12 | 119 | 0:28 | 10:09 |
| 1791 | 29:02 | 119 | 0:28 | 10:08 |
| 1792 | 30:10 | 120 | 0:29 | 10:30 |
| 1793 | 26:28 | 104 | 0:30 | 9:18 |
| 1794 | 25:29 | 100 | 0:31 | 8:54 |
| 1795 | 24:48 | 96 | 0:31 | 8:35 |
| 1796 | 24:36 | 82 | 0:33 | 8:26 |
| 1797 | 48:22 | 103 | 0:47 | 16:34 |
| 1798 | 48:09 | 104 | 0:46 | 16:30 |
| 1799 | 34:10 | 100 | 0:39 | 11:45 |
| 1800 | 36:12 | 104 | 0:40 | 12:29 |
| 1801 | 19:16 | 82 | 0:18 | 6:26 |
| 1802 | 27:58 | 112 | 0:19 | 9:27 |
| 1803 | 25:23 | 103 | 0:19 | 8:39 |
| 1804 | 27:28 | 110 | 0:19 | 9:19 |
| 1805 | 29:08 | 116 | 0:19 | 9:51 |
| 1806 | 28:22 | 109 | 0:20 | 9:39 |
| 1807 | 29:06 | 112 | 0:20 | 9:53 |
| 1808 | 21:54 | 94 | 0:19 | 7:37 |
| 1809 | 19:07 | 89 | 0:18 | 6:44 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1810 | 20:07 | 92 | 0:18 | 7:03 |
| 1811 | 18:30 | 84 | 0:18 | 6:33 |
| 1812 | 24:02 | 99 | 0:20 | 8:20 |
| 1813 | 25:22 | 101 | 0:20 | 8:46 |
| 1814 | 31:11 | 117 | 0:21 | 10:38 |
| 1815 | 32:17 | 117 | 0:21 | 11:02 |
| 1816 | 31:24 | 117 | 0:21 | 10:44 |
| 1817 | 32:30 | 124 | 0:21 | 11:00 |
| 1818 | 31:40 | 122 | 0:20 | 10:42 |
| 1819 | 33:39 | 124 | 0:21 | 11:26 |
| 1820 | 34:39 | 129 | 0:21 | 11:48 |
| 1821 | 33:03 | 116 | 0:22 | 11:20 |
| 1822 | 32:12 | 115 | 0:22 | 11:03 |
| 1823 | 30:58 | 111 | 0:22 | 10:40 |
| 1824 | 30:22 | 107 | 0:23 | 10:33 |
| 1825 | 22:14 | 91 | 0:20 | 7:51 |
| 1826 | 20:48 | 89 | 0:19 | 7:23 |
| 1827 | 17:10 | 80 | 0:19 | 6:11 |
| 1828 | 12:31 | 62 | 0:20 | 4:24 |
| 1829 | 12:20 | 56 | 0:20 | 4:18 |
| 1830 | 12:33 | 56 | 0:20 | 4:23 |
| 1831 | 11:25 | 56 | 0:19 | 3:58 |
| 1832 | 10:54 | 52 | 0:19 | 3:48 |
| 1833 | 11:54 | 55 | 0:20 | 4:07 |
| 1834 | 11:54 | 55 | 0:20 | 4:07 |
| 1835 | 12:32 | 57 | 0:20 | 4:21 |
| 1836 | 14:32 | 76 | 0:21 | 5:03 |
| 1837 | 14:47 | 76 | 0:21 | 5:07 |
| 1838 | 12:42 | 56 | 0:21 | 4:21 |
| 1839 | 15:47 | 78 | 0:22 | 5:26 |
| 1840 | 17:47 | 82 | 0:23 | 6:06 |
| 1841 | 18:20 | 82 | 0:23 | 6:17 |
| 1842 | 19:08 | 86 | 0:24 | 6:30 |
| 1843 | 20:18 | 88 | 0:25 | 6:53 |
| 1844 | 20:33 | 86 | 0:25 | 7:02 |
| 1845 | 21:32 | 87 | 0:26 | 7:18 |
| 1846 | 22:47 | 91 | 0:27 | 7:42 |
| 1847 | 24:39 | 100 | 0:27 | 8:17 |
| 1848 | 25:26 | 97 | 0:28 | 8:34 |
| 1849 | 29:28 | 129 | 0:28 | 10:02 |
| 1850 | 30:11 | 128 | 0:28 | 10:20 |
| 1851 | 30:42 | 127 | 0:29 | 10:33 |
| 1852 | 29:03 | 115 | 0:29 | 9:46 |
| 1853 | 29:40 | 120 | 0:29 | 10:02 |
| 1854 | 34:39 | 123 | 0:32 | 12:00 |
| 1855 | 32:23 | 116 | 0:31 | 11:17 |
| 1856 | 32:31 | 114 | 0:32 | 11:20 |
| 1857 | 33:15 | 104 | 0:36 | 11:36 |
| 1858 | 31:14 | 95 | 0:37 | 10:45 |
| 1859 | 40:29 | 119 | 0:38 | 14:08 |
| 1860 | 39:40 | 107 | 0:41 | 13:52 |
| 1861 | 39:38 | 126 | 0:35 | 13:46 |
| 1862 | 39:26 | 128 | 0:35 | 13:41 |
| 1863 | 38:44 | 131 | 0:34 | 13:26 |
| 1864 | 30:46 | 111 | 0:31 | 10:24 |
| 1865 | 30:18 | 110 | 0:31 | 10:15 |
| 1866 | 29:37 | 108 | 0:31 | 10:02 |
| 1867 | 28:44 | 106 | 0:30 | 9:43 |
| 1868 | 28:22 | 103 | 0:30 | 9:36 |
| 1869 | 27:55 | 103 | 0:30 | 9:28 |
| 1870 | 26:30 | 98 | 0:30 | 9:01 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1871 | 25:21 | 104 | 0:29 | 8:46 |
| 1872 | 23:37 | 90 | 0:28 | 8:11 |
| 1873 | 24:01 | 91 | 0:28 | 8:16 |
| 1874 | 26:02 | 119 | 0:29 | 9:35 |
| 1875 | 29:11 | 131 | 0:31 | 10:54 |
| 1876 | 20:07 | 85 | 0:25 | 7:06 |
| 1877 | 21:32 | 86 | 0:26 | 7:27 |
| 1878 | 23:30 | 118 | 0:26 | 8:54 |
| 1879 | 22:58 | 119 | 0:25 | 8:53 |
| 1880 | 21:56 | 114 | 0:25 | 8:24 |
| 1881 | 20:15 | 108 | 0:24 | 7:43 |
| 1882 | 19:11 | 106 | 0:23 | 7:15 |
| 1883 | 17:21 | 79 | 0:23 | 6:05 |
| 1884 | 18:42 | 81 | 0:24 | 6:31 |
| 1885 | 16:59 | 80 | 0:22 | 5:59 |
| 1886 | 16:36 | 80 | 0:22 | 5:51 |
| 1887 | 15:37 | 77 | 0:21 | 5:30 |
| 1888 | 15:29 | 77 | 0:21 | 5:27 |
| 1889 | 15:01 | 75 | 0:21 | 5:18 |
| 1890 | 14:53 | 74 | 0:21 | 5:14 |
| 1891 | 17:51 | 96 | 0:23 | 6:38 |
| 1892 | 25:08 | 106 | 0:24 | 9:25 |
| 1893 | 28:04 | 111 | 0:26 | 10:10 |
| 1894 | 24:55 | 92 | 0:23 | 8:54 |
| 1895 | 40:52 | 128 | 0:28 | 14:33 |
| 1896 | 40:11 | 129 | 0:26 | 14:16 |
| 1897 | 38:33 | 129 | 0:24 | 13:34 |
| 1898 | 37:10 | 139 | 0:22 | 13:09 |
| 1899 | 35:51 | 139 | 0:22 | 12:41 |
| 1900 | 33:41 | 145 | 0:22 | 12:12 |
| 1901 | 28:50 | 127 | 0:21 | 9:56 |
| 1902 | 27:52 | 128 | 0:21 | 9:51 |
| 1903 | 27:25 | 120 | 0:20 | 9:06 |
| 1904 | 24:45 | 108 | 0:20 | 8:15 |
| 1905 | 24:58 | 111 | 0:19 | 8:16 |
| 1906 | 25:37 | 121 | 0:20 | 9:07 |
| 1907 | 23:22 | 100 | 0:20 | 8:08 |
| 1908 | 22:34 | 98 | 0:20 | 7:50 |
| 1909 | 24:45 | 116 | 0:20 | 9:19 |
| 1910 | 29:53 | 136 | 0:20 | 12:14 |
| 1911 | 41:44 | 145 | 0:38 | 15:07 |
| 1912 | 40:04 | 147 | 0:37 | 14:33 |
| 1913 | 38:01 | 155 | 0:36 | 13:53 |
| 1914 | 37:02 | 157 | 0:35 | 13:32 |
| 1915 | 42:23 | 149 | 0:36 | 15:54 |
| 1916 | 43:55 | 144 | 0:38 | 16:20 |
| 1917 | 65:38 | 169 | 0:36 | 25:02 |
| 1918 | 20:46 | 90 | 0:18 | 7:11 |
| 1919 | 21:19 | 94 | 0:18 | 7:21 |
| 1920 | 21:17 | 95 | 0:18 | 7:21 |
| 1921 | 14:29 | 60 | 0:18 | 5:09 |
| 1922 | 13:16 | 57 | 0:18 | 4:47 |
| 1923 | 14:52 | 74 | 0:18 | 5:20 |
| 1924 | 13:02 | 69 | 0:18 | 4:41 |
| 1925 | 13:37 | 71 | 0:18 | 4:54 |
| 1926 | 9:35 | 50 | 0:18 | 3:20 |
| 1927 | 10:30 | 59 | 0:18 | 3:42 |
| 1928 | 9:48 | 56 | 0:18 | 3:26 |
| 1929 | 9:20 | 44 | 0:18 | 3:21 |
| 1930 | 12:55 | 55 | 0:18 | 4:40 |
| 1931 | 11:57 | 65 | 0:18 | 4:15 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 1932 | 10:21 | 51 | 0:18 | 3:36 |
| 1933 | 7:00 | 52 | 0:10 | 2:21 |
| 1934 | 6:25 | 50 | 0:10 | 2:11 |
| 1935 | 6:00 | 49 | 0:10 | 2:04 |
| 1936 | 6:58 | 52 | 0:10 | 2:21 |
| 1937 | 5:46 | 48 | 0:09 | 1:59 |
| 1938 | 5:33 | 46 | 0:09 | 1:55 |
| 1939 | 5:20 | 45 | 0:09 | 1:52 |
| 1940 | 5:03 | 43 | 0:09 | 1:46 |
| 1941 | 5:13 | 44 | 0:09 | 1:48 |
| 1942 | 2:46 | 24 | 0:09 | 0:57 |
| 1943 | 2:33 | 23 | 0:09 | 0:49 |
| 1944 | 2:33 | 23 | 0:08 | 0:50 |
| 1945 | 2:27 | 22 | 0:08 | 0:48 |
| 1946 | 2:21 | 22 | 0:08 | 0:45 |
| 1947 | 2:20 | 22 | 0:08 | 0:46 |
| 1948 | 16:48 | 60 | 0:29 | 5:23 |
| 1949 | 27:58 | 72 | 0:36 | 8:49 |
| 1950 | 30:35 | 77 | 0:36 | 9:38 |
| 1951 | 40:40 | 91 | 0:38 | 12:51 |
| 1952 | 48:33 | 106 | 0:37 | 15:33 |
| 1953 | 46:12 | 103 | 0:37 | 14:45 |
| 1954 | 37:59 | 101 | 0:36 | 11:58 |
| 1955 | 29:34 | 80 | 0:35 | 9:38 |
| 1956 | 32:23 | 87 | 0:35 | 10:21 |
| 1957 | 19:05 | 48 | 0:31 | 6:20 |
| 1958 | 16:22 | 41 | 0:31 | 5:31 |
| 1959 | 9:03 | 30 | 0:23 | 3:10 |
| 1960 | 10:13 | 32 | 0:25 | 3:29 |
| 1961 | 6:40 | 27 | 0:18 | 2:18 |
| 1962 | 6:11 | 26 | 0:17 | 2:07 |
| 1963 | 6:13 | 27 | 0:17 | 2:09 |
| 1964 | 18:10 | 56 | 0:33 | 5:52 |
| 1965 | 43:46 | 80 | 0:52 | 12:54 |
| 1966 | 36:21 | 75 | 0:48 | 10:46 |
| 1967 | 115:24 | 143 | 1:05 | 36:49 |
| 1968 | 106:20 | 145 | 1:00 | 34:24 |
| 1969 | 102:05 | 173 | 1:01 | 33:32 |
| 1970 | 92:56 | 151 | 0:56 | 30:11 |
| 1971 | 90:30 | 157 | 0:56 | 29:30 |
| 1972 | 87:51 | 164 | 0:56 | 28:50 |
| 1973 | 82:15 | 170 | 0:55 | 27:04 |
| 1974 | 76:12 | 154 | 0:54 | 25:04 |
| 1975 | 67:42 | 142 | 0:52 | 22:38 |
| 1976 | 58:28 | 137 | 0:48 | 19:51 |
| 1977 | 55:38 | 131 | 0:46 | 19:03 |
| 1978 | 54:32 | 129 | 0:46 | 18:46 |
| 1979 | 63:06 | 128 | 0:51 | 21:30 |
| 1980 | 59:02 | 144 | 0:47 | 20:16 |
| 1981 | 57:58 | 147 | 0:46 | 19:55 |
| 1982 | 60:14 | 146 | 0:47 | 20:40 |
| 1983 | 58:31 | 151 | 0:45 | 20:10 |
| 1984 | 59:20 | 151 | 0:45 | 20:28 |
| 1985 | 60:27 | 153 | 0:45 | 20:53 |
| 1986 | 61:56 | 151 | 0:46 | 21:24 |
| 1987 | 61:59 | 155 | 0:45 | 21:26 |
| 1988 | 65:36 | 156 | 0:47 | 22:41 |
| 1989 | 70:18 | 148 | 0:51 | 24:14 |
| 1990 | 66:09 | 148 | 0:48 | 22:49 |
| 1991 | 73:53 | 162 | 0:51 | 25:43 |
| 1992 | 74:54 | 174 | 0:51 | 26:27 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 1993 | 84:37 | 183 | 0:54 | 30:31 |
| 1994 | 83:37 | 187 | 0:53 | 30:17 |
| 1995 | 66:54 | 175 | 0:47 | 23:40 |
| 1996 | 111:23 | 217 | 0:48 | 40:38 |
| 1997 | 136:41 | 236 | 0:47 | 50:21 |
| 1998 | 137:10 | 239 | 0:47 | 50:37 |
| 1999 | 99:11 | 215 | 0:44 | 35:53 |
| 2000 | 91:32 | 204 | 0:41 | 32:43 |
| 2001 | 67:40 | 155 | 0:44 | 23:06 |
| 2002 | 135:50 | 240 | 0:47 | 50:08 |
| 2003 | 63:15 | 150 | 0:44 | 21:49 |
| 2004 | 66:21 | 177 | 0:45 | 23:11 |
| 2005 | 60:55 | 173 | 0:42 | 21:19 |
| 2006 | 59:57 | 173 | 0:42 | 20:59 |
| 2007 | 78:26 | 223 | 0:47 | 27:39 |
| 2008 | 78:50 | 206 | 0:49 | 27:37 |
| 2009 | 74:05 | 168 | 0:48 | 25:36 |
| 2010 | 80:34 | 239 | 0:47 | 28:22 |
| 2011 | 80:19 | 242 | 0:48 | 28:15 |
| 2012 | 75:50 | 210 | 0:48 | 26:35 |
| 2013 | 68:18 | 194 | 0:45 | 24:05 |
| 2014 | 64:31 | 175 | 0:45 | 22:17 |
| 2015 | 97:55 | 202 | 0:49 | 36:17 |
| 2016 | 95:06 | 203 | 0:48 | 35:15 |
| 2017 | 64:38 | 172 | 0:37 | 24:23 |
| 2018 | 63:08 | 178 | 0:36 | 23:41 |
| 2019 | 62:35 | 175 | 0:36 | 23:31 |
| 2020 | 62:05 | 135 | 0:40 | 23:43 |
| 2021 | 9:11 | 42 | 0:17 | 3:08 |
| 2022 | 8:58 | 43 | 0:17 | 3:04 |
| 2023 | 9:16 | 44 | 0:17 | 3:10 |
| 2024 | 8:52 | 43 | 0:17 | 3:01 |
| 2025 | 8:56 | 44 | 0:16 | 3:04 |
| 2026 | 8:57 | 44 | 0:16 | 3:04 |
| 2027 | 9:10 | 45 | 0:17 | 3:09 |
| 2028 | 9:04 | 45 | 0:16 | 3:09 |
| 2029 | 9:22 | 47 | 0:17 | 3:15 |
| 2030 | 9:00 | 47 | 0:16 | 3:07 |
| 2031 | 9:37 | 47 | 0:17 | 3:20 |
| 2032 | 9:52 | 48 | 0:17 | 3:29 |
| 2033 | 9:55 | 48 | 0:17 | 3:31 |
| 2034 | 9:53 | 47 | 0:17 | 3:29 |
| 2035 | 10:19 | 48 | 0:18 | 3:37 |
| 2036 | 10:13 | 46 | 0:18 | 3:37 |
| 2037 | 10:21 | 48 | 0:18 | 3:40 |
| 2038 | 10:04 | 50 | 0:17 | 3:38 |
| 2039 | 9:40 | 48 | 0:16 | 3:30 |
| 2040 | 9:37 | 47 | 0:16 | 3:28 |
| 2041 | 9:07 | 47 | 0:15 | 3:23 |
| 2042 | 9:46 | 50 | 0:16 | 3:40 |
| 2043 | 10:43 | 50 | 0:17 | 3:57 |
| 2044 | 0:00 | 0 | 0:00 | 0:00 |
| 2045 | 0:00 | 0 | 0:00 | 0:00 |
| 2046 | 0:00 | 0 | 0:00 | 0:00 |
| 2047 | 0:00 | 0 | 0:00 | 0:00 |
| 2048 | 0:00 | 0 | 0:00 | 0:00 |
| 2049 | 0:00 | 0 | 0:00 | 0:00 |
| 2050 | 9:54 | 37 | 0:21 | 3:54 |
| 2051 | 9:49 | 37 | 0:21 | 3:52 |
| 2052 | 14:21 | 58 | 0:21 | 5:28 |
| 2053 | 14:05 | 59 | 0:20 | 5:21 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 2054 | 13:37 | 57 | 0:20 | 5:09 |
| 2055 | 13:00 | 55 | 0:20 | 4:48 |
| 2056 | 12:26 | 52 | 0:20 | 4:33 |
| 2057 | 11:55 | 51 | 0:19 | 4:19 |
| 2058 | 12:12 | 51 | 0:20 | 4:23 |
| 2059 | 12:14 | 52 | 0:20 | 4:22 |
| 2060 | 12:54 | 53 | 0:20 | 4:37 |
| 2061 | 13:08 | 53 | 0:20 | 4:47 |
| 2062 | 9:09 | 35 | 0:21 | 3:27 |
| 2063 | 0:00 | 0 | 0:00 | 0:00 |
| 2064 | 0:00 | 0 | 0:00 | 0:00 |
| 2065 | 12:59 | 55 | 0:20 | 4:38 |
| 2066 | 8:38 | 33 | 0:20 | 3:06 |
| 2067 | 16:14 | 64 | 0:21 | 6:13 |
| 2068 | 13:23 | 53 | 0:20 | 4:43 |
| 2069 | 13:56 | 56 | 0:20 | 5:00 |
| 2070 | 14:12 | 58 | 0:20 | 5:04 |
| 2071 | 13:45 | 56 | 0:20 | 4:50 |
| 2072 | 14:10 | 56 | 0:21 | 4:59 |
| 2073 | 14:58 | 58 | 0:21 | 5:23 |
| 2074 | 14:58 | 58 | 0:21 | 5:22 |
| 2075 | 15:22 | 60 | 0:21 | 5:41 |
| 2076 | 15:57 | 62 | 0:21 | 5:52 |
| 2077 | 13:19 | 53 | 0:21 | 4:36 |
| 2078 | 13:13 | 53 | 0:21 | 4:36 |
| 2079 | 8:32 | 32 | 0:21 | 2:59 |
| 2080 | 13:54 | 55 | 0:21 | 4:50 |
| 2081 | 8:27 | 30 | 0:21 | 2:52 |
| 2082 | 13:49 | 55 | 0:21 | 4:48 |
| 2083 | 14:07 | 55 | 0:21 | 4:54 |
| 2084 | 17:24 | 73 | 0:21 | 6:05 |
| 2085 | 17:05 | 69 | 0:21 | 5:57 |
| 2086 | 16:01 | 65 | 0:21 | 5:34 |
| 2087 | 15:57 | 65 | 0:21 | 5:32 |
| 2088 | 15:49 | 64 | 0:22 | 5:29 |
| 2089 | 16:31 | 66 | 0:22 | 5:44 |
| 2090 | 21:06 | 87 | 0:22 | 7:27 |
| 2091 | 18:39 | 79 | 0:21 | 6:40 |
| 2092 | 11:46 | 41 | 0:21 | 4:35 |
| 2093 | 17:00 | 65 | 0:21 | 6:21 |
| 2094 | 21:43 | 90 | 0:23 | 7:37 |
| 2095 | 22:04 | 89 | 0:23 | 7:46 |
| 2096 | 22:30 | 89 | 0:23 | 7:52 |
| 2097 | 22:04 | 94 | 0:21 | 8:12 |
| 2098 | 24:21 | 98 | 0:22 | 9:21 |
| 2099 | 23:35 | 95 | 0:22 | 9:02 |
| 2100 | 22:43 | 93 | 0:22 | 8:40 |
| 2101 | 24:25 | 100 | 0:22 | 9:25 |
| 2102 | 23:14 | 96 | 0:21 | 8:56 |
| 2103 | 18:45 | 72 | 0:21 | 7:17 |
| 2104 | 18:24 | 69 | 0:21 | 7:07 |
| 2105 | 17:47 | 67 | 0:21 | 6:53 |
| 2106 | 20:33 | 78 | 0:22 | 8:00 |
| 2107 | 20:57 | 79 | 0:21 | 8:10 |
| 2108 | 28:25 | 96 | 0:22 | 10:44 |
| 2109 | 32:31 | 127 | 0:22 | 12:23 |
| 2110 | 32:40 | 128 | 0:22 | 12:25 |
| 2111 | 28:09 | 115 | 0:22 | 10:47 |
| 2112 | 30:06 | 98 | 0:22 | 11:22 |
| 2113 | 25:54 | 86 | 0:23 | 9:37 |
| 2114 | 26:56 | 88 | 0:23 | 10:02 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2115 | 24:24 | 81 | 0:23 | 8:59 |
| 2116 | 23:11 | 78 | 0:22 | 8:30 |
| 2117 | 14:49 | 47 | 0:22 | 5:33 |
| 2118 | 33:59 | 110 | 0:24 | 13:01 |
| 2119 | 36:15 | 134 | 0:24 | 13:49 |
| 2120 | 35:57 | 134 | 0:24 | 13:42 |
| 2121 | 34:16 | 134 | 0:24 | 13:05 |
| 2122 | 33:52 | 134 | 0:23 | 12:55 |
| 2123 | 31:11 | 119 | 0:23 | 11:56 |
| 2124 | 30:40 | 118 | 0:23 | 11:45 |
| 2125 | 32:59 | 131 | 0:23 | 12:35 |
| 2126 | 26:35 | 105 | 0:22 | 10:13 |
| 2127 | 26:11 | 104 | 0:22 | 10:05 |
| 2128 | 26:24 | 87 | 0:23 | 9:49 |
| 2129 | 11:49 | 40 | 0:21 | 4:24 |
| 2130 | 24:05 | 93 | 0:23 | 9:03 |
| 2131 | 27:12 | 102 | 0:24 | 10:23 |
| 2132 | 28:06 | 104 | 0:24 | 10:44 |
| 2133 | 30:39 | 111 | 0:25 | 11:43 |
| 2134 | 28:06 | 99 | 0:25 | 10:37 |
| 2135 | 26:31 | 97 | 0:25 | 9:48 |
| 2136 | 29:45 | 104 | 0:26 | 11:16 |
| 2137 | 29:35 | 102 | 0:26 | 11:07 |
| 2138 | 30:05 | 103 | 0:26 | 11:19 |
| 2139 | 30:18 | 104 | 0:27 | 11:23 |
| 2140 | 31:19 | 107 | 0:27 | 11:50 |
| 2141 | 30:23 | 78 | 0:26 | 11:47 |
| 2142 | 29:19 | 76 | 0:26 | 11:20 |
| 2143 | 27:15 | 66 | 0:28 | 10:27 |
| 2144 | 0:00 | 0 | 0:00 | 0:00 |
| 2145 | 0:00 | 0 | 0:00 | 0:00 |
| 2146 | 0:00 | 0 | 0:00 | 0:00 |
| 2147 | 0:00 | 0 | 0:00 | 0:00 |
| 2148 | 8:08 | 30 | 0:21 | 2:45 |
| 2149 | 10:08 | 40 | 0:21 | 3:27 |
| 2150 | 10:48 | 45 | 0:20 | 3:46 |
| 2151 | 9:51 | 40 | 0:20 | 3:21 |
| 2152 | 9:32 | 39 | 0:20 | 3:14 |
| 2153 | 11:20 | 46 | 0:21 | 3:59 |
| 2154 | 11:21 | 45 | 0:21 | 3:58 |
| 2155 | 11:47 | 47 | 0:21 | 4:10 |
| 2156 | 12:08 | 49 | 0:21 | 4:20 |
| 2157 | 11:57 | 48 | 0:21 | 4:12 |
| 2158 | 12:45 | 50 | 0:21 | 4:34 |
| 2159 | 12:48 | 50 | 0:21 | 4:35 |
| 2160 | 10:54 | 42 | 0:21 | 3:43 |
| 2161 | 11:14 | 44 | 0:21 | 3:52 |
| 2162 | 11:26 | 43 | 0:22 | 3:54 |
| 2163 | 11:36 | 44 | 0:22 | 3:58 |
| 2164 | 9:37 | 33 | 0:22 | 3:16 |
| 2165 | 9:23 | 32 | 0:22 | 3:11 |
| 2166 | 13:24 | 51 | 0:22 | 4:50 |
| 2167 | 13:36 | 52 | 0:22 | 4:53 |
| 2168 | 12:14 | 47 | 0:22 | 4:14 |
| 2169 | 13:32 | 51 | 0:22 | 4:46 |
| 2170 | 14:19 | 50 | 0:24 | 5:01 |
| 2171 | 11:28 | 36 | 0:24 | 3:55 |
| 2172 | 10:39 | 35 | 0:23 | 3:37 |
| 2173 | 14:21 | 54 | 0:22 | 5:11 |
| 2174 | 15:00 | 54 | 0:23 | 5:26 |
| 2175 | 15:21 | 57 | 0:23 | 5:36 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2176 | 16:44 | 60 | 0:24 | 6:11 |
| 2177 | 17:48 | 60 | 0:25 | 6:35 |
| 2178 | 18:38 | 62 | 0:25 | 6:58 |
| 2179 | 18:59 | 62 | 0:26 | 6:59 |
| 2180 | 20:30 | 66 | 0:27 | 7:40 |
| 2181 | 22:02 | 70 | 0:27 | 8:19 |
| 2182 | 21:21 | 91 | 0:23 | 8:06 |
| 2183 | 21:21 | 88 | 0:24 | 8:09 |
| 2184 | 26:15 | 96 | 0:25 | 10:19 |
| 2185 | 23:25 | 81 | 0:26 | 9:12 |
| 2186 | 20:38 | 73 | 0:25 | 8:01 |
| 2187 | 20:15 | 73 | 0:24 | 7:52 |
| 2188 | 19:54 | 84 | 0:23 | 7:40 |
| 2189 | 20:14 | 86 | 0:23 | 7:46 |
| 2190 | 20:02 | 76 | 0:23 | 7:53 |
| 2191 | 20:46 | 80 | 0:23 | 8:12 |
| 2192 | 8:09 | 30 | 0:21 | 2:45 |
| 2193 | 0:00 | 0 | 0:00 | 0:00 |
| 2194 | 0:00 | 0 | 0:00 | 0:00 |
| 2195 | 0:00 | 0 | 0:00 | 0:00 |
| 2196 | 0:00 | 0 | 0:00 | 0:00 |
| 2197 | 0:00 | 0 | 0:00 | 0:00 |
| 2198 | 36:35 | 110 | 0:27 | 14:09 |
| 2199 | 25:46 | 85 | 0:27 | 10:06 |
| 2200 | 23:50 | 79 | 0:27 | 9:17 |
| 2201 | 23:24 | 78 | 0:26 | 9:07 |
| 2202 | 24:16 | 84 | 0:24 | 9:16 |
| 2203 | 23:30 | 83 | 0:24 | 8:58 |
| 2204 | 26:47 | 90 | 0:24 | 10:16 |
| 2205 | 30:09 | 103 | 0:24 | 11:39 |
| 2206 | 29:58 | 92 | 0:28 | 11:28 |
| 2207 | 24:17 | 82 | 0:26 | 9:15 |
| 2208 | 29:08 | 89 | 0:28 | 11:08 |
| 2209 | 22:49 | 79 | 0:26 | 8:41 |
| 2210 | 36:11 | 102 | 0:29 | 13:54 |
| 2211 | 40:11 | 118 | 0:29 | 15:34 |
| 2212 | 40:00 | 117 | 0:29 | 15:29 |
| 2213 | 28:13 | 86 | 0:29 | 11:01 |
| 2214 | 27:53 | 86 | 0:29 | 10:53 |
| 2215 | 26:31 | 81 | 0:28 | 10:18 |
| 2216 | 44:40 | 118 | 0:31 | 17:15 |
| 2217 | 43:34 | 117 | 0:31 | 16:50 |
| 2218 | 43:47 | 124 | 0:32 | 16:56 |
| 2219 | 36:47 | 76 | 0:33 | 14:14 |
| 2220 | 25:10 | 76 | 0:29 | 9:36 |
| 2221 | 35:16 | 97 | 0:31 | 13:30 |
| 2222 | 21:42 | 77 | 0:25 | 8:17 |
| 2223 | 14:32 | 64 | 0:18 | 5:39 |
| 2224 | 9:26 | 41 | 0:17 | 3:47 |
| 2225 | 45:28 | 106 | 0:37 | 17:25 |
| 2226 | 10:59 | 72 | 0:12 | 4:12 |
| 2227 | 16:57 | 87 | 0:14 | 6:22 |
| 2228 | 17:41 | 84 | 0:15 | 6:37 |
| 2229 | 16:14 | 88 | 0:15 | 6:10 |
| 2230 | 15:06 | 78 | 0:15 | 5:46 |
| 2231 | 17:38 | 94 | 0:16 | 6:42 |
| 2232 | 18:13 | 83 | 0:16 | 6:48 |
| 2233 | 18:26 | 82 | 0:16 | 6:51 |
| 2234 | 18:35 | 82 | 0:16 | 6:55 |
| 2235 | 18:05 | 78 | 0:17 | 6:41 |
| 2236 | 18:04 | 77 | 0:17 | 6:41 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 2237 | 20:43 | 90 | 0:17 | 7:47 |
| 2238 | 19:57 | 95 | 0:17 | 7:34 |
| 2239 | 22:19 | 90 | 0:18 | 8:23 |
| 2240 | 10:51 | 57 | 0:14 | 3:54 |
| 2241 | 13:39 | 73 | 0:14 | 5:01 |
| 2242 | 15:59 | 78 | 0:15 | 5:56 |
| 2243 | 4:17 | 23 | 0:13 | 1:27 |
| 2244 | 4:12 | 22 | 0:13 | 1:26 |
| 2245 | 4:12 | 24 | 0:13 | 1:26 |
| 2246 | 5:21 | 37 | 0:13 | 1:51 |
| 2247 | 4:36 | 24 | 0:14 | 1:34 |
| 2248 | 4:47 | 24 | 0:15 | 1:37 |
| 2249 | 11:27 | 56 | 0:14 | 4:06 |
| 2250 | 4:57 | 24 | 0:15 | 1:41 |
| 2251 | 4:59 | 24 | 0:15 | 1:41 |
| 2252 | 10:01 | 50 | 0:16 | 3:33 |
| 2253 | 5:24 | 26 | 0:16 | 1:50 |
| 2254 | 5:26 | 25 | 0:16 | 1:51 |
| 2255 | 5:32 | 26 | 0:16 | 1:54 |
| 2256 | 5:31 | 27 | 0:15 | 1:54 |
| 2257 | 5:04 | 25 | 0:15 | 1:44 |
| 2258 | 5:07 | 26 | 0:15 | 1:45 |
| 2259 | 4:46 | 24 | 0:14 | 1:38 |
| 2260 | 4:47 | 26 | 0:14 | 1:38 |
| 2261 | 4:29 | 26 | 0:13 | 1:32 |
| 2262 | 4:02 | 25 | 0:12 | 1:23 |
| 2263 | 5:16 | 27 | 0:15 | 1:53 |
| 2264 | 6:15 | 30 | 0:15 | 2:21 |
| 2265 | 6:18 | 31 | 0:15 | 2:24 |
| 2266 | 7:05 | 31 | 0:17 | 2:41 |
| 2267 | 6:45 | 30 | 0:17 | 2:31 |
| 2268 | 6:22 | 28 | 0:17 | 2:13 |
| 2269 | 6:04 | 27 | 0:17 | 2:05 |
| 2270 | 6:17 | 28 | 0:16 | 2:16 |
| 2271 | 6:13 | 29 | 0:16 | 2:15 |
| 2272 | 12:47 | 56 | 0:20 | 4:53 |
| 2273 | 9:06 | 38 | 0:18 | 3:37 |
| 2274 | 8:46 | 36 | 0:18 | 3:29 |
| 2275 | 8:36 | 36 | 0:17 | 3:26 |
| 2276 | 15:40 | 69 | 0:20 | 6:14 |
| 2277 | 8:00 | 44 | 0:15 | 2:50 |
| 2278 | 7:51 | 45 | 0:14 | 2:49 |
| 2279 | 8:14 | 45 | 0:15 | 2:58 |
| 2280 | 12:05 | 77 | 0:20 | 5:06 |
| 2281 | 14:08 | 93 | 0:19 | 6:01 |
| 2282 | 11:01 | 68 | 0:19 | 4:38 |
| 2283 | 10:43 | 63 | 0:20 | 4:28 |
| 2284 | 12:33 | 75 | 0:21 | 5:11 |
| 2285 | 30:06 | 101 | 0:23 | 11:36 |
| 2286 | 22:18 | 89 | 0:21 | 8:44 |
| 2287 | 19:42 | 74 | 0:22 | 7:27 |
| 2288 | 5:38 | 40 | 0:10 | 2:15 |
| 2289 | 0:00 | 0 | 0:00 | 0:00 |
| 2290 | 6:49 | 34 | 0:14 | 2:32 |
| 2291 | 2:12 | 24 | 0:07 | 0:45 |
| 2292 | 32:56 | 135 | 0:23 | 11:54 |
| 2293 | 49:42 | 207 | 0:25 | 17:24 |
| 2294 | 49:19 | 194 | 0:26 | 17:00 |
| 2295 | 50:56 | 190 | 0:27 | 17:32 |
| 2296 | 45:52 | 170 | 0:27 | 15:43 |
| 2297 | 45:13 | 160 | 0:27 | 15:37 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2298 | 56:57 | 165 | 0:31 | 19:37 |
| 2299 | 48:50 | 149 | 0:29 | 16:29 |
| 2300 | 58:05 | 165 | 0:32 | 19:43 |
| 2301 | 108:58 | 228 | 0:40 | 39:36 |
| 2302 | 106:06 | 230 | 0:39 | 38:37 |
| 2303 | 90:24 | 227 | 0:37 | 32:17 |
| 2304 | 71:00 | 172 | 0:42 | 23:29 |
| 2305 | 80:38 | 150 | 0:48 | 26:10 |
| 2306 | 487:42 | 262 | 3:45 | 202:59 |
| 2307 | 808:50 | 365 | 3:13 | 328:45 |
| 2308 | 313:47 | 224 | 2:43 | 80:32 |
| 2309 | 215:16 | 172 | 1:52 | 63:43 |
| 2310 | 402:07 | 348 | 1:58 | 154:32 |
| 2311 | 193:23 | 186 | 1:33 | 67:15 |
| 2312 | 181:50 | 198 | 1:44 | 66:06 |
| 2313 | 43:25 | 96 | 0:42 | 12:38 |
| 2314 | 487:04 | 270 | 2:41 | 171:22 |
| 2315 | 746:31 | 365 | 3:28 | 293:32 |
| 2316 | 257:36 | 333 | 1:26 | 95:38 |
| 2317 | 708:35 | 365 | 3:08 | 219:43 |
| 2318 | 88:31 | 203 | 0:41 | 31:09 |
| 2319 | 76:50 | 190 | 0:41 | 27:28 |
| 2320 | 250:48 | 290 | 1:58 | 96:01 |
| 2321 | 194:04 | 280 | 1:20 | 64:51 |
| 2322 | 86:42 | 199 | 0:44 | 27:58 |
| 2323 | 346:29 | 263 | 2:27 | 92:35 |
| 2324 | 140:32 | 204 | 1:34 | 52:00 |
| 2325 | 52:39 | 155 | 0:58 | 18:35 |
| 2326 | 115:15 | 199 | 1:05 | 37:12 |
| 2327 | 48:38 | 72 | 0:52 | 20:27 |
| 2328 | 55:46 | 133 | 0:51 | 21:17 |
| 2329 | 91:24 | 140 | 1:01 | 42:33 |
| 2330 | 61:59 | 218 | 0:40 | 19:34 |
| 2331 | 55:42 | 213 | 0:38 | 17:18 |
| 2332 | 59:29 | 193 | 0:44 | 21:47 |
| 2333 | 215:44 | 273 | 1:51 | 86:04 |
| 2334 | 410:12 | 291 | 2:37 | 145:52 |
| 2335 | 253:11 | 265 | 2:34 | 84:43 |
| 2336 | 92:31 | 228 | 0:42 | 34:04 |
| 2337 | 147:50 | 283 | 1:06 | 50:41 |
| 2338 | 200:34 | 314 | 1:08 | 69:11 |
| 2339 | 68:37 | 225 | 0:43 | 24:27 |
| 2340 | 65:05 | 221 | 0:42 | 22:58 |
| 2341 | 64:09 | 223 | 0:40 | 22:23 |
| 2342 | 76:50 | 251 | 0:40 | 29:35 |
| 2343 | 66:41 | 180 | 0:39 | 25:55 |
| 2344 | 40:42 | 107 | 0:42 | 13:05 |
| 2345 | 32:54 | 112 | 0:30 | 12:03 |
| 2346 | 70:57 | 117 | 0:55 | 20:31 |
| 2347 | 68:04 | 115 | 0:55 | 20:03 |
| 2348 | 158:08 | 239 | 1:05 | 49:17 |
| 2349 | 177:57 | 258 | 1:17 | 61:45 |
| 2350 | 689:25 | 271 | 3:04 | 237:00 |
| 2351 | 558:14 | 271 | 2:52 | 256:29 |
| 2352 | 22:39 | 96 | 0:25 | 8:18 |
| 2353 | 22:30 | 91 | 0:26 | 8:07 |
| 2354 | 23:40 | 94 | 0:27 | 8:35 |
| 2355 | 26:55 | 108 | 0:23 | 9:53 |
| 2356 | 27:50 | 112 | 0:22 | 10:16 |
| 2357 | 309:47 | 183 | 2:30 | 81:22 |
| 2358 | 546:07 | 294 | 3:09 | 226:06 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2359 | 225:11 | 190 | 1:56 | 110:25 |
| 2360 | 635:42 | 282 | 3:19 | 153:56 |
| 2361 | 201:50 | 128 | 3:10 | 73:01 |
| 2362 | 304:59 | 191 | 2:04 | 86:11 |
| 2363 | 148:55 | 135 | 1:35 | 47:56 |
| 2364 | 59:15 | 113 | 0:46 | 19:48 |
| 2365 | 44:04 | 74 | 0:48 | 14:16 |
| 2366 | 5:52 | 27 | 0:17 | 1:59 |
| 2367 | 5:07 | 28 | 0:14 | 1:38 |
| 2368 | 4:47 | 26 | 0:14 | 1:33 |
| 2369 | 0:00 | 0 | 0:00 | 0:00 |
| 2370 | 31:32 | 64 | 0:35 | 9:49 |
| 2371 | 24:19 | 56 | 0:31 | 7:40 |
| 2372 | 7:42 | 36 | 0:16 | 2:22 |
| 2373 | 7:39 | 33 | 0:18 | 2:25 |
| 2374 | 10:46 | 50 | 0:17 | 3:17 |
| 2375 | 14:07 | 66 | 0:17 | 4:32 |
| 2376 | 0:00 | 0 | 0:00 | 0:00 |
| 2377 | 0:00 | 0 | 0:00 | 0:00 |
| 2378 | 15:27 | 66 | 0:20 | 4:54 |
| 2379 | 15:11 | 68 | 0:19 | 4:48 |
| 2380 | 13:35 | 58 | 0:20 | 4:22 |
| 2381 | 3:47 | 19 | 0:15 | 1:18 |
| 2382 | 19:03 | 72 | 0:22 | 6:04 |
| 2383 | 21:46 | 74 | 0:23 | 7:21 |
| 2384 | 0:00 | 0 | 0:00 | 0:00 |
| 2385 | 24:17 | 97 | 0:23 | 8:06 |
| 2386 | 19:08 | 95 | 0:19 | 6:48 |
| 2387 | 24:04 | 105 | 0:21 | 8:28 |
| 2388 | 16:09 | 74 | 0:21 | 5:31 |
| 2389 | 16:38 | 77 | 0:21 | 5:38 |
| 2390 | 16:39 | 78 | 0:21 | 5:36 |
| 2391 | 21:08 | 87 | 0:22 | 7:14 |
| 2392 | 29:42 | 117 | 0:25 | 10:14 |
| 2393 | 75:38 | 144 | 0:54 | 32:48 |
| 2394 | 86:18 | 169 | 0:57 | 37:17 |
| 2395 | 85:50 | 199 | 0:44 | 34:56 |
| 2396 | 68:42 | 177 | 0:35 | 28:34 |
| 2397 | 49:38 | 137 | 0:35 | 19:47 |
| 2398 | 81:11 | 194 | 0:46 | 30:17 |
| 2399 | 73:24 | 194 | 0:43 | 27:24 |
| 2400 | 68:05 | 163 | 0:51 | 25:10 |
| 2401 | 102:40 | 157 | 1:12 | 35:10 |
| 2402 | 175:20 | 242 | 1:16 | 66:12 |
| 2403 | 24:58 | 55 | 0:35 | 8:10 |
| 2404 | 789:24 | 235 | 5:50 | 335:05 |
| 2405 | 184:10 | 156 | 1:55 | 87:05 |
| 2406 | 162:35 | 122 | 1:53 | 66:18 |
| 2407 | 4:20 | 34 | 0:11 | 1:34 |
| 2408 | 3:38 | 82 | 0:05 | 0:57 |
| 2409 | 4:08 | 75 | 0:05 | 1:03 |
| 2410 | 1:13 | 23 | 0:05 | 0:20 |
| 2411 | 1:43 | 40 | 0:04 | 0:30 |
| 2412 | 19:44 | 114 | 0:18 | 6:09 |
| 2413 | 22:40 | 128 | 0:17 | 6:42 |
| 2414 | 30:26 | 120 | 0:26 | 10:18 |
| 2415 | 151:52 | 193 | 1:14 | 57:07 |
| 2416 | 92:14 | 134 | 1:04 | 42:02 |
| 2417 | 51:31 | 148 | 0:31 | 17:23 |
| 2418 | 110:24 | 169 | 1:09 | 47:41 |
| 2419 | 111:35 | 169 | 1:11 | 47:49 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values Shadow hours per year [h/year] |
|---|---|---|---|---|
| 2420 | 135:48 | 202 | 1:10 | 62:26 |
| 2421 | 91:14 | 134 | 1:02 | 40:06 |
| 2422 | 97:47 | 148 | 1:02 | 43:51 |
| 2423 | 152:00 | 133 | 1:26 | 48:36 |
| 2424 | 115:00 | 86 | 1:37 | 27:45 |
| 2425 | 317:00 | 209 | 2:04 | 98:28 |
| 2426 | 0:00 | 0 | 0:00 | 0:00 |
| 2427 | 0:00 | 0 | 0:00 | 0:00 |
| 2428 | 0:00 | 0 | 0:00 | 0:00 |
| 2429 | 2:08 | 51 | 0:04 | 0:31 |
| 2430 | 1:38 | 27 | 0:05 | 0:27 |
| 2431 | 3:42 | 47 | 0:07 | 0:57 |
| 2432 | 0:53 | 25 | 0:03 | 0:12 |
| 2433 | 4:35 | 46 | 0:08 | 1:04 |
| 2434 | 124:17 | 94 | 1:40 | 31:13 |
| 2435 | 639:13 | 291 | 2:53 | 181:23 |
| 2436 | 677:17 | 333 | 3:19 | 209:39 |
| 2437 | 71:37 | 146 | 0:39 | 25:51 |
| 2438 | 17:46 | 44 | 0:31 | 5:49 |
| 2439 | 46:18 | 136 | 0:30 | 17:33 |
| 2440 | 41:45 | 112 | 0:32 | 15:07 |
| 2441 | 194:36 | 205 | 2:19 | 64:49 |
| 2442 | 284:09 | 216 | 2:18 | 99:22 |
| 2443 | 229:36 | 228 | 1:47 | 84:07 |
| 2444 | 257:44 | 242 | 1:52 | 95:24 |
| 2445 | 264:47 | 243 | 1:54 | 97:47 |
| 2446 | 337:36 | 253 | 2:05 | 122:17 |
| 2447 | 305:51 | 268 | 2:01 | 117:26 |
| 2448 | 289:42 | 227 | 1:53 | 96:03 |
| 2449 | 552:35 | 261 | 3:05 | 158:09 |
| 2450 | 664:49 | 323 | 2:54 | 222:07 |
| 2451 | 78:14 | 197 | 0:47 | 28:15 |
| 2452 | 82:26 | 198 | 0:49 | 29:36 |
| 2453 | 46:13 | 78 | 0:56 | 10:41 |
| 2454 | 1:41 | 30 | 0:05 | 0:27 |
| 2455 | 16:31 | 98 | 0:25 | 5:21 |
| 2456 | 23:43 | 120 | 0:27 | 6:53 |
| 2457 | 23:31 | 115 | 0:27 | 6:48 |
| 2458 | 170:20 | 156 | 1:19 | 81:58 |
| 2459 | 345:16 | 312 | 2:12 | 89:25 |
| 2460 | 290:09 | 274 | 2:21 | 70:57 |
| 2461 | 201:21 | 201 | 1:36 | 98:08 |
| 2462 | 465:30 | 249 | 2:41 | 178:05 |
| 2463 | 59:26 | 160 | 0:42 | 24:56 |
| 2464 | 41:52 | 151 | 0:25 | 15:01 |
| 2465 | 123:34 | 161 | 1:12 | 37:22 |
| 2466 | 302:38 | 248 | 2:20 | 133:01 |
| 2467 | 44:27 | 130 | 0:34 | 15:45 |
| 2468 | 84:23 | 184 | 0:43 | 31:35 |
| 2469 | 226:19 | 259 | 1:34 | 76:17 |
| 2470 | 508:17 | 245 | 2:37 | 174:55 |
| 2471 | 18:24 | 62 | 0:26 | 5:08 |
| 2472 | 18:23 | 84 | 0:23 | 5:41 |
| 2473 | 165:17 | 157 | 2:03 | 82:44 |
| 2474 | 53:22 | 149 | 0:32 | 15:06 |
| 2475 | 200:51 | 201 | 1:39 | 89:10 |
| 2476 | 345:17 | 291 | 1:52 | 130:14 |
| 2477 | 207:19 | 249 | 1:13 | 65:09 |
| 2478 | 50:17 | 150 | 0:39 | 18:01 |
| 2479 | 51:37 | 135 | 0:46 | 19:05 |
| 2480 | 75:05 | 161 | 1:06 | 20:59 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Shadow, worst case<br>Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|---|---|---|
| 2481 | 284:07 | 234 | 2:01 | 83:21 |
| 2482 | 144:03 | 221 | 1:13 | 50:10 |
| 2483 | 129:48 | 205 | 1:23 | 47:46 |
| 2484 | 111:43 | 192 | 0:55 | 41:45 |
| 2485 | 165:16 | 237 | 1:12 | 52:41 |
| 2486 | 181:02 | 248 | 1:10 | 69:23 |
| 2487 | 279:22 | 268 | 1:40 | 118:49 |
| 2488 | 129:49 | 219 | 1:01 | 46:40 |
| 2489 | 105:58 | 227 | 0:54 | 37:00 |
| 2490 | 118:50 | 240 | 0:57 | 42:21 |
| 2491 | 184:51 | 274 | 1:13 | 68:35 |
| 2492 | 172:40 | 275 | 1:04 | 63:51 |
| 2493 | 48:36 | 198 | 0:30 | 17:40 |
| 2494 | 77:55 | 173 | 0:45 | 28:33 |
| 2495 | 52:01 | 91 | 0:51 | 17:45 |
| 2496 | 197:00 | 179 | 1:27 | 86:34 |
| 2497 | 270:00 | 163 | 2:36 | 92:25 |
| 2498 | 262:17 | 219 | 2:11 | 84:51 |
| 2499 | 168:00 | 188 | 2:11 | 49:01 |
| 2500 | 77:46 | 105 | 1:02 | 40:06 |
| 2501 | 399:03 | 217 | 2:35 | 190:06 |
| 2502 | 139:24 | 170 | 1:22 | 41:38 |
| 2503 | 117:38 | 219 | 1:14 | 41:56 |
| 2504 | 106:10 | 117 | 1:24 | 33:15 |
| 2505 | 392:50 | 270 | 2:20 | 131:19 |
| 2506 | 322:23 | 248 | 2:34 | 102:27 |
| 2507 | 622:57 | 365 | 3:01 | 198:57 |
| 2508 | 298:26 | 250 | 1:42 | 109:29 |
| 2509 | 63:38 | 117 | 0:53 | 22:16 |
| 2510 | 116:18 | 189 | 1:01 | 51:04 |
| 2511 | 32:16 | 83 | 0:38 | 11:14 |
| 2512 | 33:10 | 83 | 0:38 | 11:33 |
| 2513 | 178:12 | 176 | 2:17 | 76:18 |
| 2514 | 25:07 | 77 | 0:33 | 8:44 |
| 2515 | 41:26 | 94 | 0:42 | 13:55 |
| 2516 | 30:34 | 80 | 0:36 | 10:27 |
| 2517 | 25:57 | 80 | 0:33 | 9:01 |
| 2518 | 636:57 | 344 | 3:58 | 289:32 |
| 2519 | 606:32 | 326 | 3:31 | 218:56 |
| 2520 | 419:39 | 228 | 2:49 | 103:25 |
| 2521 | 336:44 | 199 | 2:29 | 130:17 |
| 2522 | 185:16 | 171 | 1:35 | 69:18 |
| 2523 | 0:00 | 0 | 0:00 | 0:00 |
| 2524 | 0:00 | 0 | 0:00 | 0:00 |
| 2525 | 0:00 | 0 | 0:00 | 0:00 |
| 2526 | 0:00 | 0 | 0:00 | 0:00 |
| 2527 | 0:00 | 0 | 0:00 | 0:00 |
| 2528 | 0:00 | 0 | 0:00 | 0:00 |
| 2529 | 3:20 | 44 | 0:06 | 0:46 |
| 2530 | 0:00 | 0 | 0:00 | 0:00 |
| 2531 | 13:09 | 99 | 0:20 | 4:03 |
| 2532 | 10:34 | 88 | 0:18 | 3:14 |
| 2533 | 18:20 | 96 | 0:21 | 6:16 |
| 2534 | 28:53 | 87 | 0:29 | 9:02 |
| 2535 | 19:08 | 126 | 0:19 | 6:32 |
| 2536 | 16:23 | 101 | 0:17 | 5:14 |
| 2537 | 10:59 | 55 | 0:19 | 3:31 |
| 2538 | 51:57 | 197 | 0:27 | 15:35 |
| 2539 | 46:43 | 213 | 0:30 | 16:12 |
| 2540 | 41:01 | 179 | 0:28 | 13:34 |
| 2541 | 28:03 | 138 | 0:24 | 9:30 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2542 | 30:40 | 141 | 0:25 | 11:42 |
| 2543 | 20:23 | 74 | 0:29 | 7:04 |
| 2544 | 23:13 | 105 | 0:30 | 7:47 |
| 2545 | 23:31 | 105 | 0:30 | 7:52 |
| 2546 | 22:57 | 101 | 0:30 | 7:55 |
| 2547 | 25:21 | 113 | 0:31 | 8:22 |
| 2548 | 18:43 | 66 | 0:29 | 7:26 |
| 2549 | 16:22 | 61 | 0:27 | 6:34 |
| 2550 | 38:13 | 158 | 0:31 | 15:57 |
| 2551 | 62:14 | 185 | 0:40 | 28:57 |
| 2552 | 5:38 | 64 | 0:11 | 1:45 |
| 2553 | 15:43 | 143 | 0:12 | 4:28 |
| 2554 | 9:26 | 73 | 0:12 | 2:55 |
| 2555 | 7:57 | 66 | 0:11 | 2:28 |
| 2556 | 21:23 | 107 | 0:20 | 10:41 |
| 2557 | 19:14 | 103 | 0:20 | 9:37 |
| 2558 | 18:58 | 121 | 0:19 | 8:59 |
| 2559 | 16:47 | 111 | 0:21 | 6:09 |
| 2560 | 10:54 | 40 | 0:21 | 4:38 |
| 2561 | 9:04 | 35 | 0:19 | 3:47 |
| 2562 | 93:59 | 126 | 0:56 | 26:03 |
| 2563 | 255:56 | 278 | 2:23 | 96:19 |
| 2564 | 596:59 | 338 | 3:23 | 278:40 |
| 2565 | 291:42 | 248 | 2:03 | 93:46 |
| 2566 | 340:18 | 248 | 2:17 | 152:15 |
| 2567 | 152:36 | 235 | 1:07 | 45:42 |
| 2568 | 146:18 | 247 | 1:09 | 49:05 |
| 2569 | 98:41 | 244 | 0:47 | 36:39 |
| 2570 | 2:24 | 20 | 0:09 | 0:46 |
| 2571 | 2:44 | 19 | 0:11 | 0:57 |
| 2572 | 37:59 | 102 | 0:30 | 12:15 |
| 2573 | 19:01 | 63 | 0:26 | 6:20 |
| 2574 | 0:00 | 0 | 0:00 | 0:00 |
| 2575 | 63:51 | 94 | 0:46 | 20:10 |
| 2576 | 64:32 | 120 | 0:43 | 20:53 |
| 2577 | 61:40 | 143 | 0:44 | 20:10 |
| 2578 | 62:26 | 138 | 0:44 | 20:23 |
| 2579 | 64:21 | 144 | 0:45 | 21:04 |
| 2580 | 64:24 | 127 | 0:43 | 21:00 |
| 2581 | 0:00 | 0 | 0:00 | 0:00 |
| 2582 | 9:46 | 34 | 0:21 | 3:13 |
| 2583 | 38:15 | 123 | 0:32 | 16:56 |
| 2584 | 16:17 | 58 | 0:30 | 5:37 |
| 2585 | 16:05 | 61 | 0:30 | 5:28 |
| 2586 | 46:43 | 110 | 0:43 | 17:06 |
| 2587 | 323:22 | 235 | 2:56 | 126:23 |
| 2588 | 567:42 | 236 | 4:14 | 175:02 |
| 2589 | 212:43 | 209 | 1:39 | 67:14 |
| 2590 | 294:54 | 248 | 1:47 | 85:45 |
| 2591 | 9:40 | 50 | 0:17 | 3:36 |
| 2592 | 9:33 | 45 | 0:17 | 3:43 |
| 2593 | 4:02 | 33 | 0:10 | 1:26 |
| 2594 | 4:41 | 36 | 0:11 | 1:37 |
| 2595 | 35:22 | 96 | 0:25 | 9:16 |
| 2596 | 14:56 | 81 | 0:15 | 4:46 |
| 2597 | 131:28 | 230 | 0:52 | 42:57 |
| 2598 | 0:00 | 0 | 0:00 | 0:00 |
| 2599 | 0:00 | 0 | 0:00 | 0:00 |
| 2600 | 0:00 | 0 | 0:00 | 0:00 |
| 2601 | 0:00 | 0 | 0:00 | 0:00 |
| 2602 | 0:00 | 0 | 0:00 | 0:00 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2603 | 0:00 | 0 | 0:00 | 0:00 |
| 2604 | 0:00 | 0 | 0:00 | 0:00 |
| 2605 | 21:37 | 69 | 0:27 | 8:45 |
| 2606 | 25:05 | 76 | 0:26 | 10:39 |
| 2607 | 27:46 | 80 | 0:27 | 11:49 |
| 2608 | 0:00 | 0 | 0:00 | 0:00 |
| 2609 | 0:00 | 0 | 0:00 | 0:00 |
| 2610 | 158:51 | 159 | 1:24 | 50:57 |
| 2611 | 278:06 | 231 | 1:52 | 87:28 |
| 2612 | 118:18 | 177 | 1:09 | 56:40 |
| 2613 | 547:56 | 295 | 2:45 | 201:44 |
| 2614 | 390:20 | 298 | 2:00 | 170:58 |
| 2615 | 89:32 | 210 | 0:40 | 35:44 |
| 2616 | 79:02 | 224 | 0:36 | 31:57 |
| 2617 | 59:22 | 169 | 0:31 | 25:55 |
| 2618 | 39:57 | 176 | 0:27 | 11:31 |
| 2619 | 8:58 | 62 | 0:11 | 2:54 |
| 2620 | 6:33 | 32 | 0:15 | 2:09 |
| 2621 | 11:17 | 63 | 0:15 | 3:32 |
| 2622 | 5:19 | 40 | 0:10 | 1:37 |
| 2623 | 4:00 | 28 | 0:11 | 1:20 |
| 2624 | 0:00 | 0 | 0:00 | 0:00 |
| 2625 | 0:00 | 0 | 0:00 | 0:00 |
| 2626 | 0:00 | 0 | 0:00 | 0:00 |
| 2627 | 0:00 | 0 | 0:00 | 0:00 |
| 2628 | 0:00 | 0 | 0:00 | 0:00 |
| 2629 | 0:00 | 0 | 0:00 | 0:00 |
| 2630 | 36:49 | 112 | 0:33 | 17:48 |
| 2631 | 4:56 | 55 | 0:09 | 2:47 |
| 2632 | 6:16 | 30 | 0:16 | 1:56 |
| 2633 | 11:10 | 55 | 0:20 | 3:46 |
| 2634 | 6:36 | 26 | 0:19 | 2:15 |
| 2635 | 6:20 | 26 | 0:18 | 2:09 |
| 2636 | 13:09 | 63 | 0:21 | 4:24 |
| 2637 | 13:47 | 70 | 0:21 | 4:37 |
| 2638 | 15:55 | 77 | 0:21 | 5:31 |
| 2639 | 15:25 | 70 | 0:22 | 5:24 |
| 2640 | 15:02 | 69 | 0:22 | 5:17 |
| 2641 | 18:27 | 82 | 0:27 | 6:15 |
| 2642 | 8:32 | 29 | 0:22 | 2:56 |
| 2643 | 47:03 | 124 | 0:46 | 16:01 |
| 2644 | 48:26 | 123 | 0:46 | 16:29 |
| 2645 | 391:02 | 210 | 2:42 | 118:31 |
| 2646 | 237:18 | 176 | 2:11 | 54:22 |
| 2647 | 364:26 | 189 | 2:31 | 80:51 |
| 2648 | 63:05 | 125 | 0:48 | 21:18 |
| 2649 | 145:35 | 230 | 1:10 | 46:07 |
| 2650 | 149:06 | 248 | 1:06 | 53:26 |
| 2651 | 156:37 | 207 | 1:17 | 59:22 |
| 2652 | 72:26 | 172 | 0:58 | 24:48 |
| 2653 | 287:11 | 233 | 2:01 | 104:02 |
| 2654 | 72:19 | 191 | 0:39 | 25:04 |
| 2655 | 69:32 | 161 | 0:46 | 24:15 |
| 2656 | 143:13 | 209 | 1:09 | 46:44 |
| 2657 | 49:51 | 157 | 0:41 | 17:17 |
| 2658 | 25:52 | 84 | 0:32 | 9:40 |
| 2659 | 20:40 | 84 | 0:29 | 7:06 |
| 2660 | 9:19 | 31 | 0:22 | 3:11 |
| 2661 | 0:00 | 0 | 0:00 | 0:00 |
| 2662 | 450:37 | 253 | 2:43 | 214:19 |
| 2663 | 653:02 | 341 | 3:58 | 225:28 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| | Shadow, worst case | | | Shadow, expected values |
|---|---|---|---|---|
| No. | Shadow hours per year [h/year] | Shadow days per year [days/year] | Max shadow hours per day [h/day] | Shadow hours per year [h/year] |
| 2664 | 598:09 | 327 | 4:01 | 192:20 |
| 2665 | 280:40 | 274 | 1:35 | 111:15 |
| 2666 | 0:00 | 0 | 0:00 | 0:00 |
| 2667 | 0:00 | 0 | 0:00 | 0:00 |
| 2668 | 3:25 | 31 | 0:10 | 1:04 |
| 2669 | 3:29 | 30 | 0:11 | 1:05 |
| 2670 | 3:11 | 31 | 0:10 | 0:59 |
| 2671 | 15:40 | 60 | 0:23 | 5:43 |
| 2672 | 16:06 | 62 | 0:23 | 5:54 |
| 2673 | 16:06 | 62 | 0:23 | 5:54 |
| 2674 | 15:48 | 62 | 0:24 | 5:33 |
| 2675 | 14:39 | 57 | 0:23 | 5:04 |
| 2676 | 14:43 | 58 | 0:23 | 5:08 |
| 2677 | 17:14 | 65 | 0:23 | 6:31 |
| 2678 | 17:21 | 64 | 0:24 | 6:33 |
| 2679 | 12:28 | 56 | 0:21 | 4:19 |
| 2680 | 12:51 | 58 | 0:21 | 4:25 |
| 2681 | 20:45 | 103 | 0:22 | 7:15 |
| 2682 | 33:44 | 149 | 0:23 | 12:24 |
| 2683 | 23:08 | 99 | 0:23 | 8:57 |
| 2684 | 28:55 | 123 | 0:24 | 11:00 |
| 2685 | 24:01 | 95 | 0:24 | 9:12 |
| 2686 | 11:30 | 94 | 0:12 | 2:51 |
| 2687 | 12:30 | 100 | 0:12 | 3:08 |
| 2688 | 10:38 | 95 | 0:12 | 2:37 |
| 2689 | 8:17 | 90 | 0:11 | 2:00 |
| 2690 | 7:11 | 87 | 0:10 | 1:44 |

Total amount of flickering on the shadow receptors caused by each WTG

| No. | Name | Worst case [h/year] | Expected [h/year] |
|---|---|---|---|
| 1 | D1 | 420:49 | 174:41 |
| 2 | D2 | 566:52 | 202:04 |
| 3 | D3 | 285:55 | 97:10 |
| 4 | D4 | 568:50 | 202:18 |
| 5 | D5 | 1326:17 | 519:29 |
| 6 | D6 | 1244:20 | 381:52 |
| 7 | D7 | 352:29 | 151:44 |
| 8 | D8 | 385:53 | 154:47 |
| 9 | D9 | 564:07 | 159:33 |
| 10 | D10 | 159:53 | 67:58 |
| 11 | D11 | 795:31 | 281:20 |
| 12 | D12 | 428:07 | 168:13 |
| 13 | D13 | 189:45 | 62:55 |
| 14 | D14 | 227:14 | 73:18 |
| 15 | D15 | 315:49 | 130:54 |
| 16 | D16 | 660:24 | 236:48 |
| 17 | D17 | 486:13 | 171:21 |
| 18 | D18 | 210:48 | 73:39 |
| 19 | D19 | 231:24 | 84:49 |
| 20 | C1 | 313:44 | 106:10 |
| 21 | C2 | 744:00 | 285:45 |
| 22 | C3 | 277:43 | 97:20 |
| 23 | C5 | 133:21 | 48:30 |
| 24 | C6 | 295:15 | 102:17 |
| 25 | C7 | 213:33 | 73:24 |
| 26 | C8 | 268:00 | 90:22 |
| 27 | C10 | 1365:12 | 512:46 |
| 28 | C11 | 628:07 | 223:21 |
| 29 | C12 | 1071:25 | 432:54 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Worst Case

...continued from previous page

| No. | Name | Worst case [h/year] | Expected [h/year] |
|---|---|---|---|
| 30 | C16 | 1886:45 | 700:22 |
| 31 | C19 | 274:31 | 91:25 |
| 32 | B1 | 388:53 | 136:52 |
| 33 | B2 | 999:51 | 322:31 |
| 34 | B7 | 628:00 | 242:30 |
| 35 | B9 | 1298:11 | 397:18 |
| 36 | B10 | 1971:27 | 706:30 |
| 37 | B11 | 1049:46 | 347:49 |
| 38 | B13 | 1353:41 | 443:15 |
| 39 | B14 | 591:20 | 177:39 |
| 40 | B15 | 287:13 | 95:37 |
| 41 | B17 | 309:30 | 110:17 |
| 42 | B18 | 215:46 | 79:40 |
| 43 | B19 | 1164:28 | 391:51 |
| 44 | A2 | 1367:18 | 430:14 |
| 45 | A5 | 368:24 | 140:51 |
| 46 | A6 | 696:22 | 252:36 |
| 47 | A7 | 376:50 | 129:15 |
| 48 | A9 | 893:55 | 376:05 |
| 49 | A10 | 328:33 | 117:00 |
| 50 | A11 | 576:37 | 235:13 |
| 51 | A12 | 265:24 | 83:06 |
| 52 | A15 | 186:26 | 60:05 |
| 53 | A17 | 818:49 | 289:33 |
| 54 | A18 | 394:13 | 156:18 |
| 55 | A19 | 430:03 | 191:17 |
| 56 | C4 | 168:01 | 57:54 |
| 57 | C9 | 245:31 | 93:11 |
| 58 | C13 | 102:43 | 34:01 |
| 59 | C14 | 1407:58 | 473:39 |
| 60 | C15 | 680:24 | 285:34 |
| 61 | C17 | 532:33 | 207:55 |
| 62 | B3 | 1297:07 | 529:12 |
| 63 | B4 | 241:43 | 83:40 |
| 64 | B5 | 1954:50 | 667:18 |
| 65 | B6 | 1206:03 | 459:09 |
| 66 | B8 | 1774:17 | 680:43 |
| 67 | B16 | 795:49 | 271:06 |
| 68 | A1 | 1307:24 | 503:38 |
| 69 | A3 | 197:02 | 63:45 |
| 70 | A8 | 292:13 | 95:04 |
| 71 | A13 | 338:56 | 131:01 |
| 72 | A14 | 986:42 | 327:14 |
| 73 | A16 | 283:25 | 95:24 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

# APPENDIX M SHADOW FLICKER MAIN RESULTS – REAL CASE SCENARIO

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Calculated:
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# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Real Case

### Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

| | |
|---|---|
| Minimum sun height over horizon for influence | 3 ° |
| Day step for calculation | 1 days |
| Time step for calculation | 1 minutes |

Sunshine probability S (Average daily sunshine hours) []

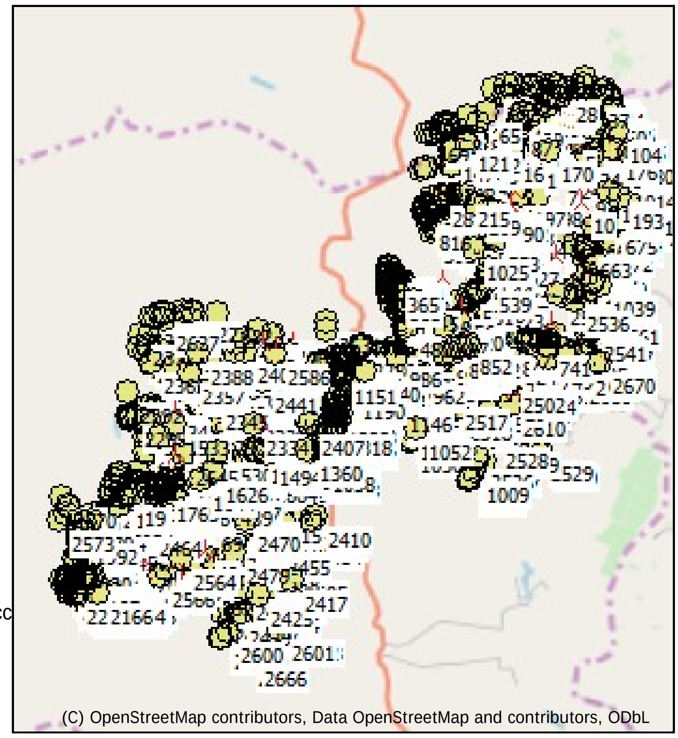
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.16 | 6.18 | 6.35 | 5.70 | 6.96 | 5.65 | 5.58 | 4.98 | 5.13 | 6.14 | 7.61 | 8.24 |

Operational time

| N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | 315 | 1,658 | 1,177 | 888 | 548 | 243 | 133 | 124 | 184 | 779 | 1,457 |

| W | WNW | NW | NNW | Sum |
|---|---|---|---|---|
| 761 | 247 | 75 | 82 | 8,760 |

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Project Wizard Elevation Data Grid (NASADEM (Succ
Obstacles used in calculation
Eye height for map: 1.5 m
Grid resolution: 1.0 m




Scale 1:200,000
New WTG
Shadow receptor

All coordinates are in
UTM (north)-WGS84 Zone: 48

### WTGs

| | Easting | Northing | Z | Row data/Description | WTG type Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Shadow data Calculation distance | RPM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | | | | | [kW] | [m] | [m] | [m] | [RPM] |
| 1 | 854,238 | 1,452,139 | 776.0 | D1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 2 | 853,773 | 1,452,659 | 783.3 | D2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 3 | 854,371 | 1,452,685 | 779.6 | D3 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 4 | 855,081 | 1,452,906 | 796.7 | D4 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 5 | 855,237 | 1,452,594 | 802.7 | D5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 6 | 855,420 | 1,452,224 | 815.0 | D6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 7 | 854,827 | 1,451,695 | 800.1 | D7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 8 | 855,589 | 1,451,811 | 819.2 | D8 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 9 | 855,557 | 1,451,450 | 813.0 | D9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 10 | 855,510 | 1,450,935 | 799.0 | D10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 11 | 853,726 | 1,451,235 | 804.6 | D11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 12 | 853,637 | 1,450,863 | 818.7 | D12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 13 | 853,953 | 1,450,581 | 800.6 | D13 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 14 | 854,277 | 1,450,255 | 772.1 | D14 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 15 | 854,797 | 1,449,575 | 755.8 | D15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 16 | 853,890 | 1,449,411 | 785.9 | D16 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 17 | 853,793 | 1,449,778 | 780.1 | D17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 18 | 852,984 | 1,451,362 | 788.8 | D18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 19 | 852,619 | 1,451,803 | 786.6 | D19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 20 | 853,064 | 1,450,371 | 804.6 | C1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 21 | 852,149 | 1,449,667 | 769.9 | C2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 22 | 851,858 | 1,448,886 | 762.6 | C3 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 23 | 853,650 | 1,448,412 | 737.8 | C5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 24 | 853,819 | 1,448,854 | 778.7 | C6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 25 | 853,503 | 1,447,664 | 745.4 | C7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 26 | 854,303 | 1,447,663 | 761.0 | C8 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 27 | 854,269 | 1,446,917 | 781.0 | C10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 28 | 853,423 | 1,446,806 | 758.3 | C11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 29 | 853,763 | 1,446,020 | 746.4 | C12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 30 | 852,210 | 1,445,365 | 749.5 | C16 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| | | | | | WTG type | | | | | | Shadow data | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Easting | Northing | Z | Row data/Description | Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Calculation distance | RPM |
| | | | [m] | | | | | [kW] | [m] | [m] | [m] | [RPM] |
| 31 | 852,278 | 1,445,974 | 734.6 | C19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 32 | 847,925 | 1,447,138 | 729.1 | B1 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 33 | 847,463 | 1,446,986 | 700.3 | B2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 34 | 844,831 | 1,445,373 | 655.4 | B7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 35 | 844,818 | 1,444,179 | 673.2 | B9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 36 | 845,656 | 1,444,245 | 688.7 | B10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 37 | 845,338 | 1,444,410 | 675.6 | B11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 38 | 846,270 | 1,444,717 | 675.9 | B13 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 39 | 845,751 | 1,445,162 | 655.7 | B14 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 40 | 847,550 | 1,445,475 | 680.0 | B15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 41 | 847,491 | 1,446,156 | 628.2 | B17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 42 | 847,912 | 1,445,475 | 704.0 | B18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 43 | 848,481 | 1,446,623 | 711.4 | B19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 44 | 846,071 | 1,443,400 | 687.3 | A2 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 45 | 843,493 | 1,441,916 | 624.0 | A5 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 46 | 844,265 | 1,442,495 | 649.7 | A6 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 47 | 843,006 | 1,442,177 | 623.5 | A7 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 48 | 844,931 | 1,441,379 | 653.2 | A9 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 49 | 845,688 | 1,441,648 | 667.7 | A10 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 50 | 846,237 | 1,441,903 | 711.0 | A11 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 51 | 847,142 | 1,442,842 | 697.1 | A12 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 52 | 846,049 | 1,440,780 | 660.4 | A15 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 53 | 846,819 | 1,442,473 | 704.7 | A17 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 54 | 843,046 | 1,441,629 | 597.8 | A18 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 55 | 844,258 | 1,440,850 | 622.6 | A19 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 56 | 852,387 | 1,448,118 | 756.9 | C4 | No | Envision | -2,650 | 2,650 | 141.0 | 130.0 | 2,500 | 0.0 |
| 57 | 854,775 | 1,447,751 | 760.1 | C9 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 58 | 853,328 | 1,445,045 | 756.5 | C13 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 59 | 853,282 | 1,445,629 | 761.2 | C14 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 60 | 853,212 | 1,446,272 | 762.5 | C15 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 61 | 851,878 | 1,446,443 | 742.0 | C17 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 62 | 847,116 | 1,447,121 | 673.4 | B3 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 63 | 846,486 | 1,446,202 | 627.8 | B4 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 64 | 844,935 | 1,446,396 | 622.3 | B5 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 65 | 845,275 | 1,445,950 | 633.3 | B6 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 66 | 844,933 | 1,444,699 | 652.4 | B8 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 67 | 847,181 | 1,444,943 | 676.3 | B16 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 68 | 847,171 | 1,443,679 | 695.8 | A1 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 69 | 845,738 | 1,442,480 | 651.3 | A3 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 70 | 844,059 | 1,441,327 | 627.4 | A8 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 71 | 846,849 | 1,441,206 | 685.3 | A13 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 72 | 846,844 | 1,440,509 | 678.3 | A14 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |
| 73 | 845,028 | 1,440,930 | 637.5 | A16 | No | Envision | -3,000 | 3,000 | 156.0 | 130.0 | 2,500 | 0.0 |

### Shadow receptor-Input

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1 | 855,607 | 1,454,197 | 794.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2 | 855,649 | 1,454,043 | 788.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 3 | 855,539 | 1,454,106 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 4 | 854,743 | 1,454,059 | 745.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 5 | 854,838 | 1,454,025 | 749.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 6 | 854,389 | 1,454,069 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 7 | 854,226 | 1,453,999 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 8 | 854,173 | 1,453,995 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 9 | 854,038 | 1,454,017 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 10 | 853,705 | 1,454,091 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 11 | 853,498 | 1,454,053 | 720.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 12 | 853,134 | 1,453,865 | 720.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 13 | 853,148 | 1,453,877 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 14 | 853,423 | 1,453,782 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 15 | 853,525 | 1,453,673 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 16 | 853,543 | 1,453,775 | 751.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 17 | 854,319 | 1,453,789 | 728.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 18 | 854,265 | 1,453,620 | 748.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 19 | 854,461 | 1,453,852 | 736.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 20 | 854,628 | 1,453,833 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 21 | 854,679 | 1,453,761 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 22 | 854,717 | 1,453,793 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 23 | 854,727 | 1,453,706 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 24 | 854,735 | 1,453,664 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 25 | 854,670 | 1,453,529 | 783.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 26 | 854,796 | 1,453,693 | 758.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 27 | 854,956 | 1,453,672 | 771.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 28 | 854,975 | 1,453,861 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 29 | 855,042 | 1,453,534 | 785.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 30 | 855,124 | 1,453,571 | 790.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 31 | 855,344 | 1,453,709 | 796.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 32 | 855,175 | 1,453,958 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 33 | 855,407 | 1,453,761 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 34 | 855,306 | 1,454,016 | 761.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 35 | 855,803 | 1,453,793 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 36 | 855,860 | 1,453,715 | 780.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 37 | 855,852 | 1,453,695 | 781.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 38 | 855,831 | 1,453,633 | 783.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 39 | 856,053 | 1,453,627 | 786.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 40 | 856,115 | 1,453,655 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 41 | 856,165 | 1,453,766 | 786.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 42 | 856,057 | 1,453,868 | 786.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 43 | 856,086 | 1,453,934 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 44 | 856,270 | 1,453,756 | 775.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 45 | 856,223 | 1,453,737 | 779.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 46 | 856,528 | 1,453,356 | 782.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 47 | 856,433 | 1,453,310 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 48 | 856,374 | 1,453,298 | 778.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 49 | 856,352 | 1,453,275 | 775.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 50 | 856,347 | 1,453,289 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 51 | 855,929 | 1,453,442 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 52 | 856,072 | 1,453,412 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 53 | 856,315 | 1,453,425 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 54 | 856,087 | 1,453,524 | 780.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 55 | 855,182 | 1,453,394 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 56 | 855,201 | 1,453,412 | 781.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 57 | 854,943 | 1,453,317 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 58 | 854,551 | 1,453,442 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 59 | 854,542 | 1,453,440 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 60 | 854,554 | 1,453,452 | 785.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 61 | 854,442 | 1,453,225 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 62 | 853,980 | 1,453,320 | 773.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 63 | 853,980 | 1,453,225 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 64 | 853,711 | 1,453,433 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 65 | 852,987 | 1,453,305 | 735.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 66 | 852,461 | 1,453,185 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 67 | 851,464 | 1,452,693 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 68 | 851,494 | 1,452,668 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 69 | 851,657 | 1,452,781 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 70 | 851,686 | 1,452,751 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 71 | 851,674 | 1,452,722 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 72 | 851,768 | 1,452,819 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 73 | 851,751 | 1,452,843 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 74 | 851,770 | 1,452,888 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 75 | 851,828 | 1,452,885 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 76 | 851,918 | 1,452,911 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 77 | 851,839 | 1,452,989 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 78 | 851,910 | 1,453,016 | 748.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 79 | 852,193 | 1,452,853 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 80 | 852,290 | 1,452,628 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 81 | 852,405 | 1,452,628 | 776.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 82 | 852,634 | 1,452,661 | 780.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 83 | 852,708 | 1,452,607 | 783.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 84 | 852,752 | 1,453,024 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 85 | 852,782 | 1,453,028 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 86 | 852,787 | 1,453,027 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 87 | 853,799 | 1,452,931 | 759.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 88 | 853,774 | 1,453,098 | 744.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 89 | 854,138 | 1,453,173 | 766.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 90 | 854,158 | 1,453,125 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 91 | 854,246 | 1,453,102 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 92 | 854,271 | 1,453,126 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 93 | 854,281 | 1,453,111 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 94 | 854,446 | 1,452,948 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 95 | 855,574 | 1,453,053 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 96 | 855,861 | 1,453,095 | 770.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 97 | 855,789 | 1,453,035 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 98 | 855,765 | 1,453,114 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 99 | 855,840 | 1,452,936 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 100 | 855,978 | 1,453,022 | 781.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 101 | 855,970 | 1,452,872 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 102 | 856,160 | 1,452,911 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 103 | 856,137 | 1,452,975 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 104 | 856,421 | 1,452,851 | 786.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 105 | 856,544 | 1,452,882 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 106 | 856,333 | 1,452,681 | 807.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 107 | 856,258 | 1,452,499 | 823.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 108 | 855,887 | 1,452,721 | 807.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 109 | 855,736 | 1,452,733 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 110 | 855,905 | 1,452,451 | 805.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 111 | 855,487 | 1,452,523 | 795.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 112 | 852,707 | 1,452,475 | 781.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 113 | 852,667 | 1,452,478 | 782.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 114 | 852,617 | 1,452,461 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 115 | 852,536 | 1,452,493 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 116 | 852,522 | 1,452,505 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 117 | 852,471 | 1,452,440 | 791.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 118 | 852,459 | 1,452,439 | 791.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 119 | 852,422 | 1,452,468 | 792.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 120 | 852,385 | 1,452,506 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 121 | 852,437 | 1,452,541 | 789.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 122 | 852,314 | 1,452,497 | 787.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 123 | 852,323 | 1,452,455 | 790.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 124 | 852,341 | 1,452,414 | 788.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 125 | 852,290 | 1,452,400 | 789.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 126 | 852,160 | 1,452,399 | 786.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 127 | 852,196 | 1,452,445 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 128 | 852,236 | 1,452,478 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 129 | 852,141 | 1,452,447 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 130 | 852,089 | 1,452,427 | 778.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 131 | 852,079 | 1,452,432 | 777.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 132 | 852,077 | 1,452,399 | 776.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 133 | 852,080 | 1,452,375 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 134 | 852,077 | 1,452,351 | 781.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 135 | 852,063 | 1,452,345 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 136 | 852,113 | 1,452,314 | 782.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 137 | 852,122 | 1,452,361 | 784.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 138 | 852,172 | 1,452,347 | 785.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 139 | 852,183 | 1,452,350 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 140 | 852,210 | 1,452,354 | 786.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 141 | 852,243 | 1,452,358 | 788.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 142 | 852,260 | 1,452,360 | 789.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 143 | 852,304 | 1,452,364 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 144 | 852,160 | 1,452,313 | 782.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 145 | 852,188 | 1,452,300 | 782.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 146 | 852,029 | 1,452,299 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 147 | 852,025 | 1,452,280 | 787.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 148 | 852,010 | 1,452,264 | 789.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 149 | 852,027 | 1,452,207 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 150 | 852,073 | 1,452,245 | 783.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 151 | 852,089 | 1,452,260 | 783.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 152 | 852,006 | 1,452,103 | 782.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 153 | 852,009 | 1,452,113 | 781.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 154 | 852,046 | 1,452,028 | 782.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 155 | 852,012 | 1,451,868 | 775.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 156 | 852,005 | 1,451,869 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 157 | 852,086 | 1,451,880 | 777.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 158 | 852,314 | 1,452,225 | 780.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 159 | 852,467 | 1,452,272 | 785.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 160 | 852,641 | 1,452,161 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 161 | 853,600 | 1,452,268 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 162 | 853,453 | 1,452,606 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 163 | 853,641 | 1,452,300 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 164 | 854,353 | 1,452,454 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 165 | 854,376 | 1,452,507 | 769.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 166 | 854,273 | 1,452,359 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 167 | 854,222 | 1,452,355 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 168 | 854,245 | 1,452,308 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 169 | 854,568 | 1,452,273 | 773.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 170 | 854,620 | 1,452,298 | 776.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 171 | 855,313 | 1,452,283 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 172 | 855,364 | 1,452,465 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 173 | 855,277 | 1,452,642 | 807.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 174 | 855,402 | 1,452,377 | 808.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 175 | 856,210 | 1,452,393 | 823.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 176 | 856,356 | 1,452,403 | 822.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 177 | 856,803 | 1,452,284 | 831.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 178 | 856,894 | 1,452,278 | 828.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 179 | 856,802 | 1,452,137 | 831.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 180 | 856,792 | 1,452,233 | 834.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 181 | 856,738 | 1,452,287 | 829.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 182 | 856,694 | 1,452,266 | 827.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 183 | 856,599 | 1,452,268 | 826.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 184 | 856,375 | 1,452,252 | 816.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 185 | 856,270 | 1,452,251 | 818.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 186 | 856,270 | 1,452,220 | 816.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 187 | 856,151 | 1,452,148 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 188 | 856,058 | 1,452,151 | 801.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 189 | 856,223 | 1,452,067 | 798.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 190 | 856,970 | 1,451,222 | 776.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 191 | 856,843 | 1,450,898 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 192 | 856,719 | 1,451,320 | 786.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 193 | 856,510 | 1,451,045 | 784.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 194 | 856,278 | 1,451,035 | 787.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 195 | 856,251 | 1,451,255 | 787.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 196 | 853,786 | 1,451,240 | 806.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 197 | 853,917 | 1,451,093 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 198 | 854,353 | 1,451,071 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 199 | 852,908 | 1,450,812 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 200 | 852,873 | 1,450,851 | 803.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 201 | 852,865 | 1,450,817 | 806.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 202 | 852,858 | 1,450,758 | 812.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 203 | 852,866 | 1,450,696 | 812.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 204 | 852,806 | 1,450,760 | 814.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 205 | 852,787 | 1,450,774 | 814.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 206 | 852,772 | 1,450,798 | 813.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 207 | 852,768 | 1,450,823 | 812.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 208 | 852,789 | 1,450,910 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 209 | 852,750 | 1,450,832 | 811.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 210 | 852,767 | 1,450,918 | 805.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 211 | 852,680 | 1,451,145 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 212 | 852,478 | 1,451,046 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 213 | 852,454 | 1,451,055 | 792.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 214 | 852,439 | 1,451,059 | 790.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 215 | 852,432 | 1,451,057 | 790.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 216 | 852,406 | 1,451,063 | 789.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 217 | 852,366 | 1,451,050 | 789.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 218 | 852,352 | 1,451,031 | 788.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 219 | 852,417 | 1,451,107 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 220 | 852,380 | 1,451,105 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 221 | 852,374 | 1,451,104 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 222 | 852,361 | 1,451,103 | 793.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 223 | 852,353 | 1,451,105 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 224 | 852,329 | 1,451,106 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 225 | 852,335 | 1,451,167 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 226 | 852,350 | 1,451,167 | 797.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 227 | 852,268 | 1,451,056 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 228 | 852,261 | 1,451,059 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 229 | 852,257 | 1,451,104 | 792.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 230 | 852,253 | 1,451,098 | 792.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 231 | 852,223 | 1,451,099 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 232 | 852,233 | 1,451,107 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 233 | 852,184 | 1,451,090 | 792.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 234 | 852,199 | 1,451,097 | 792.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 235 | 852,175 | 1,451,102 | 791.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 236 | 852,139 | 1,451,105 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 237 | 852,104 | 1,451,088 | 792.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 238 | 852,107 | 1,451,053 | 792.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 239 | 852,136 | 1,451,055 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 240 | 852,154 | 1,451,054 | 791.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 241 | 852,001 | 1,451,133 | 796.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 242 | 851,973 | 1,451,136 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 243 | 852,005 | 1,451,091 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 244 | 852,061 | 1,451,038 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 245 | 852,046 | 1,451,045 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 246 | 852,038 | 1,451,045 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 247 | 852,026 | 1,451,043 | 795.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 248 | 852,016 | 1,451,046 | 795.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 249 | 852,009 | 1,451,051 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 250 | 852,005 | 1,451,050 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 251 | 851,992 | 1,451,048 | 797.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 252 | 851,986 | 1,451,046 | 798.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 253 | 851,976 | 1,451,039 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 254 | 851,971 | 1,451,034 | 800.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 255 | 851,963 | 1,451,029 | 800.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 256 | 851,953 | 1,451,027 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 257 | 851,960 | 1,451,052 | 801.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 258 | 851,956 | 1,451,049 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 259 | 851,948 | 1,451,045 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 260 | 851,904 | 1,451,046 | 803.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 261 | 851,891 | 1,451,046 | 802.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 262 | 851,874 | 1,451,041 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 263 | 851,893 | 1,451,027 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 264 | 851,862 | 1,451,041 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 265 | 851,844 | 1,451,030 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 266 | 851,825 | 1,451,042 | 800.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 267 | 851,848 | 1,450,994 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 268 | 851,854 | 1,450,998 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 269 | 851,828 | 1,450,980 | 801.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 270 | 851,807 | 1,451,031 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 271 | 851,900 | 1,450,990 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 272 | 851,914 | 1,450,992 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 273 | 851,932 | 1,451,000 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 274 | 851,941 | 1,451,007 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 275 | 851,935 | 1,451,008 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 276 | 851,909 | 1,451,092 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 277 | 851,895 | 1,451,074 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 278 | 851,879 | 1,451,085 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 279 | 851,842 | 1,451,081 | 801.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 280 | 851,816 | 1,451,079 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 281 | 851,742 | 1,451,097 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 282 | 851,938 | 1,450,960 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 283 | 851,909 | 1,450,943 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 284 | 851,873 | 1,450,926 | 806.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 285 | 851,819 | 1,450,914 | 805.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 286 | 851,713 | 1,450,865 | 804.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 287 | 851,757 | 1,450,857 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 288 | 851,957 | 1,450,926 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 289 | 851,932 | 1,450,919 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 290 | 851,917 | 1,450,913 | 803.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 291 | 851,904 | 1,450,913 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 292 | 851,944 | 1,450,883 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 293 | 851,933 | 1,450,881 | 798.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 294 | 851,917 | 1,450,875 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 295 | 851,901 | 1,450,861 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 296 | 851,843 | 1,450,849 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 297 | 851,812 | 1,450,838 | 805.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 298 | 851,801 | 1,450,835 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 299 | 851,776 | 1,450,828 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 300 | 851,721 | 1,450,805 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 301 | 851,617 | 1,450,838 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 302 | 851,639 | 1,450,849 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 303 | 851,654 | 1,450,836 | 803.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 304 | 851,587 | 1,450,825 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 305 | 851,576 | 1,450,823 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 306 | 851,559 | 1,450,812 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 307 | 851,540 | 1,450,802 | 805.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 308 | 851,529 | 1,450,802 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 309 | 851,524 | 1,450,771 | 803.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 310 | 851,537 | 1,450,778 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 311 | 851,554 | 1,450,788 | 804.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 312 | 851,552 | 1,450,779 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 313 | 851,604 | 1,450,802 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 314 | 851,564 | 1,450,752 | 799.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 315 | 851,586 | 1,450,765 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 316 | 851,601 | 1,450,770 | 801.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 317 | 851,642 | 1,450,778 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 318 | 851,544 | 1,450,739 | 798.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 319 | 851,480 | 1,450,779 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 320 | 851,467 | 1,450,780 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 321 | 851,452 | 1,450,771 | 803.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 322 | 851,439 | 1,450,763 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 323 | 851,416 | 1,450,764 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 324 | 851,380 | 1,450,754 | 800.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 325 | 851,374 | 1,450,753 | 799.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 326 | 851,355 | 1,450,747 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 327 | 851,341 | 1,450,712 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 328 | 851,362 | 1,450,717 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 329 | 851,557 | 1,451,003 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 330 | 851,562 | 1,450,967 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 331 | 851,539 | 1,450,919 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 332 | 850,467 | 1,449,173 | 739.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 333 | 850,496 | 1,449,149 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 334 | 850,473 | 1,449,151 | 739.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 335 | 850,449 | 1,449,090 | 746.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 336 | 850,429 | 1,449,022 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 337 | 850,433 | 1,448,953 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 338 | 850,506 | 1,449,102 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 339 | 850,516 | 1,449,064 | 737.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 340 | 850,498 | 1,449,010 | 739.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 341 | 850,475 | 1,448,924 | 747.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 342 | 850,495 | 1,448,904 | 748.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 343 | 850,487 | 1,448,893 | 749.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 344 | 850,586 | 1,449,013 | 737.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 345 | 850,588 | 1,448,989 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 346 | 850,596 | 1,448,897 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 347 | 850,604 | 1,448,882 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 348 | 850,540 | 1,448,856 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 349 | 850,481 | 1,448,855 | 748.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 350 | 850,494 | 1,448,857 | 747.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 351 | 850,442 | 1,448,849 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 352 | 850,639 | 1,448,865 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 353 | 850,672 | 1,448,861 | 735.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 354 | 850,691 | 1,448,845 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 355 | 850,703 | 1,448,856 | 733.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 356 | 850,776 | 1,448,848 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 357 | 850,616 | 1,448,796 | 741.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 358 | 850,648 | 1,448,804 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 359 | 850,620 | 1,448,769 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 360 | 850,633 | 1,448,742 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 361 | 850,677 | 1,448,754 | 739.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 362 | 850,776 | 1,448,752 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 363 | 850,720 | 1,448,707 | 740.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 364 | 850,575 | 1,448,804 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 365 | 850,558 | 1,448,802 | 743.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 366 | 850,523 | 1,448,804 | 746.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 367 | 850,500 | 1,448,805 | 749.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 368 | 850,467 | 1,448,816 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 369 | 850,502 | 1,448,741 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 370 | 850,470 | 1,448,749 | 754.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 371 | 850,506 | 1,448,777 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 372 | 850,714 | 1,448,813 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 373 | 850,565 | 1,448,689 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 374 | 850,480 | 1,448,695 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 375 | 850,666 | 1,448,692 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 376 | 850,802 | 1,448,685 | 741.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 377 | 850,846 | 1,448,682 | 738.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 378 | 850,877 | 1,448,712 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 379 | 850,877 | 1,448,644 | 733.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 380 | 850,846 | 1,448,641 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 381 | 850,794 | 1,448,647 | 740.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 382 | 850,788 | 1,448,605 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 383 | 850,767 | 1,448,599 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 384 | 850,704 | 1,448,601 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 385 | 850,649 | 1,448,599 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 386 | 850,554 | 1,448,597 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 387 | 850,497 | 1,448,590 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 388 | 850,481 | 1,448,586 | 749.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 389 | 850,449 | 1,448,590 | 750.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 390 | 850,470 | 1,448,660 | 753.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 391 | 850,903 | 1,448,557 | 730.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 392 | 850,841 | 1,448,551 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 393 | 850,829 | 1,448,553 | 733.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 394 | 850,812 | 1,448,543 | 735.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 395 | 850,719 | 1,448,555 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 396 | 850,697 | 1,448,524 | 741.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 397 | 850,672 | 1,448,504 | 738.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 398 | 850,579 | 1,448,550 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 399 | 850,542 | 1,448,547 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 400 | 850,534 | 1,448,542 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 401 | 850,538 | 1,448,528 | 742.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 402 | 850,577 | 1,448,580 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 403 | 850,506 | 1,448,494 | 739.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 404 | 850,546 | 1,448,268 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 405 | 850,681 | 1,448,277 | 737.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 406 | 850,705 | 1,448,067 | 756.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 407 | 850,733 | 1,448,075 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 408 | 850,716 | 1,448,087 | 756.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 409 | 850,791 | 1,448,079 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 410 | 850,769 | 1,448,116 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 411 | 850,768 | 1,448,138 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 412 | 850,734 | 1,448,138 | 755.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 413 | 850,838 | 1,448,041 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 414 | 850,842 | 1,447,993 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 415 | 850,879 | 1,447,989 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 416 | 850,906 | 1,447,982 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 417 | 850,889 | 1,448,049 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 418 | 850,858 | 1,448,031 | 752.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 419 | 850,854 | 1,448,089 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 420 | 850,906 | 1,448,118 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 421 | 850,884 | 1,448,150 | 743.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 422 | 850,851 | 1,448,125 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 423 | 850,812 | 1,448,186 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 424 | 850,851 | 1,448,194 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 425 | 850,851 | 1,448,240 | 739.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 426 | 850,905 | 1,448,177 | 741.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 427 | 850,927 | 1,448,191 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 428 | 850,941 | 1,448,149 | 737.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 429 | 850,947 | 1,448,091 | 740.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 430 | 850,999 | 1,448,062 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 431 | 851,009 | 1,448,245 | 731.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 432 | 851,010 | 1,448,229 | 732.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 433 | 851,012 | 1,448,198 | 734.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 434 | 851,070 | 1,448,218 | 729.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 435 | 851,056 | 1,448,197 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 436 | 851,084 | 1,448,234 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 437 | 851,094 | 1,448,208 | 730.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 438 | 851,060 | 1,448,271 | 727.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 439 | 851,061 | 1,448,288 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 440 | 851,092 | 1,448,290 | 727.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 441 | 851,017 | 1,448,313 | 730.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 442 | 851,032 | 1,448,275 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 443 | 851,008 | 1,448,259 | 730.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 444 | 851,006 | 1,448,332 | 730.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 445 | 851,103 | 1,448,336 | 727.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 446 | 851,042 | 1,448,330 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 447 | 851,168 | 1,448,302 | 724.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 448 | 851,234 | 1,448,247 | 721.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 449 | 850,973 | 1,448,062 | 743.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 450 | 850,980 | 1,447,988 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 451 | 851,030 | 1,448,000 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 452 | 851,044 | 1,447,998 | 745.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 453 | 851,064 | 1,447,991 | 745.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 454 | 850,991 | 1,447,960 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 455 | 850,953 | 1,447,952 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 456 | 850,929 | 1,447,885 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 457 | 850,894 | 1,447,887 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 458 | 850,954 | 1,447,888 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 459 | 850,977 | 1,447,895 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 460 | 851,041 | 1,447,897 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 461 | 851,064 | 1,447,899 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 462 | 851,063 | 1,447,860 | 750.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 463 | 851,022 | 1,447,844 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 464 | 850,968 | 1,447,843 | 754.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 465 | 850,908 | 1,447,847 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 466 | 850,839 | 1,447,814 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 467 | 851,021 | 1,448,161 | 737.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 468 | 851,029 | 1,448,084 | 741.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 469 | 851,028 | 1,448,032 | 743.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 470 | 851,058 | 1,447,965 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 471 | 851,167 | 1,447,915 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 472 | 851,172 | 1,447,942 | 740.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 473 | 850,984 | 1,447,743 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 474 | 850,964 | 1,447,781 | 754.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 475 | 850,914 | 1,447,730 | 754.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 476 | 850,905 | 1,447,699 | 752.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 477 | 850,955 | 1,447,679 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 478 | 850,997 | 1,447,700 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 479 | 850,991 | 1,447,681 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 480 | 850,944 | 1,447,641 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 481 | 850,991 | 1,447,622 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 482 | 850,909 | 1,447,642 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 483 | 850,843 | 1,447,625 | 739.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 484 | 850,930 | 1,447,530 | 740.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 485 | 850,993 | 1,447,536 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 486 | 851,025 | 1,447,543 | 745.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 487 | 850,972 | 1,447,470 | 738.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 488 | 850,935 | 1,447,444 | 734.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 489 | 851,457 | 1,448,121 | 714.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 490 | 851,456 | 1,448,143 | 715.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 491 | 851,441 | 1,448,225 | 712.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 492 | 851,351 | 1,448,208 | 714.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 493 | 851,939 | 1,447,800 | 732.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 494 | 851,931 | 1,447,739 | 730.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 495 | 851,979 | 1,447,753 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 496 | 851,964 | 1,447,702 | 728.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 497 | 851,938 | 1,447,694 | 726.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 498 | 851,893 | 1,447,697 | 722.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 499 | 851,872 | 1,447,591 | 718.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 500 | 851,964 | 1,447,583 | 715.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 501 | 851,991 | 1,447,642 | 722.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 502 | 852,035 | 1,447,698 | 728.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 503 | 851,998 | 1,447,690 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 504 | 852,077 | 1,447,692 | 730.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 505 | 852,092 | 1,447,696 | 731.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 506 | 852,137 | 1,447,695 | 730.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 507 | 852,186 | 1,447,708 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 508 | 852,222 | 1,447,702 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 509 | 852,256 | 1,447,714 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 510 | 852,303 | 1,447,726 | 728.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 511 | 852,356 | 1,447,731 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 512 | 852,373 | 1,447,740 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 513 | 852,243 | 1,447,759 | 732.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 514 | 852,131 | 1,447,732 | 730.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 515 | 851,991 | 1,447,812 | 735.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 516 | 852,241 | 1,447,886 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 517 | 852,299 | 1,447,768 | 731.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 518 | 852,346 | 1,447,785 | 731.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 519 | 852,396 | 1,447,804 | 731.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 520 | 852,342 | 1,447,832 | 735.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 521 | 852,332 | 1,447,879 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 522 | 852,442 | 1,447,777 | 727.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 523 | 852,475 | 1,447,775 | 724.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 524 | 852,506 | 1,447,791 | 725.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 525 | 852,461 | 1,447,829 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 526 | 852,571 | 1,447,843 | 727.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 527 | 852,625 | 1,447,861 | 727.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 528 | 852,641 | 1,447,949 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 529 | 852,393 | 1,448,373 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 530 | 852,533 | 1,448,376 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 531 | 852,567 | 1,448,474 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 532 | 852,676 | 1,448,523 | 771.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 533 | 852,733 | 1,448,543 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 534 | 852,772 | 1,448,578 | 772.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 535 | 852,822 | 1,448,652 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 536 | 852,873 | 1,448,540 | 774.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 537 | 852,819 | 1,448,515 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 538 | 852,791 | 1,448,493 | 770.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 539 | 853,026 | 1,448,836 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 540 | 853,030 | 1,449,000 | 773.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 541 | 852,874 | 1,449,018 | 757.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 542 | 853,101 | 1,449,204 | 773.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 543 | 853,147 | 1,449,208 | 773.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 544 | 853,085 | 1,449,174 | 772.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 545 | 853,071 | 1,449,138 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 546 | 853,177 | 1,449,380 | 781.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 547 | 853,285 | 1,449,297 | 778.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 548 | 853,296 | 1,449,566 | 791.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 549 | 853,373 | 1,449,709 | 802.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 550 | 853,426 | 1,449,685 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 551 | 853,432 | 1,449,727 | 803.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 552 | 853,293 | 1,449,841 | 797.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 553 | 853,249 | 1,449,893 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 554 | 853,247 | 1,449,900 | 803.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 555 | 853,242 | 1,449,907 | 803.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 556 | 853,214 | 1,449,932 | 801.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 557 | 853,207 | 1,449,937 | 800.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 558 | 853,199 | 1,449,936 | 799.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 559 | 853,192 | 1,449,941 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 560 | 853,202 | 1,449,988 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 561 | 853,220 | 1,449,977 | 796.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 562 | 853,164 | 1,449,963 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 563 | 853,138 | 1,449,960 | 806.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 564 | 853,127 | 1,449,963 | 807.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 565 | 853,110 | 1,449,972 | 808.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 566 | 853,084 | 1,449,977 | 808.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 567 | 853,075 | 1,449,978 | 808.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 568 | 853,049 | 1,449,981 | 809.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 569 | 853,009 | 1,449,973 | 809.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 570 | 853,003 | 1,449,944 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 571 | 853,005 | 1,450,018 | 814.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 572 | 852,998 | 1,450,033 | 814.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 573 | 852,992 | 1,450,046 | 814.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 574 | 852,977 | 1,450,051 | 814.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 575 | 852,968 | 1,450,060 | 814.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 576 | 852,957 | 1,450,073 | 814.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 577 | 853,007 | 1,450,106 | 812.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 578 | 853,034 | 1,450,046 | 812.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 579 | 852,866 | 1,449,971 | 805.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 580 | 852,853 | 1,449,970 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 581 | 852,838 | 1,449,954 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 582 | 852,544 | 1,450,478 | 774.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 583 | 852,501 | 1,450,424 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 584 | 852,495 | 1,450,648 | 783.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 585 | 851,999 | 1,449,940 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 586 | 851,695 | 1,450,206 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 587 | 851,704 | 1,450,269 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 588 | 851,806 | 1,450,390 | 761.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 589 | 851,812 | 1,450,385 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 590 | 851,742 | 1,450,417 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 591 | 851,725 | 1,450,461 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 592 | 851,510 | 1,450,110 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 593 | 851,565 | 1,450,581 | 786.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 594 | 851,456 | 1,450,573 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 595 | 851,843 | 1,450,890 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 596 | 851,864 | 1,450,900 | 805.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 597 | 851,873 | 1,450,902 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 598 | 851,883 | 1,450,906 | 804.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 599 | 851,980 | 1,450,887 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 600 | 851,980 | 1,450,836 | 794.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 601 | 851,960 | 1,450,818 | 797.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 602 | 851,967 | 1,450,791 | 798.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 603 | 851,941 | 1,450,859 | 795.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 604 | 851,866 | 1,450,831 | 801.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 605 | 851,878 | 1,450,830 | 800.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 606 | 851,842 | 1,450,824 | 803.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 607 | 851,824 | 1,450,814 | 805.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 608 | 851,794 | 1,450,801 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 609 | 851,777 | 1,450,791 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 610 | 851,899 | 1,450,804 | 802.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 611 | 851,888 | 1,450,799 | 802.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 612 | 851,879 | 1,450,792 | 803.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 613 | 851,857 | 1,450,785 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 614 | 851,727 | 1,450,710 | 796.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 615 | 851,740 | 1,450,719 | 797.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 616 | 851,741 | 1,450,745 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 617 | 851,775 | 1,450,732 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 618 | 851,781 | 1,450,742 | 800.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 619 | 851,795 | 1,450,727 | 801.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 620 | 851,888 | 1,450,761 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 621 | 851,901 | 1,450,777 | 802.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 622 | 851,914 | 1,450,782 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 623 | 851,957 | 1,450,732 | 793.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 624 | 851,928 | 1,450,746 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 625 | 851,886 | 1,450,736 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 626 | 851,895 | 1,450,715 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 627 | 851,915 | 1,450,723 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 628 | 851,873 | 1,450,711 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 629 | 851,862 | 1,450,704 | 798.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 630 | 851,851 | 1,450,701 | 798.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 631 | 851,834 | 1,450,715 | 800.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 632 | 851,823 | 1,450,689 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 633 | 851,816 | 1,450,709 | 799.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 634 | 851,783 | 1,450,696 | 797.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 635 | 851,800 | 1,450,679 | 796.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 636 | 851,720 | 1,450,644 | 786.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 637 | 851,749 | 1,450,677 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 638 | 851,699 | 1,450,737 | 797.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 639 | 851,859 | 1,450,757 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 640 | 851,844 | 1,450,777 | 802.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 641 | 851,805 | 1,450,768 | 802.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 642 | 851,792 | 1,450,762 | 801.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 643 | 852,375 | 1,450,901 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 644 | 852,448 | 1,450,686 | 780.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 645 | 855,049 | 1,450,156 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 646 | 855,165 | 1,450,083 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 647 | 856,170 | 1,449,224 | 758.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 648 | 856,152 | 1,449,227 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 649 | 856,080 | 1,449,280 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 650 | 856,020 | 1,449,284 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 651 | 855,958 | 1,449,368 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 652 | 855,927 | 1,449,399 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 653 | 855,854 | 1,449,418 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 654 | 855,832 | 1,449,451 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 655 | 855,817 | 1,449,470 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 656 | 855,727 | 1,449,612 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 657 | 855,697 | 1,449,636 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 658 | 855,692 | 1,449,642 | 756.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 659 | 855,684 | 1,449,645 | 754.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 660 | 855,566 | 1,449,535 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 661 | 855,589 | 1,449,583 | 744.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 662 | 855,638 | 1,449,657 | 747.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 663 | 855,695 | 1,449,758 | 752.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 664 | 855,678 | 1,449,821 | 744.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 665 | 855,340 | 1,449,831 | 726.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 666 | 855,760 | 1,450,302 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 667 | 855,890 | 1,450,344 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 668 | 855,876 | 1,450,118 | 772.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 669 | 856,062 | 1,450,121 | 787.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 670 | 856,131 | 1,450,172 | 789.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 671 | 856,175 | 1,450,333 | 772.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 672 | 856,246 | 1,449,961 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 673 | 856,320 | 1,450,442 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 674 | 856,445 | 1,450,440 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 675 | 856,403 | 1,450,419 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 676 | 856,449 | 1,450,211 | 775.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 677 | 856,934 | 1,450,597 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 678 | 856,161 | 1,446,967 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 679 | 856,180 | 1,446,997 | 798.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 680 | 856,141 | 1,447,063 | 799.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 681 | 856,108 | 1,447,203 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 682 | 856,132 | 1,447,207 | 803.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 683 | 856,147 | 1,447,222 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 684 | 856,182 | 1,447,231 | 806.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 685 | 856,062 | 1,447,408 | 798.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 686 | 856,135 | 1,447,431 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 687 | 856,292 | 1,447,471 | 786.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 688 | 855,999 | 1,446,758 | 808.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 689 | 856,036 | 1,446,721 | 804.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 690 | 855,957 | 1,446,770 | 811.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 691 | 855,929 | 1,446,781 | 812.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 692 | 855,954 | 1,446,820 | 809.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 693 | 855,923 | 1,446,841 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 694 | 855,897 | 1,446,808 | 810.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 695 | 855,853 | 1,446,826 | 807.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 696 | 855,804 | 1,446,824 | 808.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 697 | 855,781 | 1,446,920 | 806.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 698 | 855,736 | 1,446,842 | 809.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 699 | 855,715 | 1,446,931 | 805.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 700 | 855,665 | 1,446,888 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 701 | 855,647 | 1,446,950 | 802.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 702 | 855,609 | 1,446,923 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 703 | 855,551 | 1,446,911 | 802.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 704 | 855,649 | 1,447,015 | 800.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 705 | 855,585 | 1,447,040 | 801.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 706 | 855,611 | 1,447,082 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 707 | 855,653 | 1,447,050 | 802.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 708 | 855,668 | 1,447,107 | 803.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 709 | 855,680 | 1,447,164 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 710 | 855,653 | 1,447,179 | 804.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 711 | 855,643 | 1,447,154 | 805.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 712 | 855,809 | 1,447,281 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 713 | 855,874 | 1,447,299 | 799.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 714 | 855,696 | 1,447,284 | 805.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 715 | 855,492 | 1,447,001 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 716 | 855,470 | 1,446,963 | 796.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 717 | 855,464 | 1,446,963 | 796.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 718 | 855,466 | 1,447,018 | 798.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 719 | 855,428 | 1,446,967 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 720 | 855,398 | 1,446,976 | 793.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 721 | 855,365 | 1,446,983 | 796.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 722 | 855,340 | 1,446,992 | 799.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 723 | 855,315 | 1,446,988 | 802.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 724 | 855,355 | 1,447,048 | 798.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 725 | 855,304 | 1,447,071 | 797.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 726 | 855,197 | 1,447,051 | 795.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 727 | 855,160 | 1,446,919 | 792.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 728 | 855,162 | 1,446,877 | 792.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 729 | 855,174 | 1,446,838 | 793.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 730 | 855,120 | 1,447,077 | 794.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 731 | 855,086 | 1,447,061 | 794.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 732 | 855,034 | 1,447,093 | 794.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 733 | 855,029 | 1,447,134 | 794.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 734 | 855,003 | 1,447,142 | 793.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 735 | 854,942 | 1,447,162 | 793.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 736 | 854,859 | 1,447,132 | 789.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 737 | 854,759 | 1,447,152 | 795.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 738 | 854,761 | 1,447,199 | 795.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 739 | 854,719 | 1,447,163 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 740 | 854,681 | 1,447,174 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 741 | 854,658 | 1,447,184 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 742 | 854,653 | 1,447,150 | 785.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 743 | 854,610 | 1,447,194 | 783.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 744 | 854,619 | 1,447,227 | 778.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 745 | 854,592 | 1,447,244 | 781.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 746 | 854,713 | 1,447,036 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 747 | 854,726 | 1,446,990 | 786.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 748 | 854,627 | 1,446,953 | 787.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 749 | 854,697 | 1,446,834 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 750 | 854,508 | 1,446,885 | 784.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 751 | 854,455 | 1,447,032 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 752 | 854,483 | 1,447,084 | 783.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 753 | 854,552 | 1,447,248 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 754 | 854,541 | 1,447,262 | 778.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 755 | 854,474 | 1,447,218 | 779.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 756 | 854,429 | 1,447,249 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 757 | 854,447 | 1,447,282 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 758 | 854,377 | 1,447,296 | 785.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 759 | 854,349 | 1,447,247 | 782.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 760 | 854,360 | 1,447,293 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 761 | 854,401 | 1,447,294 | 785.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 762 | 854,296 | 1,447,275 | 783.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 763 | 854,249 | 1,447,277 | 780.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 764 | 854,361 | 1,447,344 | 786.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 765 | 854,395 | 1,447,338 | 784.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 766 | 854,479 | 1,447,346 | 780.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 767 | 854,580 | 1,447,361 | 786.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 768 | 854,631 | 1,447,346 | 784.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 769 | 854,257 | 1,447,325 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 770 | 854,246 | 1,447,272 | 780.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 771 | 854,234 | 1,447,320 | 779.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 772 | 854,126 | 1,447,322 | 778.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 773 | 854,117 | 1,447,285 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 774 | 854,083 | 1,447,281 | 781.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 775 | 854,027 | 1,447,269 | 778.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 776 | 853,942 | 1,447,319 | 775.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 777 | 853,913 | 1,447,282 | 779.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 778 | 853,853 | 1,447,279 | 777.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 779 | 853,614 | 1,447,307 | 774.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 780 | 853,767 | 1,447,275 | 774.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 781 | 853,515 | 1,447,318 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 782 | 853,375 | 1,447,298 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 783 | 853,434 | 1,447,317 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 784 | 853,398 | 1,447,226 | 770.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 785 | 853,250 | 1,447,218 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 786 | 853,220 | 1,447,211 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 787 | 853,222 | 1,447,246 | 767.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 788 | 853,110 | 1,447,187 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 789 | 853,035 | 1,447,203 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 790 | 852,900 | 1,447,129 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 791 | 852,865 | 1,447,105 | 758.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 792 | 852,844 | 1,447,103 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 793 | 852,834 | 1,447,094 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 794 | 852,833 | 1,447,149 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 795 | 852,807 | 1,447,085 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 796 | 852,776 | 1,447,121 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 797 | 852,734 | 1,447,117 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 798 | 852,741 | 1,447,059 | 753.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 799 | 852,708 | 1,447,050 | 750.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 800 | 852,699 | 1,447,100 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 801 | 852,647 | 1,447,088 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 802 | 852,651 | 1,447,025 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 803 | 852,650 | 1,446,975 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 804 | 852,621 | 1,447,069 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 805 | 852,631 | 1,447,074 | 748.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 806 | 852,639 | 1,447,185 | 750.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 807 | 852,568 | 1,447,068 | 750.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 808 | 852,542 | 1,447,029 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 809 | 852,520 | 1,447,034 | 747.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 810 | 852,515 | 1,446,979 | 748.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 811 | 852,553 | 1,446,983 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 812 | 851,439 | 1,450,741 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 813 | 851,481 | 1,450,757 | 801.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 814 | 851,500 | 1,450,763 | 801.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 815 | 851,576 | 1,450,791 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 816 | 851,484 | 1,450,473 | 779.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 817 | 851,431 | 1,450,464 | 778.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 818 | 851,520 | 1,450,352 | 784.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 819 | 851,559 | 1,450,447 | 777.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 820 | 852,488 | 1,446,992 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 821 | 852,436 | 1,446,960 | 743.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 822 | 852,405 | 1,446,995 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 823 | 852,376 | 1,446,990 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 824 | 852,423 | 1,447,039 | 738.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 825 | 852,381 | 1,447,042 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 826 | 852,322 | 1,447,007 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 827 | 852,348 | 1,447,002 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 828 | 852,357 | 1,447,098 | 737.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 829 | 852,332 | 1,447,104 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 830 | 852,327 | 1,447,054 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 831 | 852,268 | 1,447,064 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 832 | 852,265 | 1,447,016 | 745.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 833 | 852,337 | 1,446,935 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 834 | 852,324 | 1,446,944 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 835 | 852,327 | 1,446,953 | 745.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 836 | 852,270 | 1,446,897 | 742.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 837 | 852,306 | 1,446,900 | 743.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 838 | 852,338 | 1,446,897 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 839 | 852,364 | 1,446,897 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 840 | 852,398 | 1,446,889 | 749.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 841 | 852,441 | 1,446,885 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 842 | 852,428 | 1,446,934 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 843 | 852,389 | 1,446,929 | 748.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 844 | 852,478 | 1,446,913 | 747.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 845 | 852,533 | 1,446,894 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 846 | 852,462 | 1,447,143 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 847 | 852,498 | 1,447,128 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 848 | 852,498 | 1,447,128 | 742.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 849 | 852,597 | 1,447,177 | 748.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 850 | 852,641 | 1,447,216 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 851 | 852,512 | 1,447,186 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 852 | 852,546 | 1,447,191 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 853 | 852,535 | 1,447,244 | 738.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 854 | 852,546 | 1,447,297 | 736.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 855 | 852,467 | 1,447,251 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 856 | 852,409 | 1,447,216 | 730.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 857 | 852,391 | 1,447,259 | 728.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 858 | 852,351 | 1,447,266 | 723.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 859 | 852,339 | 1,447,159 | 730.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 860 | 852,328 | 1,447,183 | 728.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 861 | 852,285 | 1,447,219 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 862 | 852,291 | 1,447,277 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 863 | 852,217 | 1,447,290 | 726.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 864 | 852,215 | 1,447,225 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 865 | 852,234 | 1,447,172 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 866 | 852,220 | 1,447,169 | 735.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 867 | 852,237 | 1,447,137 | 738.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 868 | 852,246 | 1,447,109 | 740.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 869 | 852,274 | 1,447,123 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 870 | 852,298 | 1,447,121 | 736.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 871 | 852,212 | 1,447,068 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 872 | 852,226 | 1,447,064 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 873 | 852,182 | 1,447,068 | 743.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 874 | 852,134 | 1,447,035 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 875 | 852,067 | 1,447,048 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 876 | 852,085 | 1,447,094 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 877 | 852,059 | 1,447,150 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 878 | 852,088 | 1,447,138 | 739.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 879 | 852,099 | 1,447,166 | 736.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 880 | 852,120 | 1,447,192 | 734.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 881 | 852,133 | 1,447,198 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 882 | 852,130 | 1,447,231 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 883 | 851,988 | 1,447,166 | 743.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 884 | 851,976 | 1,447,212 | 738.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 885 | 851,938 | 1,447,213 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 886 | 852,065 | 1,447,205 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 887 | 851,965 | 1,447,141 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 888 | 851,882 | 1,447,138 | 744.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 889 | 851,920 | 1,447,109 | 745.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 890 | 851,937 | 1,447,100 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 891 | 851,963 | 1,447,104 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 892 | 851,976 | 1,447,114 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 893 | 851,986 | 1,447,113 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 894 | 852,009 | 1,447,099 | 744.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 895 | 852,024 | 1,447,107 | 744.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 896 | 852,039 | 1,447,102 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 897 | 852,020 | 1,447,044 | 741.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 898 | 851,979 | 1,447,053 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 899 | 851,968 | 1,447,033 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 900 | 851,873 | 1,447,070 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 901 | 852,030 | 1,447,038 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 902 | 852,191 | 1,447,018 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 903 | 852,248 | 1,447,024 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 904 | 852,239 | 1,446,964 | 744.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 905 | 852,162 | 1,446,919 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 906 | 852,115 | 1,446,970 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 907 | 852,070 | 1,446,966 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 908 | 852,054 | 1,446,998 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 909 | 852,060 | 1,447,002 | 742.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 910 | 852,065 | 1,446,994 | 742.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 911 | 852,029 | 1,446,992 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 912 | 852,027 | 1,446,943 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 913 | 851,979 | 1,446,952 | 743.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 914 | 851,949 | 1,446,908 | 738.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 915 | 852,014 | 1,446,898 | 739.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 916 | 851,866 | 1,446,954 | 736.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 917 | 851,855 | 1,446,915 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 918 | 851,843 | 1,446,913 | 732.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 919 | 851,915 | 1,446,849 | 729.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 920 | 851,911 | 1,446,915 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 921 | 851,943 | 1,446,851 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 922 | 852,065 | 1,446,833 | 736.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 923 | 852,082 | 1,446,798 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 924 | 852,009 | 1,446,764 | 734.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 925 | 852,002 | 1,446,697 | 737.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 926 | 852,059 | 1,446,738 | 743.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 927 | 852,077 | 1,446,698 | 748.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 928 | 852,117 | 1,446,682 | 751.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 929 | 852,151 | 1,446,688 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 930 | 852,175 | 1,446,680 | 752.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 931 | 852,220 | 1,446,730 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 932 | 852,228 | 1,446,720 | 750.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 933 | 852,164 | 1,446,729 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 934 | 852,129 | 1,446,736 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 935 | 852,153 | 1,446,773 | 744.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 936 | 852,183 | 1,446,855 | 743.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 937 | 852,234 | 1,446,856 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 938 | 852,223 | 1,446,848 | 747.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 939 | 852,209 | 1,446,806 | 744.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 940 | 852,236 | 1,446,763 | 750.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 941 | 852,266 | 1,446,734 | 749.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 942 | 852,303 | 1,446,687 | 748.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 943 | 852,321 | 1,446,795 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 944 | 852,339 | 1,446,844 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 945 | 852,472 | 1,446,869 | 746.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 946 | 851,927 | 1,447,066 | 745.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 947 | 852,582 | 1,446,980 | 751.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 948 | 852,568 | 1,447,007 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 949 | 852,614 | 1,447,010 | 749.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 950 | 852,638 | 1,447,096 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 951 | 852,623 | 1,447,107 | 748.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 952 | 852,732 | 1,447,077 | 755.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 953 | 851,257 | 1,446,295 | 712.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 954 | 851,231 | 1,446,289 | 717.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 955 | 851,191 | 1,446,284 | 724.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 956 | 851,173 | 1,446,281 | 724.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 957 | 851,165 | 1,446,331 | 722.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 958 | 851,184 | 1,446,335 | 722.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 959 | 851,200 | 1,446,330 | 721.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 960 | 851,221 | 1,446,333 | 719.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 961 | 851,249 | 1,446,332 | 715.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 962 | 851,266 | 1,446,398 | 719.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 963 | 851,231 | 1,446,378 | 719.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 964 | 851,197 | 1,446,376 | 720.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 965 | 851,165 | 1,446,371 | 723.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 966 | 851,195 | 1,446,419 | 720.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 967 | 851,232 | 1,446,426 | 720.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 968 | 851,256 | 1,446,430 | 719.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 969 | 851,254 | 1,446,138 | 718.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 970 | 851,208 | 1,446,121 | 724.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 971 | 851,209 | 1,446,049 | 725.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 972 | 851,483 | 1,446,797 | 708.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 973 | 851,460 | 1,446,789 | 706.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 974 | 851,446 | 1,446,771 | 705.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 975 | 851,481 | 1,446,753 | 706.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 976 | 851,465 | 1,446,867 | 707.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 977 | 851,222 | 1,446,704 | 717.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 978 | 851,187 | 1,446,677 | 727.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 979 | 851,148 | 1,446,695 | 727.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 980 | 850,994 | 1,446,753 | 729.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 981 | 850,972 | 1,446,762 | 730.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 982 | 851,028 | 1,446,779 | 724.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 983 | 850,874 | 1,446,794 | 726.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 984 | 850,832 | 1,446,809 | 722.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 985 | 850,767 | 1,446,810 | 726.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 986 | 850,717 | 1,446,858 | 725.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 987 | 850,674 | 1,446,829 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 988 | 850,645 | 1,446,833 | 734.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 989 | 850,619 | 1,446,869 | 732.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 990 | 850,920 | 1,446,964 | 711.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 991 | 850,571 | 1,446,839 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 992 | 850,460 | 1,446,873 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 993 | 850,381 | 1,446,911 | 738.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 994 | 850,372 | 1,446,912 | 738.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 995 | 850,375 | 1,446,953 | 736.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 996 | 850,368 | 1,446,948 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 997 | 850,586 | 1,447,064 | 729.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 998 | 850,574 | 1,447,043 | 727.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 999 | 850,629 | 1,447,089 | 728.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1000 | 850,981 | 1,447,343 | 729.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1001 | 850,946 | 1,447,359 | 728.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1002 | 850,915 | 1,447,425 | 731.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1003 | 851,350 | 1,447,490 | 726.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1004 | 852,663 | 1,443,677 | 715.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1005 | 852,664 | 1,443,628 | 714.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1006 | 852,634 | 1,443,631 | 712.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1007 | 852,646 | 1,443,594 | 717.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1008 | 852,601 | 1,443,620 | 709.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1009 | 852,763 | 1,443,803 | 706.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1010 | 852,745 | 1,443,790 | 707.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1011 | 852,570 | 1,443,927 | 702.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1012 | 854,043 | 1,453,014 | 740.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1013 | 854,608 | 1,453,051 | 751.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1014 | 856,571 | 1,451,591 | 807.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1015 | 856,184 | 1,451,365 | 782.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1016 | 855,698 | 1,451,408 | 810.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1017 | 851,226 | 1,451,726 | 788.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1018 | 851,383 | 1,451,819 | 784.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1019 | 851,433 | 1,451,783 | 778.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1020 | 852,052 | 1,450,571 | 779.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1021 | 852,016 | 1,450,316 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1022 | 852,302 | 1,449,693 | 772.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1023 | 852,214 | 1,449,498 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1024 | 852,608 | 1,449,780 | 773.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1025 | 852,674 | 1,449,656 | 766.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1026 | 853,463 | 1,449,552 | 785.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1027 | 853,469 | 1,449,520 | 782.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1028 | 853,443 | 1,449,514 | 782.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1029 | 853,512 | 1,449,390 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1030 | 853,530 | 1,449,196 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1031 | 853,565 | 1,449,152 | 752.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1032 | 853,574 | 1,449,230 | 754.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1033 | 853,625 | 1,449,293 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1034 | 855,724 | 1,449,045 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1035 | 855,771 | 1,448,921 | 775.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1036 | 855,813 | 1,448,860 | 780.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1037 | 855,841 | 1,448,873 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1038 | 855,885 | 1,448,857 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1039 | 856,001 | 1,448,765 | 776.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1040 | 856,026 | 1,448,724 | 776.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1041 | 851,324 | 1,445,117 | 723.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1042 | 851,366 | 1,445,143 | 725.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1043 | 851,262 | 1,445,117 | 725.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1044 | 851,212 | 1,445,117 | 728.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1045 | 851,382 | 1,445,049 | 718.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1046 | 851,467 | 1,445,040 | 712.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1047 | 851,509 | 1,445,089 | 710.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1048 | 851,373 | 1,445,243 | 726.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1049 | 851,073 | 1,445,292 | 728.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1050 | 850,908 | 1,444,954 | 708.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1051 | 851,030 | 1,444,877 | 704.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1052 | 851,247 | 1,444,888 | 704.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1053 | 851,285 | 1,444,891 | 703.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1054 | 851,059 | 1,444,629 | 711.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1055 | 851,005 | 1,444,655 | 712.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1056 | 850,984 | 1,444,587 | 718.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1057 | 848,726 | 1,444,048 | 759.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1058 | 848,716 | 1,444,061 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1059 | 848,705 | 1,444,052 | 761.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1060 | 848,693 | 1,444,067 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1061 | 848,761 | 1,444,327 | 742.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1062 | 849,134 | 1,446,836 | 778.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1063 | 849,113 | 1,446,830 | 776.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1064 | 849,118 | 1,446,807 | 775.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1065 | 849,145 | 1,446,776 | 774.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1066 | 849,244 | 1,446,811 | 772.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1067 | 849,271 | 1,446,808 | 770.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1068 | 849,256 | 1,446,788 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1069 | 849,238 | 1,446,774 | 770.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1070 | 849,242 | 1,446,724 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1071 | 849,239 | 1,446,696 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1072 | 849,221 | 1,446,717 | 770.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1073 | 849,234 | 1,446,680 | 766.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1074 | 849,226 | 1,446,663 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1075 | 849,235 | 1,446,649 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1076 | 849,221 | 1,446,632 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1077 | 849,215 | 1,446,618 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1078 | 849,223 | 1,446,602 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1079 | 849,277 | 1,446,729 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1080 | 849,289 | 1,446,733 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1081 | 849,332 | 1,446,737 | 762.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1082 | 849,373 | 1,446,725 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1083 | 849,407 | 1,446,742 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1084 | 849,278 | 1,446,666 | 764.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1085 | 849,296 | 1,446,666 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1086 | 849,313 | 1,446,689 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1087 | 849,347 | 1,446,688 | 763.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1088 | 849,359 | 1,446,689 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1089 | 849,356 | 1,446,683 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1090 | 849,357 | 1,446,662 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1091 | 849,340 | 1,446,659 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1092 | 849,425 | 1,446,677 | 750.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1093 | 849,394 | 1,446,725 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1094 | 849,435 | 1,446,618 | 751.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1095 | 849,388 | 1,446,616 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1096 | 849,315 | 1,446,621 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1097 | 849,294 | 1,446,614 | 763.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1098 | 849,280 | 1,446,620 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1099 | 849,264 | 1,446,612 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1100 | 849,447 | 1,446,570 | 751.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1101 | 849,395 | 1,446,566 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1102 | 849,272 | 1,446,579 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1103 | 849,283 | 1,446,576 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1104 | 849,217 | 1,446,592 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1105 | 849,219 | 1,446,572 | 763.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1106 | 849,217 | 1,446,556 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1107 | 849,215 | 1,446,530 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1108 | 849,208 | 1,446,506 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1109 | 849,208 | 1,446,494 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1110 | 849,203 | 1,446,469 | 759.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1111 | 849,197 | 1,446,451 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1112 | 849,194 | 1,446,427 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1113 | 849,196 | 1,446,413 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1114 | 849,196 | 1,446,399 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1115 | 849,202 | 1,446,377 | 758.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1116 | 849,131 | 1,446,355 | 754.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1117 | 849,105 | 1,446,334 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1118 | 849,181 | 1,446,356 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1119 | 849,201 | 1,446,353 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1120 | 849,221 | 1,446,357 | 758.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1121 | 849,238 | 1,446,351 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1122 | 849,245 | 1,446,383 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1123 | 849,261 | 1,446,400 | 760.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1124 | 849,292 | 1,446,393 | 759.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1125 | 849,304 | 1,446,380 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1126 | 849,256 | 1,446,353 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1127 | 849,280 | 1,446,321 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1128 | 849,336 | 1,446,379 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1129 | 849,348 | 1,446,378 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1130 | 849,378 | 1,446,396 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1131 | 849,385 | 1,446,417 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1132 | 849,437 | 1,446,382 | 746.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1133 | 849,414 | 1,446,338 | 746.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1134 | 849,432 | 1,446,334 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1135 | 849,523 | 1,446,336 | 733.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1136 | 849,907 | 1,446,396 | 758.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1137 | 849,852 | 1,446,376 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1138 | 849,837 | 1,446,430 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1139 | 849,833 | 1,446,473 | 749.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1140 | 849,868 | 1,446,466 | 751.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1141 | 849,892 | 1,446,260 | 760.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1142 | 849,908 | 1,446,211 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1143 | 850,421 | 1,445,826 | 737.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1144 | 850,516 | 1,445,836 | 736.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1145 | 850,626 | 1,445,617 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1146 | 850,686 | 1,445,672 | 737.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1147 | 850,700 | 1,445,535 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1148 | 850,707 | 1,445,639 | 734.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1149 | 850,614 | 1,445,514 | 738.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1150 | 850,716 | 1,445,403 | 732.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1151 | 849,179 | 1,446,333 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1152 | 849,185 | 1,446,305 | 757.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1153 | 849,187 | 1,446,282 | 756.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1154 | 849,177 | 1,446,196 | 752.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1155 | 849,186 | 1,446,257 | 755.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1156 | 849,219 | 1,446,282 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1157 | 849,286 | 1,446,238 | 752.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1158 | 849,310 | 1,446,282 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1159 | 849,324 | 1,446,223 | 747.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1160 | 849,329 | 1,446,176 | 742.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1161 | 849,259 | 1,446,187 | 749.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1162 | 849,181 | 1,446,233 | 754.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1163 | 849,197 | 1,446,243 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1164 | 849,182 | 1,446,267 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1165 | 849,195 | 1,446,271 | 755.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1166 | 849,352 | 1,446,264 | 749.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1167 | 849,427 | 1,446,289 | 742.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1168 | 849,401 | 1,446,189 | 742.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1169 | 849,157 | 1,446,169 | 751.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1170 | 849,157 | 1,446,149 | 751.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1171 | 849,165 | 1,446,130 | 750.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1172 | 849,168 | 1,446,111 | 750.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1173 | 849,169 | 1,446,093 | 751.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1174 | 849,155 | 1,446,080 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1175 | 849,144 | 1,446,054 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1176 | 849,160 | 1,446,028 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1177 | 849,148 | 1,446,013 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1178 | 849,159 | 1,445,998 | 760.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1179 | 849,152 | 1,445,966 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1180 | 849,165 | 1,446,014 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1181 | 849,181 | 1,446,015 | 760.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1182 | 849,199 | 1,446,017 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1183 | 849,223 | 1,446,011 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1184 | 849,193 | 1,445,942 | 764.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1185 | 849,189 | 1,445,898 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1186 | 849,221 | 1,445,896 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1187 | 849,217 | 1,445,925 | 762.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1188 | 849,275 | 1,445,996 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1189 | 849,288 | 1,445,933 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1190 | 849,454 | 1,445,987 | 739.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1191 | 849,383 | 1,446,096 | 739.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1192 | 849,340 | 1,446,117 | 740.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1193 | 849,427 | 1,446,117 | 734.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1194 | 849,386 | 1,446,030 | 741.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1195 | 849,393 | 1,446,001 | 743.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1196 | 849,386 | 1,445,956 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1197 | 849,443 | 1,445,922 | 735.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1198 | 849,303 | 1,445,872 | 747.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1199 | 849,335 | 1,445,870 | 745.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1200 | 849,316 | 1,445,892 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1201 | 849,345 | 1,445,824 | 746.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1202 | 849,190 | 1,445,811 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1203 | 849,198 | 1,445,827 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1204 | 849,158 | 1,445,812 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1205 | 849,128 | 1,445,821 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1206 | 849,130 | 1,445,812 | 760.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1207 | 849,134 | 1,445,867 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1208 | 849,179 | 1,445,701 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1209 | 849,189 | 1,445,722 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1210 | 849,230 | 1,445,719 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1211 | 849,235 | 1,445,696 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1212 | 849,224 | 1,445,652 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1213 | 849,210 | 1,445,640 | 757.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1214 | 849,188 | 1,445,656 | 760.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1215 | 849,179 | 1,445,662 | 761.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1216 | 849,165 | 1,445,644 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1217 | 849,134 | 1,445,637 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1218 | 849,143 | 1,445,672 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1219 | 849,129 | 1,445,695 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1220 | 849,118 | 1,445,731 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1221 | 849,159 | 1,445,729 | 763.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1222 | 849,162 | 1,445,747 | 761.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1223 | 849,153 | 1,445,759 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1224 | 849,112 | 1,445,586 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1225 | 849,129 | 1,445,582 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1226 | 849,133 | 1,445,538 | 765.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1227 | 849,132 | 1,445,556 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1228 | 848,938 | 1,445,593 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1229 | 848,951 | 1,445,563 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1230 | 848,975 | 1,445,466 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1231 | 848,950 | 1,445,433 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1232 | 849,072 | 1,445,269 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1233 | 849,079 | 1,445,282 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1234 | 849,068 | 1,445,283 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1235 | 849,074 | 1,445,290 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1236 | 849,064 | 1,445,300 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1237 | 849,157 | 1,445,244 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1238 | 849,097 | 1,445,352 | 764.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1239 | 849,152 | 1,445,365 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1240 | 849,143 | 1,445,368 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1241 | 849,160 | 1,445,366 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1242 | 849,187 | 1,445,368 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1243 | 849,202 | 1,445,363 | 757.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1244 | 849,218 | 1,445,370 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1245 | 849,227 | 1,445,371 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1246 | 849,223 | 1,445,401 | 757.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1247 | 849,201 | 1,445,398 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1248 | 849,187 | 1,445,398 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1249 | 849,172 | 1,445,402 | 756.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1250 | 849,257 | 1,445,378 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1251 | 849,252 | 1,445,394 | 755.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1252 | 849,249 | 1,445,414 | 754.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1253 | 849,233 | 1,445,299 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1254 | 849,223 | 1,445,299 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1255 | 849,216 | 1,445,305 | 759.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1256 | 849,210 | 1,445,310 | 759.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1257 | 849,198 | 1,445,308 | 758.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1258 | 849,193 | 1,445,308 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1259 | 849,180 | 1,445,301 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1260 | 849,160 | 1,445,313 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1261 | 849,142 | 1,445,314 | 760.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1262 | 849,203 | 1,445,456 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1263 | 849,197 | 1,445,456 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1264 | 849,163 | 1,445,446 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1265 | 849,155 | 1,445,459 | 757.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1266 | 849,218 | 1,445,445 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1267 | 849,262 | 1,445,478 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1268 | 849,261 | 1,445,460 | 752.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1269 | 849,265 | 1,445,453 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1270 | 849,258 | 1,445,430 | 753.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1271 | 849,265 | 1,445,437 | 753.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1272 | 849,274 | 1,445,356 | 754.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1273 | 849,207 | 1,445,548 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1274 | 849,218 | 1,445,530 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1275 | 849,232 | 1,445,551 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1276 | 849,222 | 1,445,486 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1277 | 849,209 | 1,445,500 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1278 | 849,191 | 1,445,486 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1279 | 849,319 | 1,445,542 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1280 | 849,384 | 1,445,629 | 738.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1281 | 849,382 | 1,445,650 | 739.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1282 | 849,259 | 1,445,778 | 756.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1283 | 849,346 | 1,445,754 | 747.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1284 | 849,344 | 1,445,735 | 747.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1285 | 849,385 | 1,445,767 | 739.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1286 | 849,392 | 1,445,803 | 740.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1287 | 849,419 | 1,445,809 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1288 | 849,428 | 1,445,767 | 734.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1289 | 849,446 | 1,445,766 | 733.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1290 | 849,479 | 1,445,797 | 734.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1291 | 849,461 | 1,445,815 | 735.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1292 | 849,440 | 1,445,699 | 732.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1293 | 849,433 | 1,445,700 | 733.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1294 | 849,423 | 1,445,685 | 734.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1295 | 849,337 | 1,445,693 | 745.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1296 | 849,307 | 1,445,696 | 749.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1297 | 849,341 | 1,445,649 | 743.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1298 | 849,335 | 1,445,638 | 743.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1299 | 849,355 | 1,445,624 | 741.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1300 | 849,387 | 1,445,589 | 737.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1301 | 849,315 | 1,445,211 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1302 | 849,127 | 1,445,397 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1303 | 849,122 | 1,445,412 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1304 | 849,115 | 1,445,426 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1305 | 849,108 | 1,445,472 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1306 | 849,110 | 1,445,506 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1307 | 849,061 | 1,446,035 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1308 | 849,161 | 1,445,149 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1309 | 849,195 | 1,445,115 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1310 | 849,253 | 1,445,122 | 765.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1311 | 849,256 | 1,445,181 | 764.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1312 | 849,205 | 1,445,207 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1313 | 849,237 | 1,445,013 | 767.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1314 | 849,226 | 1,444,904 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1315 | 849,233 | 1,444,845 | 748.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1316 | 849,192 | 1,444,985 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1317 | 849,189 | 1,445,008 | 763.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1318 | 849,143 | 1,445,025 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1319 | 849,121 | 1,445,033 | 763.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1320 | 849,154 | 1,444,961 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1321 | 849,146 | 1,444,972 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1322 | 849,118 | 1,444,978 | 757.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1323 | 849,079 | 1,445,002 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1324 | 848,850 | 1,445,008 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1325 | 848,700 | 1,444,925 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1326 | 848,633 | 1,444,930 | 766.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1327 | 848,667 | 1,444,975 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1328 | 848,611 | 1,444,969 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1329 | 848,808 | 1,444,838 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1330 | 848,717 | 1,444,776 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1331 | 848,850 | 1,444,775 | 752.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1332 | 848,861 | 1,444,868 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1333 | 848,920 | 1,444,928 | 764.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1334 | 848,970 | 1,444,955 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1335 | 848,946 | 1,444,966 | 764.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1336 | 848,953 | 1,444,976 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1337 | 848,974 | 1,444,984 | 762.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1338 | 848,986 | 1,444,836 | 756.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1339 | 849,237 | 1,445,076 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1340 | 849,109 | 1,445,262 | 762.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1341 | 848,716 | 1,444,399 | 747.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1342 | 848,676 | 1,444,422 | 752.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1343 | 848,649 | 1,444,427 | 759.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1344 | 848,639 | 1,444,443 | 761.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1345 | 848,581 | 1,444,527 | 755.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1346 | 848,558 | 1,444,870 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1347 | 848,525 | 1,444,904 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1348 | 848,488 | 1,444,870 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1349 | 848,455 | 1,444,850 | 761.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1350 | 848,462 | 1,444,807 | 760.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1351 | 848,303 | 1,444,534 | 759.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1352 | 848,260 | 1,444,506 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1353 | 848,307 | 1,444,485 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1354 | 848,321 | 1,444,465 | 769.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1355 | 848,318 | 1,444,451 | 770.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1356 | 848,312 | 1,444,438 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1357 | 848,311 | 1,444,430 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1358 | 848,314 | 1,444,413 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1359 | 848,318 | 1,444,389 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1360 | 848,315 | 1,444,365 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1361 | 848,316 | 1,444,351 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1362 | 848,320 | 1,444,326 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1363 | 848,324 | 1,444,315 | 767.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1364 | 848,308 | 1,444,285 | 767.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1365 | 848,328 | 1,444,265 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1366 | 848,362 | 1,444,287 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1367 | 848,356 | 1,444,306 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1368 | 848,353 | 1,444,330 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1369 | 848,386 | 1,444,345 | 766.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1370 | 848,397 | 1,444,360 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1371 | 848,402 | 1,444,314 | 769.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1372 | 848,410 | 1,444,300 | 771.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1373 | 848,404 | 1,444,282 | 772.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1374 | 848,468 | 1,444,356 | 770.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1375 | 848,455 | 1,444,465 | 766.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1376 | 848,458 | 1,444,554 | 760.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1377 | 848,452 | 1,444,569 | 758.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1378 | 848,488 | 1,444,248 | 771.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1379 | 848,271 | 1,444,448 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1380 | 848,273 | 1,444,409 | 757.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1381 | 848,272 | 1,444,382 | 759.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1382 | 848,285 | 1,444,328 | 767.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1383 | 848,283 | 1,444,310 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1384 | 848,506 | 1,444,126 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1385 | 848,485 | 1,444,123 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1386 | 848,488 | 1,444,080 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1387 | 848,472 | 1,444,087 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1388 | 848,459 | 1,444,113 | 770.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1389 | 848,441 | 1,444,117 | 768.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1390 | 848,423 | 1,444,120 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1391 | 848,402 | 1,444,125 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1392 | 848,395 | 1,444,119 | 765.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1393 | 848,372 | 1,444,121 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1394 | 848,350 | 1,444,124 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1395 | 848,450 | 1,444,161 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1396 | 848,436 | 1,444,166 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1397 | 848,427 | 1,444,164 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1398 | 848,434 | 1,444,184 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1399 | 848,418 | 1,444,166 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1400 | 848,411 | 1,444,165 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1401 | 848,402 | 1,444,163 | 767.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1402 | 848,392 | 1,444,165 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1403 | 848,386 | 1,444,170 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1404 | 848,378 | 1,444,161 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1405 | 848,373 | 1,444,163 | 768.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1406 | 848,362 | 1,444,162 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1407 | 848,353 | 1,444,161 | 768.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1408 | 848,348 | 1,444,166 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1409 | 848,337 | 1,444,164 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1410 | 848,326 | 1,444,158 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1411 | 848,315 | 1,444,159 | 768.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1412 | 848,304 | 1,444,156 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1413 | 848,343 | 1,444,123 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1414 | 848,333 | 1,444,128 | 766.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1415 | 848,299 | 1,444,122 | 765.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1416 | 848,292 | 1,444,122 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1417 | 848,278 | 1,444,126 | 765.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1418 | 848,267 | 1,444,125 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1419 | 848,252 | 1,444,125 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1420 | 848,241 | 1,444,127 | 765.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1421 | 848,232 | 1,444,123 | 764.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1422 | 848,225 | 1,444,124 | 765.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1423 | 848,221 | 1,444,125 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1424 | 848,200 | 1,444,129 | 766.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1425 | 848,179 | 1,444,115 | 765.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1426 | 848,150 | 1,444,124 | 766.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1427 | 848,163 | 1,444,119 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1428 | 848,186 | 1,444,130 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1429 | 848,281 | 1,444,173 | 768.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1430 | 848,267 | 1,444,174 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1431 | 848,259 | 1,444,167 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1432 | 848,251 | 1,444,159 | 768.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1433 | 848,236 | 1,444,164 | 768.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1434 | 848,227 | 1,444,164 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1435 | 848,222 | 1,444,158 | 769.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1436 | 848,217 | 1,444,161 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1437 | 848,206 | 1,444,158 | 769.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1438 | 848,199 | 1,444,159 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1439 | 848,194 | 1,444,161 | 769.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1440 | 848,186 | 1,444,156 | 769.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1441 | 848,177 | 1,444,158 | 769.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1442 | 848,161 | 1,444,163 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1443 | 848,143 | 1,444,163 | 767.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1444 | 848,117 | 1,444,152 | 764.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1445 | 848,106 | 1,444,158 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1446 | 848,112 | 1,444,098 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1447 | 848,137 | 1,444,125 | 766.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1448 | 848,099 | 1,444,121 | 762.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1449 | 848,075 | 1,444,157 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1450 | 847,997 | 1,444,156 | 756.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1451 | 847,877 | 1,444,114 | 744.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1452 | 847,721 | 1,444,104 | 758.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1453 | 847,719 | 1,444,117 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1454 | 847,678 | 1,444,100 | 756.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1455 | 847,690 | 1,444,115 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1456 | 847,674 | 1,444,157 | 754.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1457 | 847,645 | 1,444,149 | 753.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1458 | 848,488 | 1,444,227 | 771.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1459 | 848,436 | 1,444,213 | 771.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1460 | 848,424 | 1,444,243 | 775.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1461 | 848,413 | 1,444,257 | 776.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1462 | 848,409 | 1,444,268 | 774.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1463 | 848,398 | 1,444,328 | 768.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1464 | 848,263 | 1,444,215 | 763.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1465 | 848,269 | 1,444,225 | 762.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1466 | 848,272 | 1,444,234 | 762.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1467 | 848,275 | 1,444,252 | 763.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1468 | 848,286 | 1,444,154 | 768.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1469 | 848,451 | 1,444,114 | 769.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1470 | 848,406 | 1,444,128 | 766.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1471 | 848,495 | 1,444,071 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1472 | 848,535 | 1,444,036 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1473 | 848,550 | 1,444,030 | 766.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1474 | 848,563 | 1,444,017 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1475 | 848,602 | 1,444,001 | 762.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1476 | 848,585 | 1,443,998 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1477 | 848,590 | 1,444,002 | 763.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1478 | 848,624 | 1,443,985 | 759.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1479 | 848,639 | 1,443,989 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1480 | 848,631 | 1,443,967 | 757.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1481 | 848,642 | 1,443,957 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1482 | 848,668 | 1,443,946 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1483 | 848,713 | 1,443,933 | 766.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1484 | 848,737 | 1,443,941 | 768.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1485 | 848,732 | 1,443,922 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1486 | 848,771 | 1,443,920 | 766.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1487 | 848,762 | 1,443,935 | 767.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1488 | 848,768 | 1,443,893 | 761.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1489 | 848,775 | 1,443,890 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1490 | 848,747 | 1,443,889 | 760.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1491 | 847,321 | 1,444,176 | 731.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1492 | 847,322 | 1,444,188 | 731.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1493 | 847,312 | 1,444,203 | 729.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1494 | 847,305 | 1,444,213 | 727.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1495 | 847,271 | 1,444,240 | 723.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1496 | 847,248 | 1,444,262 | 720.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1497 | 847,240 | 1,444,264 | 719.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1498 | 847,217 | 1,444,273 | 718.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1499 | 847,190 | 1,444,223 | 712.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1500 | 847,234 | 1,444,162 | 711.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1501 | 847,156 | 1,444,278 | 708.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1502 | 847,138 | 1,444,288 | 703.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1503 | 847,097 | 1,444,280 | 697.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1504 | 847,024 | 1,444,302 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1505 | 847,014 | 1,444,291 | 694.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1506 | 846,995 | 1,444,308 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1507 | 847,005 | 1,444,244 | 689.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1508 | 846,980 | 1,444,261 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1509 | 847,066 | 1,444,247 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1510 | 846,919 | 1,444,318 | 691.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1511 | 846,849 | 1,444,268 | 694.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1512 | 846,751 | 1,444,245 | 695.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1513 | 846,311 | 1,444,161 | 720.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1514 | 846,301 | 1,444,178 | 721.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1515 | 846,203 | 1,444,214 | 702.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1516 | 846,182 | 1,444,226 | 700.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1517 | 846,162 | 1,444,206 | 698.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1518 | 846,219 | 1,444,263 | 703.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1519 | 846,299 | 1,444,272 | 707.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1520 | 846,278 | 1,444,261 | 707.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1521 | 846,268 | 1,444,264 | 705.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1522 | 846,339 | 1,444,128 | 716.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1523 | 846,334 | 1,444,068 | 718.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1524 | 846,289 | 1,444,056 | 714.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1525 | 846,275 | 1,444,083 | 711.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1526 | 846,078 | 1,444,148 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1527 | 846,063 | 1,444,142 | 694.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1528 | 846,060 | 1,444,159 | 695.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1529 | 846,113 | 1,444,228 | 696.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1530 | 845,926 | 1,444,252 | 687.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1531 | 845,902 | 1,444,204 | 689.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1532 | 845,783 | 1,444,181 | 691.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1533 | 844,815 | 1,444,973 | 662.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1534 | 844,865 | 1,444,911 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1535 | 844,332 | 1,445,361 | 678.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1536 | 844,263 | 1,445,323 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1537 | 844,188 | 1,445,471 | 667.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1538 | 844,488 | 1,445,298 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1539 | 844,086 | 1,445,411 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1540 | 843,957 | 1,445,415 | 650.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1541 | 844,413 | 1,443,303 | 664.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1542 | 844,424 | 1,443,305 | 666.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1543 | 844,443 | 1,443,312 | 669.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1544 | 844,454 | 1,443,313 | 670.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1545 | 844,436 | 1,443,341 | 669.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1546 | 844,472 | 1,443,319 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1547 | 844,490 | 1,443,346 | 672.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1548 | 844,499 | 1,443,393 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1549 | 844,521 | 1,443,347 | 674.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1550 | 844,512 | 1,443,334 | 673.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1551 | 844,552 | 1,443,336 | 676.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1552 | 844,580 | 1,443,350 | 678.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1553 | 844,547 | 1,443,392 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1554 | 844,546 | 1,443,413 | 676.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1555 | 844,513 | 1,443,408 | 674.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1556 | 844,592 | 1,443,389 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1557 | 844,587 | 1,443,404 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1558 | 844,585 | 1,443,409 | 678.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1559 | 844,600 | 1,443,444 | 677.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1560 | 844,630 | 1,443,415 | 680.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1561 | 844,616 | 1,443,383 | 680.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1562 | 844,635 | 1,443,359 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1563 | 844,626 | 1,443,367 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1564 | 844,615 | 1,443,344 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1565 | 844,687 | 1,443,367 | 685.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1566 | 844,708 | 1,443,378 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1567 | 844,719 | 1,443,386 | 686.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1568 | 844,735 | 1,443,386 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1569 | 844,771 | 1,443,434 | 692.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1570 | 844,745 | 1,443,444 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1571 | 844,712 | 1,443,440 | 684.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1572 | 844,722 | 1,443,475 | 683.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1573 | 844,740 | 1,443,485 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1574 | 844,750 | 1,443,478 | 686.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1575 | 844,759 | 1,443,492 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1576 | 844,752 | 1,443,381 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1577 | 844,813 | 1,443,398 | 695.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1578 | 844,832 | 1,443,390 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1579 | 844,857 | 1,443,400 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1580 | 844,860 | 1,443,400 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1581 | 844,870 | 1,443,404 | 696.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1582 | 844,899 | 1,443,402 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1583 | 844,869 | 1,443,382 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1584 | 844,845 | 1,443,457 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1585 | 844,835 | 1,443,454 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1586 | 844,836 | 1,443,484 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1587 | 844,801 | 1,443,485 | 686.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1588 | 844,874 | 1,443,498 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1589 | 844,876 | 1,443,507 | 687.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1590 | 844,935 | 1,443,413 | 697.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1591 | 844,930 | 1,443,506 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1592 | 844,958 | 1,443,522 | 691.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1593 | 844,977 | 1,443,526 | 692.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1594 | 844,983 | 1,443,523 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1595 | 845,003 | 1,443,527 | 692.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1596 | 845,028 | 1,443,533 | 690.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1597 | 845,007 | 1,443,482 | 696.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1598 | 844,961 | 1,443,419 | 699.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1599 | 844,975 | 1,443,425 | 699.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1600 | 844,998 | 1,443,425 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1601 | 845,016 | 1,443,419 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1602 | 845,044 | 1,443,423 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1603 | 845,070 | 1,443,429 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1604 | 845,049 | 1,443,534 | 689.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1605 | 845,044 | 1,443,537 | 688.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1606 | 845,081 | 1,443,532 | 689.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1607 | 845,151 | 1,443,471 | 701.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1608 | 845,161 | 1,443,470 | 701.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1609 | 845,176 | 1,443,474 | 703.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1610 | 845,174 | 1,443,500 | 699.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1611 | 845,241 | 1,443,496 | 699.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1612 | 845,251 | 1,443,499 | 697.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1613 | 845,265 | 1,443,501 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1614 | 845,487 | 1,443,559 | 689.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1615 | 845,461 | 1,443,532 | 691.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1616 | 845,535 | 1,443,548 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1617 | 845,534 | 1,443,558 | 691.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1618 | 845,552 | 1,443,575 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1619 | 845,591 | 1,443,575 | 688.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1620 | 845,677 | 1,443,587 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1621 | 845,699 | 1,443,593 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1622 | 845,783 | 1,443,652 | 689.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1623 | 845,805 | 1,443,660 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1624 | 845,810 | 1,443,666 | 690.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1625 | 845,835 | 1,443,682 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1626 | 845,845 | 1,443,700 | 693.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1627 | 845,865 | 1,443,720 | 695.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1628 | 845,873 | 1,443,719 | 696.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1629 | 845,887 | 1,443,731 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1630 | 845,899 | 1,443,744 | 701.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1631 | 845,913 | 1,443,756 | 704.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1632 | 845,948 | 1,443,795 | 707.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1633 | 845,965 | 1,443,800 | 709.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1634 | 845,723 | 1,443,554 | 689.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1635 | 845,726 | 1,443,570 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1636 | 845,684 | 1,443,554 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1637 | 845,650 | 1,443,514 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1638 | 845,650 | 1,443,509 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1639 | 845,637 | 1,443,501 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1640 | 845,610 | 1,443,502 | 693.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1641 | 845,570 | 1,443,488 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1642 | 845,556 | 1,443,498 | 691.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1643 | 845,562 | 1,443,499 | 691.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1644 | 845,532 | 1,443,483 | 693.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1645 | 845,547 | 1,443,480 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1646 | 845,507 | 1,443,482 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1647 | 845,493 | 1,443,473 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1648 | 845,468 | 1,443,425 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1649 | 845,539 | 1,443,428 | 690.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1650 | 845,549 | 1,443,433 | 691.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1651 | 845,532 | 1,443,429 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1652 | 845,421 | 1,443,476 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1653 | 845,398 | 1,443,468 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1654 | 845,360 | 1,443,467 | 696.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1655 | 845,305 | 1,443,447 | 692.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1656 | 845,294 | 1,443,440 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1657 | 845,394 | 1,443,418 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1658 | 845,129 | 1,443,416 | 697.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1659 | 845,108 | 1,443,413 | 698.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1660 | 845,072 | 1,443,400 | 698.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1661 | 845,074 | 1,443,388 | 697.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1662 | 845,057 | 1,443,388 | 698.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1663 | 845,046 | 1,443,389 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1664 | 845,033 | 1,443,380 | 700.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1665 | 845,026 | 1,443,363 | 700.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1666 | 845,008 | 1,443,369 | 701.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1667 | 844,945 | 1,443,365 | 695.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1668 | 844,954 | 1,443,348 | 696.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1669 | 844,907 | 1,443,332 | 696.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1670 | 844,896 | 1,443,328 | 697.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1671 | 844,857 | 1,443,322 | 695.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1672 | 844,848 | 1,443,320 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1673 | 844,827 | 1,443,316 | 694.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1674 | 844,837 | 1,443,294 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1675 | 844,785 | 1,443,307 | 694.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1676 | 844,768 | 1,443,287 | 694.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1677 | 844,755 | 1,443,305 | 691.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1678 | 844,750 | 1,443,279 | 691.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1679 | 844,743 | 1,443,276 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1680 | 844,694 | 1,443,264 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1681 | 844,688 | 1,443,260 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1682 | 844,653 | 1,443,282 | 685.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1683 | 844,659 | 1,443,306 | 685.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1684 | 844,616 | 1,443,297 | 680.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1685 | 844,590 | 1,443,279 | 679.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1686 | 844,576 | 1,443,265 | 678.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1687 | 844,590 | 1,443,240 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1688 | 844,606 | 1,443,244 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1689 | 844,616 | 1,443,252 | 681.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1690 | 844,621 | 1,443,242 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1691 | 844,615 | 1,443,257 | 681.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1692 | 844,640 | 1,443,270 | 683.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1693 | 844,572 | 1,443,227 | 679.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1694 | 844,567 | 1,443,236 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1695 | 844,564 | 1,443,269 | 677.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1696 | 844,547 | 1,443,272 | 675.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1697 | 844,532 | 1,443,280 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1698 | 844,523 | 1,443,275 | 673.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1699 | 844,498 | 1,443,278 | 671.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1700 | 844,508 | 1,443,249 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1701 | 844,516 | 1,443,238 | 674.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1702 | 844,537 | 1,443,231 | 676.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1703 | 844,485 | 1,443,230 | 672.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1704 | 844,477 | 1,443,227 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1705 | 844,469 | 1,443,229 | 671.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1706 | 844,458 | 1,443,237 | 670.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1707 | 844,447 | 1,443,240 | 670.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1708 | 844,436 | 1,443,238 | 670.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1709 | 844,414 | 1,443,239 | 670.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1710 | 844,404 | 1,443,242 | 670.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1711 | 844,388 | 1,443,241 | 669.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1712 | 844,379 | 1,443,244 | 668.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1713 | 844,331 | 1,443,242 | 667.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1714 | 844,303 | 1,443,279 | 665.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1715 | 844,296 | 1,443,276 | 665.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1716 | 844,292 | 1,443,288 | 665.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1717 | 844,325 | 1,443,285 | 664.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1718 | 844,312 | 1,443,304 | 664.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1719 | 844,213 | 1,443,342 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1720 | 844,225 | 1,443,348 | 660.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1721 | 844,224 | 1,443,301 | 662.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1722 | 844,214 | 1,443,262 | 664.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1723 | 844,190 | 1,443,267 | 662.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1724 | 844,181 | 1,443,262 | 662.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1725 | 844,176 | 1,443,267 | 661.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1726 | 844,169 | 1,443,273 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1727 | 844,153 | 1,443,278 | 660.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1728 | 844,145 | 1,443,276 | 661.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1729 | 844,134 | 1,443,286 | 660.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1730 | 844,118 | 1,443,286 | 660.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1731 | 844,107 | 1,443,298 | 659.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1732 | 844,105 | 1,443,353 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1733 | 844,004 | 1,443,324 | 655.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1734 | 843,920 | 1,443,400 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1735 | 843,905 | 1,443,399 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1736 | 843,880 | 1,443,408 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1737 | 843,847 | 1,443,403 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1738 | 843,821 | 1,443,373 | 648.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1739 | 843,813 | 1,443,374 | 647.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1740 | 843,761 | 1,443,399 | 646.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1741 | 843,754 | 1,443,397 | 646.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1742 | 843,751 | 1,443,400 | 646.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1743 | 844,677 | 1,443,312 | 686.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1744 | 844,304 | 1,443,163 | 674.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1745 | 844,318 | 1,443,178 | 673.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1746 | 844,345 | 1,443,179 | 674.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1747 | 844,350 | 1,443,143 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1748 | 844,333 | 1,443,109 | 674.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1749 | 844,367 | 1,443,189 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1750 | 844,384 | 1,443,199 | 673.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1751 | 844,404 | 1,443,202 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1752 | 844,409 | 1,443,166 | 676.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1753 | 844,356 | 1,443,088 | 675.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1754 | 844,344 | 1,443,094 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1755 | 844,298 | 1,443,051 | 674.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1756 | 844,304 | 1,443,031 | 672.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1757 | 844,277 | 1,443,026 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1758 | 844,364 | 1,443,037 | 673.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1759 | 844,407 | 1,443,050 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1760 | 844,440 | 1,443,103 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1761 | 844,413 | 1,443,204 | 673.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1762 | 844,424 | 1,443,200 | 673.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1763 | 844,436 | 1,443,207 | 672.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1764 | 844,473 | 1,443,196 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1765 | 844,511 | 1,443,179 | 678.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1766 | 844,531 | 1,443,186 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1767 | 844,573 | 1,443,194 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1768 | 844,582 | 1,443,194 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1769 | 844,598 | 1,443,192 | 681.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1770 | 844,612 | 1,443,183 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1771 | 844,619 | 1,443,207 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1772 | 844,627 | 1,443,206 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1773 | 844,636 | 1,443,200 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1774 | 844,701 | 1,443,225 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1775 | 844,711 | 1,443,226 | 687.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1776 | 844,721 | 1,443,230 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1777 | 844,737 | 1,443,236 | 689.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1778 | 844,747 | 1,443,232 | 690.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1779 | 844,775 | 1,443,232 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1780 | 844,784 | 1,443,224 | 690.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1781 | 844,802 | 1,443,246 | 695.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1782 | 844,806 | 1,443,244 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1783 | 844,827 | 1,443,251 | 692.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1784 | 844,833 | 1,443,258 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1785 | 844,868 | 1,443,242 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1786 | 844,880 | 1,443,245 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1787 | 844,894 | 1,443,254 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1788 | 844,917 | 1,443,269 | 691.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1789 | 844,929 | 1,443,284 | 695.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1790 | 844,967 | 1,443,302 | 696.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1791 | 844,978 | 1,443,310 | 697.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1792 | 845,008 | 1,443,297 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1793 | 845,045 | 1,443,338 | 698.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1794 | 845,052 | 1,443,343 | 697.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1795 | 845,061 | 1,443,347 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1796 | 845,080 | 1,443,349 | 695.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1797 | 845,375 | 1,443,360 | 686.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1798 | 845,379 | 1,443,374 | 687.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1799 | 845,237 | 1,443,396 | 690.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1800 | 845,266 | 1,443,433 | 691.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1801 | 844,346 | 1,442,983 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1802 | 844,435 | 1,443,055 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1803 | 844,460 | 1,443,072 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1804 | 844,464 | 1,443,055 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1805 | 844,456 | 1,443,042 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1806 | 844,501 | 1,443,045 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1807 | 844,493 | 1,443,041 | 681.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1808 | 844,516 | 1,443,076 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1809 | 844,531 | 1,443,085 | 689.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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VN-DAKAO WARD, District 1

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1810 | 844,538 | 1,443,078 | 689.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1811 | 844,546 | 1,443,083 | 689.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1812 | 844,546 | 1,443,058 | 688.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1813 | 844,546 | 1,443,052 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1814 | 844,527 | 1,443,023 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1815 | 844,533 | 1,443,016 | 680.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1816 | 844,540 | 1,443,022 | 681.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1817 | 844,476 | 1,443,016 | 675.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1818 | 844,459 | 1,443,018 | 675.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1819 | 844,496 | 1,443,007 | 675.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1820 | 844,500 | 1,442,993 | 674.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1821 | 844,558 | 1,443,013 | 680.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1822 | 844,566 | 1,443,018 | 681.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1823 | 844,580 | 1,443,024 | 681.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1824 | 844,598 | 1,443,028 | 680.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1825 | 844,587 | 1,443,061 | 685.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1826 | 844,584 | 1,443,067 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1827 | 844,579 | 1,443,081 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1828 | 844,602 | 1,443,087 | 684.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1829 | 844,617 | 1,443,084 | 683.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1830 | 844,630 | 1,443,085 | 683.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1831 | 844,588 | 1,443,127 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1832 | 844,568 | 1,443,138 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1833 | 844,616 | 1,443,146 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1834 | 844,623 | 1,443,148 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1835 | 844,649 | 1,443,136 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1836 | 844,667 | 1,443,137 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1837 | 844,675 | 1,443,150 | 686.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1838 | 844,647 | 1,443,181 | 683.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1839 | 844,720 | 1,443,156 | 689.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1840 | 844,760 | 1,443,160 | 688.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1841 | 844,772 | 1,443,163 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1842 | 844,781 | 1,443,186 | 686.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1843 | 844,805 | 1,443,186 | 684.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1844 | 844,818 | 1,443,163 | 683.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1845 | 844,846 | 1,443,179 | 685.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1846 | 844,878 | 1,443,189 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1847 | 844,901 | 1,443,216 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1848 | 844,919 | 1,443,195 | 685.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1849 | 844,948 | 1,443,245 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1850 | 844,958 | 1,443,251 | 692.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1851 | 844,974 | 1,443,252 | 694.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1852 | 844,969 | 1,443,223 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1853 | 844,984 | 1,443,222 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1854 | 845,050 | 1,443,253 | 693.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1855 | 845,056 | 1,443,289 | 696.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1856 | 845,066 | 1,443,291 | 695.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1857 | 845,136 | 1,443,297 | 689.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1858 | 845,153 | 1,443,307 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1859 | 845,143 | 1,443,244 | 686.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1860 | 845,195 | 1,443,263 | 684.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1861 | 845,106 | 1,443,228 | 688.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1862 | 845,098 | 1,443,221 | 688.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1863 | 845,084 | 1,443,212 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1864 | 845,013 | 1,443,195 | 688.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1865 | 845,006 | 1,443,192 | 687.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1866 | 844,999 | 1,443,187 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1867 | 844,988 | 1,443,187 | 687.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1868 | 844,978 | 1,443,183 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1869 | 844,969 | 1,443,178 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1870 | 844,941 | 1,443,166 | 681.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1871 | 844,911 | 1,443,149 | 678.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1872 | 844,882 | 1,443,140 | 678.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1873 | 844,892 | 1,443,148 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1874 | 844,888 | 1,443,111 | 675.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1875 | 844,924 | 1,443,108 | 673.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1876 | 844,810 | 1,443,113 | 683.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1877 | 844,844 | 1,443,140 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1878 | 844,837 | 1,443,080 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1879 | 844,805 | 1,443,059 | 679.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1880 | 844,791 | 1,443,062 | 680.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1881 | 844,759 | 1,443,055 | 682.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1882 | 844,736 | 1,443,051 | 682.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1883 | 844,751 | 1,443,113 | 687.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1884 | 844,783 | 1,443,125 | 685.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1885 | 844,741 | 1,443,105 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1886 | 844,729 | 1,443,104 | 687.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1887 | 844,701 | 1,443,098 | 687.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1888 | 844,694 | 1,443,096 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1889 | 844,671 | 1,443,087 | 686.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1890 | 844,660 | 1,443,085 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1891 | 844,704 | 1,443,049 | 680.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1892 | 844,680 | 1,443,039 | 677.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1893 | 844,655 | 1,443,038 | 676.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1894 | 844,632 | 1,443,045 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1895 | 844,573 | 1,442,984 | 673.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1896 | 844,559 | 1,442,981 | 674.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1897 | 844,541 | 1,442,978 | 674.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1898 | 844,509 | 1,442,962 | 673.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1899 | 844,502 | 1,442,959 | 673.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1900 | 844,497 | 1,442,943 | 672.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1901 | 844,466 | 1,442,953 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1902 | 844,453 | 1,442,943 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1903 | 844,421 | 1,442,985 | 672.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1904 | 844,400 | 1,442,977 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1905 | 844,392 | 1,442,988 | 670.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1906 | 844,430 | 1,442,935 | 672.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1907 | 844,407 | 1,442,933 | 671.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1908 | 844,385 | 1,442,937 | 669.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1909 | 844,386 | 1,442,911 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1910 | 844,386 | 1,442,871 | 666.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1911 | 845,109 | 1,443,142 | 677.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1912 | 845,093 | 1,443,136 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1913 | 845,073 | 1,443,131 | 679.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1914 | 845,060 | 1,443,128 | 679.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1915 | 845,089 | 1,443,104 | 674.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1916 | 845,109 | 1,443,115 | 674.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1917 | 845,164 | 1,443,058 | 667.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1918 | 844,408 | 1,443,119 | 678.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1919 | 844,403 | 1,443,116 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1920 | 844,409 | 1,443,115 | 678.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1921 | 844,455 | 1,443,126 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1922 | 844,463 | 1,443,129 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1923 | 844,453 | 1,443,137 | 677.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1924 | 844,448 | 1,443,146 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1925 | 844,437 | 1,443,148 | 676.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1926 | 844,450 | 1,443,164 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1927 | 844,436 | 1,443,159 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1928 | 844,429 | 1,443,164 | 676.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1929 | 844,479 | 1,443,136 | 679.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1930 | 844,494 | 1,443,117 | 682.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1931 | 844,523 | 1,443,117 | 685.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1932 | 844,543 | 1,443,138 | 684.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1933 | 843,782 | 1,443,140 | 665.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 1934 | 843,765 | 1,443,113 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1935 | 843,743 | 1,443,109 | 668.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1936 | 843,800 | 1,443,118 | 667.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1937 | 843,716 | 1,443,117 | 669.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1938 | 843,686 | 1,443,114 | 667.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1939 | 843,649 | 1,443,097 | 665.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1940 | 843,636 | 1,443,096 | 665.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1941 | 843,616 | 1,443,067 | 662.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1942 | 843,571 | 1,443,099 | 661.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1943 | 843,525 | 1,443,005 | 658.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1944 | 843,515 | 1,443,050 | 658.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1945 | 843,479 | 1,443,023 | 656.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1946 | 843,446 | 1,443,027 | 655.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1947 | 843,485 | 1,442,954 | 657.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1948 | 843,468 | 1,442,933 | 656.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1949 | 843,462 | 1,442,913 | 654.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1950 | 843,450 | 1,442,911 | 654.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1951 | 843,435 | 1,442,890 | 652.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1952 | 843,412 | 1,442,860 | 648.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1953 | 843,397 | 1,442,874 | 648.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1954 | 843,376 | 1,442,834 | 642.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1955 | 843,349 | 1,442,804 | 640.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1956 | 843,348 | 1,442,828 | 641.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1957 | 843,231 | 1,442,790 | 635.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1958 | 843,222 | 1,442,675 | 626.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1959 | 842,873 | 1,442,667 | 635.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1960 | 842,958 | 1,442,519 | 635.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1961 | 842,718 | 1,442,568 | 647.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1962 | 842,688 | 1,442,560 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1963 | 842,693 | 1,442,471 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1964 | 842,578 | 1,442,466 | 655.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1965 | 842,556 | 1,442,453 | 655.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1966 | 842,566 | 1,442,456 | 655.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1967 | 842,529 | 1,442,372 | 655.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1968 | 842,487 | 1,442,375 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1969 | 842,491 | 1,442,323 | 652.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1970 | 842,451 | 1,442,366 | 653.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1971 | 842,450 | 1,442,353 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1972 | 842,442 | 1,442,343 | 653.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1973 | 842,432 | 1,442,324 | 652.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1974 | 842,418 | 1,442,317 | 650.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1975 | 842,392 | 1,442,288 | 650.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1976 | 842,353 | 1,442,272 | 652.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1977 | 842,347 | 1,442,252 | 655.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1978 | 842,346 | 1,442,228 | 656.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1979 | 842,398 | 1,442,166 | 656.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1980 | 842,363 | 1,442,162 | 657.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1981 | 842,354 | 1,442,158 | 658.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1982 | 842,366 | 1,442,153 | 658.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1983 | 842,344 | 1,442,139 | 659.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1984 | 842,341 | 1,442,123 | 658.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1985 | 842,343 | 1,442,110 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1986 | 842,355 | 1,442,117 | 658.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1987 | 842,346 | 1,442,093 | 658.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1988 | 842,367 | 1,442,095 | 657.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1989 | 842,404 | 1,442,115 | 657.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1990 | 842,384 | 1,442,120 | 658.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1991 | 842,403 | 1,442,084 | 656.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1992 | 842,387 | 1,442,060 | 653.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1993 | 842,411 | 1,442,046 | 650.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1994 | 842,400 | 1,442,038 | 649.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1995 | 842,345 | 1,442,044 | 653.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | 842,330 | 1,441,978 | 643.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1997 | 842,326 | 1,441,938 | 640.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1998 | 842,326 | 1,441,926 | 639.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 1999 | 842,324 | 1,441,865 | 636.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2000 | 842,339 | 1,441,856 | 636.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2001 | 842,384 | 1,441,831 | 634.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2002 | 842,318 | 1,441,928 | 639.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2003 | 842,372 | 1,441,813 | 632.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2004 | 842,365 | 1,441,767 | 626.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2005 | 842,327 | 1,441,771 | 626.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2006 | 842,316 | 1,441,772 | 626.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2007 | 842,371 | 1,441,725 | 623.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2008 | 842,411 | 1,441,750 | 626.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2009 | 842,425 | 1,441,786 | 632.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2010 | 842,370 | 1,441,651 | 618.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2011 | 842,374 | 1,441,640 | 618.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2012 | 842,378 | 1,441,604 | 615.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2013 | 842,334 | 1,441,579 | 609.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2014 | 842,332 | 1,441,624 | 609.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2015 | 842,396 | 1,441,478 | 605.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2016 | 842,384 | 1,441,476 | 606.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2017 | 842,177 | 1,441,388 | 610.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2018 | 842,171 | 1,441,400 | 612.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2019 | 842,163 | 1,441,393 | 611.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2020 | 842,236 | 1,441,313 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2021 | 842,048 | 1,440,945 | 577.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2022 | 842,038 | 1,440,957 | 578.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2023 | 842,038 | 1,440,897 | 579.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2024 | 842,025 | 1,440,914 | 580.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2025 | 842,021 | 1,440,880 | 582.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2026 | 842,017 | 1,440,864 | 582.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2027 | 842,036 | 1,440,866 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2028 | 842,020 | 1,440,843 | 581.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2029 | 842,030 | 1,440,843 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2030 | 842,010 | 1,440,845 | 581.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2031 | 842,055 | 1,440,856 | 579.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2032 | 842,068 | 1,440,827 | 582.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2033 | 842,076 | 1,440,823 | 582.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2034 | 842,080 | 1,440,835 | 581.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2035 | 842,097 | 1,440,841 | 580.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2036 | 842,104 | 1,440,836 | 580.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2037 | 842,107 | 1,440,834 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2038 | 842,073 | 1,440,797 | 585.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2039 | 842,055 | 1,440,784 | 585.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2040 | 842,047 | 1,440,794 | 583.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2041 | 841,990 | 1,440,717 | 589.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2042 | 842,066 | 1,440,728 | 592.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2043 | 842,123 | 1,440,775 | 586.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2044 | 842,386 | 1,440,799 | 592.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2045 | 842,360 | 1,440,795 | 586.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2046 | 842,343 | 1,440,800 | 584.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2047 | 842,334 | 1,440,780 | 583.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2048 | 842,327 | 1,440,779 | 583.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2049 | 842,318 | 1,440,784 | 582.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2050 | 842,294 | 1,440,780 | 579.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2051 | 842,291 | 1,440,777 | 579.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2052 | 842,283 | 1,440,770 | 579.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2053 | 842,271 | 1,440,769 | 579.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2054 | 842,256 | 1,440,772 | 580.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2055 | 842,246 | 1,440,808 | 581.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2056 | 842,229 | 1,440,819 | 581.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2057 | 842,210 | 1,440,826 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2058 | 842,231 | 1,440,843 | 581.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2059 | 842,239 | 1,440,855 | 581.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2060 | 842,285 | 1,440,864 | 584.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2061 | 842,279 | 1,440,834 | 583.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2062 | 842,302 | 1,440,830 | 583.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2063 | 842,318 | 1,440,831 | 584.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2064 | 842,323 | 1,440,840 | 585.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2065 | 842,295 | 1,440,870 | 584.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2066 | 842,320 | 1,440,888 | 588.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2067 | 842,403 | 1,440,796 | 595.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2068 | 842,352 | 1,440,901 | 592.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2069 | 842,367 | 1,440,879 | 594.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2070 | 842,399 | 1,440,896 | 598.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2071 | 842,379 | 1,440,912 | 596.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2072 | 842,402 | 1,440,920 | 597.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2073 | 842,434 | 1,440,893 | 600.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2074 | 842,437 | 1,440,897 | 600.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2075 | 842,430 | 1,440,854 | 600.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2076 | 842,459 | 1,440,867 | 602.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2077 | 842,361 | 1,440,949 | 589.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2078 | 842,336 | 1,440,919 | 589.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2079 | 842,328 | 1,440,918 | 588.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2080 | 842,390 | 1,440,946 | 592.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2081 | 842,397 | 1,441,022 | 595.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2082 | 842,420 | 1,441,000 | 599.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2083 | 842,448 | 1,441,022 | 602.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2084 | 842,476 | 1,440,951 | 603.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2085 | 842,496 | 1,440,980 | 606.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2086 | 842,471 | 1,441,012 | 603.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2087 | 842,464 | 1,441,017 | 603.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2088 | 842,475 | 1,441,036 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2089 | 842,498 | 1,441,026 | 605.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2090 | 842,558 | 1,440,956 | 611.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2091 | 842,491 | 1,440,907 | 605.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2092 | 842,501 | 1,440,852 | 606.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2093 | 842,511 | 1,440,862 | 608.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2094 | 842,586 | 1,440,983 | 611.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2095 | 842,592 | 1,440,976 | 611.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2096 | 842,610 | 1,440,998 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2097 | 842,560 | 1,440,864 | 613.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2098 | 842,568 | 1,440,809 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2099 | 842,555 | 1,440,810 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2100 | 842,538 | 1,440,809 | 609.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2101 | 842,537 | 1,440,787 | 607.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2102 | 842,515 | 1,440,786 | 606.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2103 | 842,485 | 1,440,788 | 604.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2104 | 842,496 | 1,440,804 | 605.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2105 | 842,459 | 1,440,790 | 601.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2106 | 842,455 | 1,440,744 | 596.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2107 | 842,489 | 1,440,759 | 602.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2108 | 842,469 | 1,440,690 | 594.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2109 | 842,571 | 1,440,758 | 608.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2110 | 842,554 | 1,440,747 | 607.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2111 | 842,535 | 1,440,755 | 606.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2112 | 842,565 | 1,440,723 | 607.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2113 | 842,596 | 1,440,694 | 608.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2114 | 842,611 | 1,440,705 | 610.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2115 | 842,646 | 1,440,699 | 611.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2116 | 842,658 | 1,440,696 | 610.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2117 | 842,684 | 1,440,696 | 610.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2118 | 842,694 | 1,440,806 | 616.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2119 | 842,685 | 1,440,811 | 615.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2120 | 842,674 | 1,440,805 | 615.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2121 | 842,668 | 1,440,808 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2122 | 842,658 | 1,440,803 | 614.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2123 | 842,649 | 1,440,806 | 614.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2124 | 842,637 | 1,440,801 | 614.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2125 | 842,625 | 1,440,787 | 613.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2126 | 842,603 | 1,440,806 | 614.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2127 | 842,590 | 1,440,801 | 612.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2128 | 842,608 | 1,440,701 | 609.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2129 | 842,711 | 1,440,693 | 610.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2130 | 842,628 | 1,440,871 | 614.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2131 | 842,655 | 1,440,848 | 613.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2132 | 842,677 | 1,440,854 | 614.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2133 | 842,705 | 1,440,851 | 614.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2134 | 842,721 | 1,440,895 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2135 | 842,720 | 1,440,931 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2136 | 842,754 | 1,440,901 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2137 | 842,770 | 1,440,923 | 618.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2138 | 842,781 | 1,440,927 | 618.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2139 | 842,794 | 1,440,933 | 620.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2140 | 842,806 | 1,440,929 | 622.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2141 | 842,767 | 1,440,814 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2142 | 842,756 | 1,440,802 | 616.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2143 | 842,820 | 1,440,799 | 614.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2144 | 842,775 | 1,440,671 | 611.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2145 | 842,780 | 1,440,662 | 610.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2146 | 842,775 | 1,440,640 | 608.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2147 | 842,766 | 1,440,624 | 607.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2148 | 842,726 | 1,440,588 | 604.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2149 | 842,782 | 1,440,552 | 610.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2150 | 842,743 | 1,440,487 | 609.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2151 | 842,729 | 1,440,523 | 607.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2152 | 842,724 | 1,440,533 | 606.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2153 | 842,769 | 1,440,489 | 610.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2154 | 842,786 | 1,440,500 | 611.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2155 | 842,784 | 1,440,482 | 610.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2156 | 842,794 | 1,440,476 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2157 | 842,813 | 1,440,497 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2158 | 842,836 | 1,440,485 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2159 | 842,845 | 1,440,488 | 615.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2160 | 842,805 | 1,440,535 | 611.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2161 | 842,818 | 1,440,530 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2162 | 842,842 | 1,440,547 | 613.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2163 | 842,854 | 1,440,548 | 614.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2164 | 842,834 | 1,440,571 | 611.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2165 | 842,840 | 1,440,602 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2166 | 842,871 | 1,440,487 | 618.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2167 | 842,889 | 1,440,495 | 619.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2168 | 842,874 | 1,440,533 | 616.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2169 | 842,929 | 1,440,527 | 622.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2170 | 842,959 | 1,440,541 | 619.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2171 | 842,945 | 1,440,578 | 617.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2172 | 842,917 | 1,440,591 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2173 | 842,924 | 1,440,501 | 621.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2174 | 842,941 | 1,440,500 | 620.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2175 | 842,936 | 1,440,489 | 620.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2176 | 842,956 | 1,440,482 | 618.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2177 | 842,990 | 1,440,494 | 616.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2178 | 842,995 | 1,440,483 | 615.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2179 | 843,030 | 1,440,510 | 615.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2180 | 843,051 | 1,440,500 | 616.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2181 | 843,090 | 1,440,504 | 620.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2182 | 842,911 | 1,440,435 | 614.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2183 | 842,940 | 1,440,439 | 614.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2184 | 842,963 | 1,440,376 | 610.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2185 | 842,997 | 1,440,420 | 612.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2186 | 842,962 | 1,440,426 | 612.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2187 | 842,945 | 1,440,417 | 612.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2188 | 842,913 | 1,440,417 | 612.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2189 | 842,905 | 1,440,418 | 612.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2190 | 842,894 | 1,440,383 | 609.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2191 | 842,889 | 1,440,371 | 607.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2192 | 842,732 | 1,440,593 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2193 | 842,820 | 1,440,711 | 610.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2194 | 842,868 | 1,440,671 | 614.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2195 | 842,842 | 1,440,635 | 611.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2196 | 842,836 | 1,440,639 | 610.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2197 | 842,872 | 1,440,728 | 614.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2198 | 843,063 | 1,440,385 | 614.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2199 | 843,069 | 1,440,449 | 616.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2200 | 843,047 | 1,440,451 | 616.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2201 | 843,034 | 1,440,446 | 616.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2202 | 842,931 | 1,440,262 | 597.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2203 | 842,949 | 1,440,264 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2204 | 842,892 | 1,440,265 | 597.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2205 | 842,888 | 1,440,307 | 601.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2206 | 843,104 | 1,440,342 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2207 | 843,126 | 1,440,328 | 614.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2208 | 843,150 | 1,440,353 | 616.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2209 | 843,186 | 1,440,345 | 620.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2210 | 843,128 | 1,440,378 | 616.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2211 | 843,149 | 1,440,437 | 618.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2212 | 843,144 | 1,440,433 | 617.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2213 | 843,144 | 1,440,481 | 622.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2214 | 843,138 | 1,440,479 | 622.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2215 | 843,130 | 1,440,484 | 621.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2216 | 843,220 | 1,440,456 | 623.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2217 | 843,201 | 1,440,450 | 622.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2218 | 843,228 | 1,440,477 | 623.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2219 | 843,273 | 1,440,445 | 626.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2220 | 843,159 | 1,440,516 | 626.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2221 | 843,227 | 1,440,398 | 622.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2222 | 843,248 | 1,440,365 | 625.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2223 | 843,278 | 1,440,360 | 626.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2224 | 843,305 | 1,440,354 | 626.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2225 | 843,428 | 1,440,484 | 636.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2226 | 842,010 | 1,440,524 | 613.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2227 | 842,113 | 1,440,531 | 608.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2228 | 842,142 | 1,440,533 | 604.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2229 | 842,142 | 1,440,571 | 602.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2230 | 842,144 | 1,440,580 | 602.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2231 | 842,178 | 1,440,586 | 601.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2232 | 842,167 | 1,440,537 | 600.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2233 | 842,181 | 1,440,534 | 598.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2234 | 842,191 | 1,440,538 | 598.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2235 | 842,222 | 1,440,534 | 596.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2236 | 842,230 | 1,440,536 | 596.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2237 | 842,217 | 1,440,578 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2238 | 842,218 | 1,440,599 | 598.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2239 | 842,266 | 1,440,598 | 595.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2240 | 842,230 | 1,440,475 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2241 | 842,136 | 1,440,480 | 608.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2242 | 842,145 | 1,440,508 | 605.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2243 | 842,273 | 1,440,433 | 603.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2244 | 842,265 | 1,440,432 | 604.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2245 | 842,253 | 1,440,434 | 604.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2246 | 842,242 | 1,440,444 | 603.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2247 | 842,299 | 1,440,451 | 599.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2248 | 842,321 | 1,440,468 | 597.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2249 | 842,292 | 1,440,501 | 596.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2250 | 842,338 | 1,440,471 | 597.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2251 | 842,350 | 1,440,470 | 597.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2252 | 842,372 | 1,440,522 | 593.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2253 | 842,385 | 1,440,473 | 596.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2254 | 842,399 | 1,440,467 | 595.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2255 | 842,406 | 1,440,428 | 598.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2256 | 842,400 | 1,440,413 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2257 | 842,347 | 1,440,412 | 598.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2258 | 842,345 | 1,440,425 | 598.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2259 | 842,316 | 1,440,415 | 601.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2260 | 842,312 | 1,440,407 | 602.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2261 | 842,294 | 1,440,401 | 605.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2262 | 842,257 | 1,440,392 | 609.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2263 | 842,356 | 1,440,367 | 600.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2264 | 842,427 | 1,440,328 | 601.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2265 | 842,429 | 1,440,315 | 601.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2266 | 842,495 | 1,440,343 | 599.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2267 | 842,483 | 1,440,360 | 598.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2268 | 842,467 | 1,440,429 | 594.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2269 | 842,451 | 1,440,438 | 595.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2270 | 842,463 | 1,440,385 | 598.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2271 | 842,447 | 1,440,377 | 599.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2272 | 842,621 | 1,440,338 | 593.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2273 | 842,600 | 1,440,310 | 600.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2274 | 842,581 | 1,440,302 | 602.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2275 | 842,573 | 1,440,299 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2276 | 842,659 | 1,440,281 | 598.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2277 | 841,909 | 1,440,778 | 583.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2278 | 841,900 | 1,440,764 | 585.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2279 | 841,939 | 1,440,765 | 586.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2280 | 849,741 | 1,447,067 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2281 | 849,725 | 1,447,111 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2282 | 849,777 | 1,447,077 | 768.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2283 | 849,812 | 1,447,092 | 767.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2284 | 849,808 | 1,447,127 | 763.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2285 | 843,428 | 1,443,637 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2286 | 843,361 | 1,443,629 | 658.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2287 | 843,442 | 1,443,559 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2288 | 843,391 | 1,443,357 | 660.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2289 | 843,255 | 1,443,331 | 658.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2290 | 843,251 | 1,443,444 | 663.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2291 | 843,449 | 1,443,160 | 664.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2292 | 843,562 | 1,445,792 | 657.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2293 | 843,512 | 1,445,188 | 645.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2294 | 843,599 | 1,445,158 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2295 | 843,632 | 1,445,191 | 651.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2296 | 843,618 | 1,445,109 | 648.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2297 | 843,641 | 1,445,063 | 647.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2298 | 843,772 | 1,445,124 | 653.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2299 | 843,727 | 1,445,170 | 656.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2300 | 843,813 | 1,445,166 | 656.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2301 | 844,024 | 1,445,058 | 652.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2302 | 844,008 | 1,445,049 | 651.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2303 | 843,971 | 1,444,990 | 647.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2304 | 844,104 | 1,444,958 | 647.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2305 | 844,212 | 1,444,995 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

Licensed user:
ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2306 | 844,965 | 1,444,806 | 652.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2307 | 845,033 | 1,444,726 | 652.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2308 | 845,139 | 1,444,554 | 660.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2309 | 845,336 | 1,444,616 | 663.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2310 | 845,085 | 1,444,393 | 660.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2311 | 845,329 | 1,444,091 | 679.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2312 | 845,415 | 1,444,117 | 681.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2313 | 845,594 | 1,444,036 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2314 | 845,492 | 1,444,234 | 687.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2315 | 845,700 | 1,444,327 | 682.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2316 | 846,640 | 1,444,704 | 689.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2317 | 846,166 | 1,444,756 | 676.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2318 | 846,141 | 1,444,914 | 671.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2319 | 846,131 | 1,444,933 | 669.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2320 | 845,950 | 1,444,754 | 660.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2321 | 845,876 | 1,444,882 | 663.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2322 | 846,065 | 1,444,979 | 664.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2323 | 845,904 | 1,445,091 | 660.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2324 | 845,688 | 1,444,950 | 648.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2325 | 845,592 | 1,445,390 | 637.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2326 | 845,449 | 1,445,401 | 630.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2327 | 845,412 | 1,445,508 | 624.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2328 | 845,489 | 1,445,463 | 632.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2329 | 845,288 | 1,445,564 | 598.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2330 | 847,080 | 1,444,645 | 684.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2331 | 847,119 | 1,444,628 | 688.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2332 | 847,049 | 1,444,750 | 683.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2333 | 846,993 | 1,444,823 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2334 | 846,931 | 1,445,014 | 675.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2335 | 846,968 | 1,445,117 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2336 | 846,745 | 1,445,250 | 671.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2337 | 846,728 | 1,445,216 | 666.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2338 | 846,700 | 1,445,173 | 660.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2339 | 846,802 | 1,445,309 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2340 | 846,775 | 1,445,325 | 686.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2341 | 846,758 | 1,445,360 | 684.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2342 | 846,616 | 1,445,456 | 678.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2343 | 846,418 | 1,445,548 | 684.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2344 | 846,357 | 1,445,628 | 671.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2345 | 845,879 | 1,445,636 | 636.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2346 | 845,856 | 1,445,691 | 633.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2347 | 845,822 | 1,445,698 | 626.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2348 | 845,812 | 1,445,784 | 632.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2349 | 845,783 | 1,445,853 | 641.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2350 | 845,389 | 1,445,950 | 636.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2351 | 845,422 | 1,446,019 | 636.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2352 | 845,213 | 1,446,161 | 631.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2353 | 845,228 | 1,446,203 | 628.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2354 | 845,248 | 1,446,194 | 628.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2355 | 845,107 | 1,446,245 | 627.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2356 | 845,079 | 1,446,253 | 625.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2357 | 845,142 | 1,446,316 | 623.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2358 | 844,958 | 1,446,440 | 618.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2359 | 845,122 | 1,446,563 | 581.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2360 | 844,829 | 1,446,462 | 624.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2361 | 844,934 | 1,446,541 | 613.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2362 | 844,710 | 1,446,513 | 619.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2363 | 844,558 | 1,446,502 | 612.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2364 | 844,198 | 1,446,501 | 571.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2365 | 844,171 | 1,446,634 | 564.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2366 | 844,335 | 1,446,875 | 561.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2367 | 844,148 | 1,447,000 | 568.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z [m] | Width [m] | Height [m] | Elevation a.g.l. [m] | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|---|---|---|---|---|---|---|---|---|---|
| 2368 | 844,130 | 1,446,987 | 568.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2369 | 844,035 | 1,447,008 | 574.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2370 | 843,938 | 1,446,891 | 561.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2371 | 843,828 | 1,446,949 | 561.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2372 | 844,432 | 1,446,966 | 575.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2373 | 844,478 | 1,446,913 | 566.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2374 | 844,498 | 1,447,008 | 576.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2375 | 844,511 | 1,447,028 | 576.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2376 | 844,097 | 1,447,293 | 611.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2377 | 843,908 | 1,447,347 | 590.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2378 | 844,649 | 1,446,941 | 559.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2379 | 844,614 | 1,446,984 | 560.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2380 | 844,669 | 1,446,874 | 564.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2381 | 844,745 | 1,447,115 | 562.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2382 | 844,888 | 1,446,827 | 573.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2383 | 844,941 | 1,446,930 | 567.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2384 | 844,897 | 1,447,068 | 567.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2385 | 845,577 | 1,446,922 | 593.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2386 | 845,233 | 1,446,865 | 596.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2387 | 845,321 | 1,446,819 | 595.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2388 | 845,374 | 1,446,859 | 600.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2389 | 845,407 | 1,446,894 | 605.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2390 | 845,391 | 1,446,923 | 603.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2391 | 845,497 | 1,446,813 | 592.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2392 | 845,653 | 1,446,941 | 595.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2393 | 845,799 | 1,446,847 | 591.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2394 | 845,848 | 1,446,817 | 588.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2395 | 846,000 | 1,446,848 | 590.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2396 | 846,110 | 1,446,943 | 617.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2397 | 846,116 | 1,447,026 | 627.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2398 | 846,356 | 1,446,948 | 632.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2399 | 846,303 | 1,446,963 | 638.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2400 | 846,399 | 1,447,115 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2401 | 846,625 | 1,447,199 | 676.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2402 | 846,674 | 1,446,956 | 664.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2403 | 847,014 | 1,447,423 | 704.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2404 | 847,163 | 1,447,203 | 685.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2405 | 847,290 | 1,447,292 | 699.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2406 | 847,407 | 1,447,352 | 692.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2407 | 848,384 | 1,445,011 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2408 | 848,484 | 1,442,337 | 794.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2409 | 848,478 | 1,442,322 | 794.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2410 | 848,579 | 1,442,608 | 791.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2411 | 848,478 | 1,442,508 | 798.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2412 | 848,156 | 1,442,543 | 764.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2413 | 848,208 | 1,442,486 | 758.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2414 | 847,763 | 1,442,523 | 748.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2415 | 847,335 | 1,442,712 | 713.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2416 | 847,289 | 1,442,634 | 712.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2417 | 847,984 | 1,440,844 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2418 | 847,316 | 1,440,659 | 666.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2419 | 847,308 | 1,440,650 | 667.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2420 | 847,312 | 1,440,688 | 665.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2421 | 847,378 | 1,440,689 | 664.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2422 | 847,380 | 1,440,705 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2423 | 847,229 | 1,440,498 | 681.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2424 | 847,241 | 1,440,330 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2425 | 847,129 | 1,440,482 | 693.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2426 | 846,610 | 1,439,962 | 655.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2427 | 846,701 | 1,439,969 | 652.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2428 | 846,575 | 1,439,880 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2429 | 846,505 | 1,439,961 | 660.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2430 | 846,551 | 1,440,103 | 643.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2431 | 846,339 | 1,440,072 | 647.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2432 | 846,310 | 1,439,954 | 662.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2433 | 846,157 | 1,440,056 | 650.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2434 | 845,877 | 1,443,571 | 690.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2435 | 845,965 | 1,443,445 | 691.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2436 | 845,994 | 1,443,414 | 690.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2437 | 846,194 | 1,443,239 | 679.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2438 | 846,115 | 1,443,080 | 676.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2439 | 845,993 | 1,443,164 | 681.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2440 | 845,715 | 1,442,955 | 655.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2441 | 847,108 | 1,446,141 | 609.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2442 | 847,162 | 1,446,092 | 616.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2443 | 848,744 | 1,446,651 | 737.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2444 | 848,726 | 1,446,652 | 736.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2445 | 848,722 | 1,446,651 | 735.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2446 | 848,691 | 1,446,642 | 736.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2447 | 848,700 | 1,446,658 | 733.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2448 | 848,726 | 1,446,617 | 736.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2449 | 848,611 | 1,446,594 | 734.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2450 | 848,601 | 1,446,619 | 732.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2451 | 849,049 | 1,446,745 | 763.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2452 | 849,033 | 1,446,738 | 762.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2453 | 848,976 | 1,446,383 | 732.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2454 | 848,324 | 1,442,167 | 787.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2455 | 847,552 | 1,441,852 | 699.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2456 | 847,442 | 1,441,790 | 691.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2457 | 847,422 | 1,441,782 | 690.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2458 | 847,256 | 1,441,361 | 667.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2459 | 846,667 | 1,440,642 | 654.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2460 | 846,725 | 1,440,654 | 651.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2461 | 847,155 | 1,440,682 | 668.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2462 | 844,195 | 1,442,469 | 651.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2463 | 844,106 | 1,442,290 | 644.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2464 | 844,098 | 1,442,322 | 645.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2465 | 843,862 | 1,442,701 | 640.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2466 | 843,230 | 1,441,803 | 615.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2467 | 843,017 | 1,441,072 | 620.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2468 | 843,235 | 1,441,057 | 630.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2469 | 846,642 | 1,442,652 | 687.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2470 | 846,714 | 1,442,470 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2471 | 846,719 | 1,442,317 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2472 | 846,772 | 1,442,292 | 699.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2473 | 846,513 | 1,442,098 | 695.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2474 | 846,567 | 1,442,203 | 698.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2475 | 846,527 | 1,441,988 | 690.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2476 | 846,417 | 1,441,922 | 690.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2477 | 846,232 | 1,441,461 | 680.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2478 | 845,795 | 1,441,419 | 659.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2479 | 846,392 | 1,441,616 | 678.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2480 | 855,530 | 1,452,119 | 819.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2481 | 855,676 | 1,452,149 | 817.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2482 | 855,826 | 1,452,201 | 812.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2483 | 855,815 | 1,452,243 | 810.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2484 | 855,985 | 1,452,111 | 798.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2485 | 855,909 | 1,452,083 | 812.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2486 | 856,108 | 1,452,030 | 790.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2487 | 855,173 | 1,451,878 | 804.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2488 | 855,014 | 1,451,914 | 797.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2489 | 853,068 | 1,450,756 | 803.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2490 | 853,094 | 1,450,745 | 804.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2491 | 853,191 | 1,450,722 | 800.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2492 | 853,163 | 1,450,720 | 801.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2493 | 855,851 | 1,449,897 | 760.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2494 | 853,507 | 1,447,205 | 771.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2495 | 853,660 | 1,447,061 | 771.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2496 | 853,805 | 1,447,014 | 771.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2497 | 854,023 | 1,446,973 | 776.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2498 | 853,803 | 1,446,717 | 770.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2499 | 853,775 | 1,446,664 | 772.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2500 | 853,774 | 1,446,578 | 776.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2501 | 853,415 | 1,446,365 | 770.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2502 | 853,664 | 1,446,195 | 767.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2503 | 853,218 | 1,445,910 | 770.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2504 | 852,970 | 1,445,880 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2505 | 852,989 | 1,445,762 | 765.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2506 | 853,145 | 1,445,782 | 765.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2507 | 853,119 | 1,445,670 | 767.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2508 | 852,983 | 1,445,580 | 757.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2509 | 852,621 | 1,445,708 | 760.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2510 | 852,593 | 1,445,629 | 756.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2511 | 852,336 | 1,445,681 | 758.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2512 | 852,352 | 1,445,684 | 758.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2513 | 852,287 | 1,445,517 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2514 | 852,192 | 1,445,748 | 746.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2515 | 852,433 | 1,445,830 | 755.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2516 | 852,303 | 1,445,787 | 752.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2517 | 852,207 | 1,445,755 | 746.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2518 | 852,269 | 1,445,438 | 753.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2519 | 852,221 | 1,445,429 | 750.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2520 | 852,298 | 1,445,322 | 749.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2521 | 852,102 | 1,445,307 | 741.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2522 | 851,830 | 1,445,260 | 718.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2523 | 852,810 | 1,444,222 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2524 | 852,807 | 1,444,227 | 721.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2525 | 852,778 | 1,444,220 | 719.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2526 | 852,883 | 1,444,220 | 728.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2527 | 853,001 | 1,444,153 | 731.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2528 | 853,221 | 1,444,706 | 753.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2529 | 854,464 | 1,444,434 | 764.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2530 | 854,601 | 1,444,292 | 755.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2531 | 855,548 | 1,446,694 | 804.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2532 | 855,637 | 1,446,691 | 803.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2533 | 855,164 | 1,448,511 | 783.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2534 | 854,945 | 1,448,538 | 761.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2535 | 855,249 | 1,448,426 | 784.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2536 | 855,344 | 1,448,357 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2537 | 855,292 | 1,448,665 | 778.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2538 | 855,738 | 1,447,439 | 801.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2539 | 855,701 | 1,447,541 | 799.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2540 | 855,720 | 1,447,523 | 801.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2541 | 855,845 | 1,447,579 | 800.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2542 | 855,823 | 1,447,639 | 799.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2543 | 855,745 | 1,447,763 | 795.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2544 | 855,740 | 1,447,725 | 793.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2545 | 855,734 | 1,447,724 | 793.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2546 | 855,726 | 1,447,750 | 794.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2547 | 855,718 | 1,447,713 | 792.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2548 | 855,771 | 1,447,893 | 791.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2549 | 855,822 | 1,447,908 | 791.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2550 | 855,695 | 1,448,082 | 790.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2551 | 855,536 | 1,448,145 | 787.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2552 | 855,709 | 1,448,492 | 785.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2553 | 855,777 | 1,448,698 | 785.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2554 | 855,797 | 1,448,803 | 781.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2555 | 855,899 | 1,448,801 | 777.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2556 | 855,968 | 1,448,361 | 790.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2557 | 855,980 | 1,448,379 | 790.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2558 | 855,774 | 1,448,327 | 790.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2559 | 855,979 | 1,448,032 | 790.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2560 | 856,036 | 1,448,059 | 786.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2561 | 856,155 | 1,448,044 | 777.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2562 | 854,875 | 1,447,505 | 775.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2563 | 844,817 | 1,441,289 | 642.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2564 | 845,014 | 1,441,463 | 662.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2565 | 844,611 | 1,441,114 | 634.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2566 | 844,505 | 1,440,967 | 627.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2567 | 845,385 | 1,441,237 | 630.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2568 | 845,366 | 1,441,320 | 644.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2569 | 844,615 | 1,442,157 | 618.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2570 | 841,893 | 1,443,025 | 630.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2571 | 842,007 | 1,442,776 | 626.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2572 | 841,940 | 1,442,610 | 615.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2573 | 841,757 | 1,442,448 | 585.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2574 | 842,087 | 1,442,718 | 618.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2575 | 842,357 | 1,442,455 | 656.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2576 | 842,311 | 1,442,455 | 653.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2577 | 842,303 | 1,442,410 | 650.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2578 | 842,309 | 1,442,414 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2579 | 842,321 | 1,442,401 | 649.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2580 | 842,300 | 1,442,446 | 651.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2581 | 843,147 | 1,443,146 | 644.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2582 | 843,158 | 1,443,068 | 642.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2583 | 847,483 | 1,446,697 | 681.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2584 | 847,420 | 1,446,790 | 695.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2585 | 847,398 | 1,446,821 | 693.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2586 | 847,443 | 1,446,891 | 702.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2587 | 847,384 | 1,446,924 | 690.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2588 | 847,424 | 1,446,989 | 691.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2589 | 847,818 | 1,446,972 | 718.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2590 | 847,832 | 1,446,892 | 699.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2591 | 848,194 | 1,445,018 | 755.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2592 | 848,186 | 1,445,052 | 756.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2593 | 848,393 | 1,444,999 | 767.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2594 | 848,375 | 1,444,965 | 763.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2595 | 848,411 | 1,445,174 | 738.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2596 | 848,218 | 1,445,137 | 759.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2597 | 848,079 | 1,445,326 | 731.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2598 | 846,127 | 1,439,364 | 670.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2599 | 846,081 | 1,439,366 | 672.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2600 | 846,301 | 1,439,493 | 669.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2601 | 847,645 | 1,439,577 | 668.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2602 | 847,806 | 1,439,638 | 672.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2603 | 847,900 | 1,439,635 | 675.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2604 | 847,280 | 1,439,802 | 653.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2605 | 848,017 | 1,441,153 | 697.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2606 | 848,032 | 1,441,147 | 695.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2607 | 848,021 | 1,441,135 | 692.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2608 | 853,523 | 1,444,650 | 723.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2609 | 853,559 | 1,444,654 | 719.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2610 | 853,656 | 1,445,612 | 730.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2611 | 853,575 | 1,445,602 | 740.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2612 | 853,833 | 1,445,880 | 734.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2613 | 853,631 | 1,445,995 | 762.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2614 | 853,964 | 1,446,101 | 741.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2615 | 854,547 | 1,446,409 | 757.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

To be continued on next page...

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ERM
Level 3, 09 Dinh Tien Hoang St
VN-DAKAO WARD, District 1

Nam Le / nam.le@erm.com
Calculated:
7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2616 | 854,642 | 1,446,393 | 755.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2617 | 854,681 | 1,446,448 | 766.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2618 | 855,442 | 1,446,473 | 778.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2619 | 845,199 | 1,447,921 | 683.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2620 | 845,195 | 1,447,748 | 649.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2621 | 845,324 | 1,447,844 | 666.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2622 | 844,996 | 1,447,944 | 667.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2623 | 844,952 | 1,447,814 | 663.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2624 | 844,577 | 1,447,898 | 647.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2625 | 844,402 | 1,447,876 | 639.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2626 | 844,449 | 1,447,871 | 641.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2627 | 844,497 | 1,447,746 | 653.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2628 | 844,203 | 1,447,779 | 612.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2629 | 844,232 | 1,447,790 | 619.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2630 | 848,822 | 1,447,504 | 749.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2631 | 848,820 | 1,447,673 | 764.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2632 | 845,867 | 1,447,894 | 661.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2633 | 844,531 | 1,443,297 | 673.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2634 | 844,441 | 1,443,268 | 668.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2635 | 844,425 | 1,443,238 | 670.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2636 | 844,661 | 1,443,294 | 686.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2637 | 844,649 | 1,443,344 | 684.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2638 | 844,619 | 1,443,446 | 678.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2639 | 844,673 | 1,443,455 | 681.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2640 | 844,636 | 1,443,470 | 678.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2641 | 844,859 | 1,443,603 | 677.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2642 | 844,616 | 1,443,615 | 666.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2643 | 845,373 | 1,443,473 | 696.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2644 | 845,386 | 1,443,465 | 693.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2645 | 845,032 | 1,444,140 | 672.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2646 | 844,892 | 1,444,109 | 669.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2647 | 844,885 | 1,444,136 | 669.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2648 | 844,686 | 1,444,492 | 661.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2649 | 844,402 | 1,444,399 | 665.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2650 | 844,413 | 1,444,602 | 647.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2651 | 844,492 | 1,444,517 | 660.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2652 | 844,188 | 1,444,172 | 680.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2653 | 844,512 | 1,444,136 | 679.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2654 | 844,027 | 1,444,611 | 653.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2655 | 844,173 | 1,444,633 | 650.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2656 | 844,447 | 1,444,855 | 649.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2657 | 843,977 | 1,444,207 | 677.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2658 | 843,877 | 1,443,723 | 640.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2659 | 845,018 | 1,443,373 | 701.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2660 | 844,721 | 1,443,295 | 687.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2661 | 845,860 | 1,443,668 | 696.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2662 | 847,351 | 1,443,766 | 710.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2663 | 847,176 | 1,443,753 | 696.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2664 | 847,166 | 1,443,765 | 694.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2665 | 845,842 | 1,444,588 | 664.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2666 | 846,915 | 1,438,916 | 650.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2667 | 846,768 | 1,438,918 | 640.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2668 | 856,018 | 1,446,794 | 807.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2669 | 856,022 | 1,446,781 | 807.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2670 | 856,072 | 1,446,767 | 805.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2671 | 850,453 | 1,448,499 | 741.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2672 | 850,459 | 1,448,496 | 741.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2673 | 850,459 | 1,448,496 | 741.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2674 | 850,483 | 1,448,550 | 744.2 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2675 | 850,455 | 1,448,560 | 746.5 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2676 | 850,447 | 1,448,548 | 745.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2677 | 850,477 | 1,448,467 | 740.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

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# SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Easting | Northing | Z | Width | Height | Elevation a.g.l. | Slope of window | Direction mode | Eye height (ZVI) a.g.l. |
|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | [m] | [m] | [m] | [°] | | [m] |
| 2678 | 850,481 | 1,448,470 | 740.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2679 | 850,418 | 1,448,692 | 756.3 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2680 | 850,431 | 1,448,734 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2681 | 850,426 | 1,448,869 | 752.4 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2682 | 850,438 | 1,448,954 | 750.1 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2683 | 850,457 | 1,449,050 | 747.0 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2684 | 850,462 | 1,449,017 | 745.9 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2685 | 850,514 | 1,449,049 | 737.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2686 | 849,232 | 1,444,951 | 763.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2687 | 849,216 | 1,444,969 | 764.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2688 | 849,252 | 1,444,931 | 761.6 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2689 | 849,243 | 1,444,897 | 755.8 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |
| 2690 | 849,242 | 1,444,886 | 753.7 | 1.0 | 1.0 | 1.0 | 90.0 | "Green house mode" | 2.0 |

## Calculation Results

Shadow receptor

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1 | 0:00 |
| 2 | 0:00 |
| 3 | 0:00 |
| 4 | 0:00 |
| 5 | 0:00 |
| 6 | 0:00 |
| 7 | 0:00 |
| 8 | 0:00 |
| 9 | 0:00 |
| 10 | 0:00 |
| 11 | 0:00 |
| 12 | 1:18 |
| 13 | 0:21 |
| 14 | 0:00 |
| 15 | 2:31 |
| 16 | 0:00 |
| 17 | 0:00 |
| 18 | 0:00 |
| 19 | 0:00 |
| 20 | 0:00 |
| 21 | 0:00 |
| 22 | 0:00 |
| 23 | 0:00 |
| 24 | 0:00 |
| 25 | 0:00 |
| 26 | 0:00 |
| 27 | 0:00 |
| 28 | 0:00 |
| 29 | 0:00 |
| 30 | 0:00 |
| 31 | 0:00 |
| 32 | 0:00 |
| 33 | 0:00 |
| 34 | 0:00 |
| 35 | 0:00 |
| 36 | 1:47 |
| 37 | 2:19 |
| 38 | 3:26 |
| 39 | 1:13 |
| 40 | 0:00 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| | Shadow, expected values |
|---|---|
| No. | Shadow hours per year [h/year] |
| 41 | 0:00 |
| 42 | 0:00 |
| 43 | 0:00 |
| 44 | 0:00 |
| 45 | 0:00 |
| 46 | 4:25 |
| 47 | 4:55 |
| 48 | 5:47 |
| 49 | 5:53 |
| 50 | 6:07 |
| 51 | 8:07 |
| 52 | 20:55 |
| 53 | 10:27 |
| 54 | 6:01 |
| 55 | 5:20 |
| 56 | 4:06 |
| 57 | 2:50 |
| 58 | 0:00 |
| 59 | 0:00 |
| 60 | 0:00 |
| 61 | 17:10 |
| 62 | 6:54 |
| 63 | 9:38 |
| 64 | 4:33 |
| 65 | 9:50 |
| 66 | 7:37 |
| 67 | 0:50 |
| 68 | 0:55 |
| 69 | 1:08 |
| 70 | 1:13 |
| 71 | 1:13 |
| 72 | 1:25 |
| 73 | 1:20 |
| 74 | 1:23 |
| 75 | 1:34 |
| 76 | 3:36 |
| 77 | 1:32 |
| 78 | 3:41 |
| 79 | 2:27 |
| 80 | 3:52 |
| 81 | 4:50 |
| 82 | 10:38 |
| 83 | 11:55 |
| 84 | 10:40 |
| 85 | 12:06 |
| 86 | 12:10 |
| 87 | 37:40 |
| 88 | 7:07 |
| 89 | 10:36 |
| 90 | 14:20 |
| 91 | 15:15 |
| 92 | 12:19 |
| 93 | 13:42 |
| 94 | 60:57 |
| 95 | 38:15 |
| 96 | 16:10 |
| 97 | 18:28 |
| 98 | 23:07 |
| 99 | 44:32 |
| 100 | 28:39 |
| 101 | 31:47 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 102 | 19:53 |
| 103 | 28:33 |
| 104 | 9:36 |
| 105 | 8:03 |
| 106 | 27:34 |
| 107 | 25:12 |
| 108 | 30:17 |
| 109 | 55:04 |
| 110 | 67:43 |
| 111 | 73:52 |
| 112 | 10:36 |
| 113 | 9:31 |
| 114 | 8:28 |
| 115 | 6:27 |
| 116 | 6:16 |
| 117 | 6:04 |
| 118 | 5:59 |
| 119 | 4:31 |
| 120 | 4:05 |
| 121 | 4:34 |
| 122 | 3:45 |
| 123 | 3:53 |
| 124 | 4:17 |
| 125 | 3:51 |
| 126 | 3:08 |
| 127 | 3:13 |
| 128 | 3:21 |
| 129 | 2:57 |
| 130 | 1:56 |
| 131 | 1:53 |
| 132 | 0:00 |
| 133 | 3:00 |
| 134 | 3:00 |
| 135 | 2:58 |
| 136 | 3:18 |
| 137 | 3:08 |
| 138 | 3:26 |
| 139 | 3:29 |
| 140 | 3:40 |
| 141 | 3:47 |
| 142 | 3:52 |
| 143 | 4:15 |
| 144 | 3:36 |
| 145 | 3:54 |
| 146 | 2:47 |
| 147 | 2:42 |
| 148 | 2:34 |
| 149 | 3:08 |
| 150 | 3:16 |
| 151 | 3:21 |
| 152 | 22:49 |
| 153 | 20:56 |
| 154 | 35:23 |
| 155 | 28:50 |
| 156 | 27:45 |
| 157 | 27:41 |
| 158 | 6:06 |
| 159 | 8:31 |
| 160 | 14:57 |
| 161 | 54:38 |
| 162 | 85:31 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 163 | 55:06 |
| 164 | 40:06 |
| 165 | 39:43 |
| 166 | 24:05 |
| 167 | 20:47 |
| 168 | 22:01 |
| 169 | 117:19 |
| 170 | 109:04 |
| 171 | 145:56 |
| 172 | 12:25 |
| 173 | 297:40 |
| 174 | 29:20 |
| 175 | 25:31 |
| 176 | 23:00 |
| 177 | 13:36 |
| 178 | 10:54 |
| 179 | 10:56 |
| 180 | 12:53 |
| 181 | 18:11 |
| 182 | 19:39 |
| 183 | 27:10 |
| 184 | 29:19 |
| 185 | 22:33 |
| 186 | 33:30 |
| 187 | 40:22 |
| 188 | 30:10 |
| 189 | 42:43 |
| 190 | 9:51 |
| 191 | 7:50 |
| 192 | 13:35 |
| 193 | 15:11 |
| 194 | 14:08 |
| 195 | 51:45 |
| 196 | 225:05 |
| 197 | 54:07 |
| 198 | 55:32 |
| 199 | 24:43 |
| 200 | 33:50 |
| 201 | 26:57 |
| 202 | 18:19 |
| 203 | 19:50 |
| 204 | 16:58 |
| 205 | 20:03 |
| 206 | 23:46 |
| 207 | 27:07 |
| 208 | 34:23 |
| 209 | 28:19 |
| 210 | 30:15 |
| 211 | 21:20 |
| 212 | 15:36 |
| 213 | 14:13 |
| 214 | 13:56 |
| 215 | 14:07 |
| 216 | 20:40 |
| 217 | 20:42 |
| 218 | 15:22 |
| 219 | 35:01 |
| 220 | 36:46 |
| 221 | 36:44 |
| 222 | 36:51 |
| 223 | 37:35 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 224 | 37:53 |
| 225 | 38:26 |
| 226 | 41:05 |
| 227 | 28:50 |
| 228 | 29:47 |
| 229 | 35:40 |
| 230 | 35:09 |
| 231 | 33:05 |
| 232 | 33:52 |
| 233 | 30:12 |
| 234 | 31:06 |
| 235 | 26:36 |
| 236 | 22:27 |
| 237 | 21:08 |
| 238 | 26:15 |
| 239 | 27:58 |
| 240 | 28:29 |
| 241 | 15:03 |
| 242 | 14:12 |
| 243 | 15:36 |
| 244 | 23:43 |
| 245 | 20:33 |
| 246 | 19:51 |
| 247 | 19:03 |
| 248 | 18:07 |
| 249 | 17:22 |
| 250 | 17:08 |
| 251 | 16:28 |
| 252 | 16:07 |
| 253 | 15:50 |
| 254 | 15:49 |
| 255 | 15:36 |
| 256 | 15:05 |
| 257 | 14:20 |
| 258 | 14:08 |
| 259 | 13:53 |
| 260 | 11:52 |
| 261 | 11:34 |
| 262 | 11:09 |
| 263 | 12:11 |
| 264 | 10:59 |
| 265 | 10:47 |
| 266 | 9:54 |
| 267 | 14:42 |
| 268 | 14:08 |
| 269 | 16:24 |
| 270 | 10:02 |
| 271 | 15:08 |
| 272 | 14:59 |
| 273 | 15:31 |
| 274 | 15:40 |
| 275 | 15:13 |
| 276 | 11:06 |
| 277 | 10:58 |
| 278 | 10:20 |
| 279 | 9:40 |
| 280 | 9:09 |
| 281 | 7:46 |
| 282 | 21:13 |
| 283 | 23:14 |
| 284 | 23:53 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 285 | 23:08 |
| 286 | 17:11 |
| 287 | 17:41 |
| 288 | 22:23 |
| 289 | 23:15 |
| 290 | 23:34 |
| 291 | 23:39 |
| 292 | 22:15 |
| 293 | 22:25 |
| 294 | 22:14 |
| 295 | 21:34 |
| 296 | 18:09 |
| 297 | 16:19 |
| 298 | 16:03 |
| 299 | 15:39 |
| 300 | 14:08 |
| 301 | 13:42 |
| 302 | 14:16 |
| 303 | 15:27 |
| 304 | 13:17 |
| 305 | 12:40 |
| 306 | 12:46 |
| 307 | 12:38 |
| 308 | 11:51 |
| 309 | 13:08 |
| 310 | 13:30 |
| 311 | 13:38 |
| 312 | 13:36 |
| 313 | 14:20 |
| 314 | 13:13 |
| 315 | 13:47 |
| 316 | 13:47 |
| 317 | 13:35 |
| 318 | 12:29 |
| 319 | 10:17 |
| 320 | 9:35 |
| 321 | 9:02 |
| 322 | 8:58 |
| 323 | 8:17 |
| 324 | 7:47 |
| 325 | 7:39 |
| 326 | 7:27 |
| 327 | 8:52 |
| 328 | 9:14 |
| 329 | 11:12 |
| 330 | 10:21 |
| 331 | 9:25 |
| 332 | 6:26 |
| 333 | 6:57 |
| 334 | 6:39 |
| 335 | 6:47 |
| 336 | 9:43 |
| 337 | 12:12 |
| 338 | 7:42 |
| 339 | 8:38 |
| 340 | 13:00 |
| 341 | 11:11 |
| 342 | 9:42 |
| 343 | 8:32 |
| 344 | 11:46 |
| 345 | 12:10 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 346 | 8:08 |
| 347 | 8:25 |
| 348 | 6:13 |
| 349 | 5:24 |
| 350 | 5:28 |
| 351 | 5:54 |
| 352 | 8:49 |
| 353 | 9:17 |
| 354 | 9:35 |
| 355 | 9:40 |
| 356 | 10:18 |
| 357 | 6:39 |
| 358 | 7:18 |
| 359 | 6:28 |
| 360 | 6:35 |
| 361 | 7:14 |
| 362 | 9:04 |
| 363 | 7:47 |
| 364 | 6:08 |
| 365 | 5:53 |
| 366 | 5:28 |
| 367 | 5:12 |
| 368 | 4:58 |
| 369 | 5:05 |
| 370 | 4:44 |
| 371 | 5:11 |
| 372 | 9:47 |
| 373 | 5:50 |
| 374 | 4:54 |
| 375 | 7:00 |
| 376 | 9:18 |
| 377 | 10:22 |
| 378 | 11:19 |
| 379 | 11:54 |
| 380 | 10:58 |
| 381 | 9:37 |
| 382 | 10:12 |
| 383 | 9:47 |
| 384 | 8:18 |
| 385 | 7:16 |
| 386 | 5:53 |
| 387 | 5:21 |
| 388 | 5:10 |
| 389 | 4:48 |
| 390 | 4:49 |
| 391 | 19:13 |
| 392 | 14:24 |
| 393 | 13:40 |
| 394 | 13:24 |
| 395 | 9:25 |
| 396 | 9:42 |
| 397 | 9:45 |
| 398 | 6:46 |
| 399 | 6:16 |
| 400 | 6:11 |
| 401 | 6:26 |
| 402 | 6:23 |
| 403 | 6:30 |
| 404 | 5:07 |
| 405 | 2:04 |
| 406 | 1:51 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 407 | 1:57 |
| 408 | 1:51 |
| 409 | 2:12 |
| 410 | 2:03 |
| 411 | 2:03 |
| 412 | 1:54 |
| 413 | 2:21 |
| 414 | 2:19 |
| 415 | 2:30 |
| 416 | 2:38 |
| 417 | 2:37 |
| 418 | 2:27 |
| 419 | 2:30 |
| 420 | 2:41 |
| 421 | 2:37 |
| 422 | 2:28 |
| 423 | 2:22 |
| 424 | 2:29 |
| 425 | 2:36 |
| 426 | 2:41 |
| 427 | 2:47 |
| 428 | 2:50 |
| 429 | 2:56 |
| 430 | 3:11 |
| 431 | 3:15 |
| 432 | 3:14 |
| 433 | 3:12 |
| 434 | 4:10 |
| 435 | 3:25 |
| 436 | 4:14 |
| 437 | 4:17 |
| 438 | 3:31 |
| 439 | 3:30 |
| 440 | 4:24 |
| 441 | 3:18 |
| 442 | 3:24 |
| 443 | 3:16 |
| 444 | 3:13 |
| 445 | 4:29 |
| 446 | 3:22 |
| 447 | 5:38 |
| 448 | 6:15 |
| 449 | 3:02 |
| 450 | 3:01 |
| 451 | 3:50 |
| 452 | 3:54 |
| 453 | 4:05 |
| 454 | 3:01 |
| 455 | 2:48 |
| 456 | 2:44 |
| 457 | 2:40 |
| 458 | 2:51 |
| 459 | 3:02 |
| 460 | 4:01 |
| 461 | 4:09 |
| 462 | 4:17 |
| 463 | 3:56 |
| 464 | 3:08 |
| 465 | 2:50 |
| 466 | 2:26 |
| 467 | 3:11 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 468 | 3:21 |
| 469 | 3:19 |
| 470 | 4:01 |
| 471 | 5:02 |
| 472 | 5:01 |
| 473 | 3:54 |
| 474 | 3:26 |
| 475 | 3:25 |
| 476 | 3:36 |
| 477 | 4:19 |
| 478 | 4:29 |
| 479 | 4:37 |
| 480 | 4:49 |
| 481 | 5:56 |
| 482 | 0:00 |
| 483 | 4:09 |
| 484 | 8:30 |
| 485 | 8:25 |
| 486 | 8:53 |
| 487 | 4:36 |
| 488 | 3:43 |
| 489 | 10:51 |
| 490 | 10:44 |
| 491 | 8:04 |
| 492 | 7:37 |
| 493 | 7:42 |
| 494 | 8:38 |
| 495 | 9:52 |
| 496 | 9:34 |
| 497 | 9:20 |
| 498 | 9:32 |
| 499 | 7:50 |
| 500 | 4:20 |
| 501 | 6:59 |
| 502 | 9:00 |
| 503 | 8:59 |
| 504 | 8:14 |
| 505 | 8:09 |
| 506 | 7:29 |
| 507 | 7:32 |
| 508 | 6:00 |
| 509 | 6:36 |
| 510 | 8:18 |
| 511 | 10:23 |
| 512 | 10:48 |
| 513 | 11:28 |
| 514 | 10:08 |
| 515 | 8:30 |
| 516 | 12:27 |
| 517 | 12:52 |
| 518 | 12:57 |
| 519 | 12:12 |
| 520 | 15:52 |
| 521 | 16:22 |
| 522 | 10:44 |
| 523 | 10:48 |
| 524 | 9:59 |
| 525 | 10:01 |
| 526 | 9:58 |
| 527 | 11:19 |
| 528 | 21:53 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 529 | 11:01 |
| 530 | 16:49 |
| 531 | 14:16 |
| 532 | 19:20 |
| 533 | 25:49 |
| 534 | 29:32 |
| 535 | 26:09 |
| 536 | 35:40 |
| 537 | 31:22 |
| 538 | 28:32 |
| 539 | 17:23 |
| 540 | 23:06 |
| 541 | 28:17 |
| 542 | 35:37 |
| 543 | 37:40 |
| 544 | 40:44 |
| 545 | 43:10 |
| 546 | 25:01 |
| 547 | 31:13 |
| 548 | 60:51 |
| 549 | 58:37 |
| 550 | 91:15 |
| 551 | 56:55 |
| 552 | 40:35 |
| 553 | 37:08 |
| 554 | 36:46 |
| 555 | 36:15 |
| 556 | 32:47 |
| 557 | 32:32 |
| 558 | 31:56 |
| 559 | 31:40 |
| 560 | 40:36 |
| 561 | 40:41 |
| 562 | 30:18 |
| 563 | 28:05 |
| 564 | 27:30 |
| 565 | 26:59 |
| 566 | 26:30 |
| 567 | 26:20 |
| 568 | 25:51 |
| 569 | 25:26 |
| 570 | 24:36 |
| 571 | 30:46 |
| 572 | 31:46 |
| 573 | 32:03 |
| 574 | 31:13 |
| 575 | 30:39 |
| 576 | 30:10 |
| 577 | 34:54 |
| 578 | 33:58 |
| 579 | 36:19 |
| 580 | 37:46 |
| 581 | 42:49 |
| 582 | 31:50 |
| 583 | 36:12 |
| 584 | 33:59 |
| 585 | 20:02 |
| 586 | 9:21 |
| 587 | 10:05 |
| 588 | 7:25 |
| 589 | 7:35 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 590 | 15:17 |
| 591 | 11:50 |
| 592 | 6:10 |
| 593 | 7:08 |
| 594 | 6:05 |
| 595 | 23:13 |
| 596 | 23:44 |
| 597 | 23:50 |
| 598 | 23:58 |
| 599 | 20:44 |
| 600 | 16:38 |
| 601 | 15:48 |
| 602 | 13:30 |
| 603 | 20:20 |
| 604 | 15:58 |
| 605 | 15:47 |
| 606 | 14:59 |
| 607 | 13:40 |
| 608 | 13:06 |
| 609 | 12:34 |
| 610 | 11:16 |
| 611 | 10:53 |
| 612 | 10:29 |
| 613 | 10:01 |
| 614 | 9:06 |
| 615 | 9:12 |
| 616 | 9:41 |
| 617 | 9:07 |
| 618 | 8:56 |
| 619 | 9:11 |
| 620 | 10:37 |
| 621 | 11:01 |
| 622 | 11:20 |
| 623 | 12:22 |
| 624 | 11:36 |
| 625 | 10:19 |
| 626 | 10:30 |
| 627 | 11:09 |
| 628 | 10:30 |
| 629 | 10:47 |
| 630 | 10:50 |
| 631 | 10:08 |
| 632 | 10:43 |
| 633 | 9:52 |
| 634 | 9:51 |
| 635 | 10:24 |
| 636 | 9:49 |
| 637 | 9:51 |
| 638 | 10:40 |
| 639 | 9:59 |
| 640 | 9:38 |
| 641 | 9:03 |
| 642 | 8:48 |
| 643 | 10:28 |
| 644 | 33:55 |
| 645 | 22:55 |
| 646 | 24:34 |
| 647 | 4:53 |
| 648 | 5:06 |
| 649 | 5:24 |
| 650 | 6:15 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 651 | 7:11 |
| 652 | 7:47 |
| 653 | 9:54 |
| 654 | 10:40 |
| 655 | 10:51 |
| 656 | 14:03 |
| 657 | 15:41 |
| 658 | 16:12 |
| 659 | 16:37 |
| 660 | 17:05 |
| 661 | 17:11 |
| 662 | 19:00 |
| 663 | 22:05 |
| 664 | 20:49 |
| 665 | 56:47 |
| 666 | 12:50 |
| 667 | 12:12 |
| 668 | 19:12 |
| 669 | 12:12 |
| 670 | 10:46 |
| 671 | 4:15 |
| 672 | 3:43 |
| 673 | 2:05 |
| 674 | 3:15 |
| 675 | 3:54 |
| 676 | 3:22 |
| 677 | 5:16 |
| 678 | 2:01 |
| 679 | 1:56 |
| 680 | 1:58 |
| 681 | 4:52 |
| 682 | 5:09 |
| 683 | 5:29 |
| 684 | 5:15 |
| 685 | 5:32 |
| 686 | 4:35 |
| 687 | 2:31 |
| 688 | 1:04 |
| 689 | 1:05 |
| 690 | 1:06 |
| 691 | 1:10 |
| 692 | 1:11 |
| 693 | 1:21 |
| 694 | 1:23 |
| 695 | 1:44 |
| 696 | 1:53 |
| 697 | 2:18 |
| 698 | 2:20 |
| 699 | 3:13 |
| 700 | 3:37 |
| 701 | 3:32 |
| 702 | 4:25 |
| 703 | 4:43 |
| 704 | 2:50 |
| 705 | 3:36 |
| 706 | 4:44 |
| 707 | 3:37 |
| 708 | 5:30 |
| 709 | 6:37 |
| 710 | 6:42 |
| 711 | 6:37 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 712 | 6:33 |
| 713 | 8:22 |
| 714 | 4:55 |
| 715 | 4:28 |
| 716 | 5:00 |
| 717 | 5:06 |
| 718 | 4:57 |
| 719 | 5:45 |
| 720 | 5:18 |
| 721 | 5:38 |
| 722 | 6:39 |
| 723 | 6:46 |
| 724 | 6:43 |
| 725 | 7:54 |
| 726 | 10:33 |
| 727 | 9:43 |
| 728 | 9:17 |
| 729 | 8:48 |
| 730 | 13:48 |
| 731 | 15:07 |
| 732 | 19:32 |
| 733 | 21:11 |
| 734 | 23:11 |
| 735 | 29:08 |
| 736 | 36:29 |
| 737 | 55:14 |
| 738 | 40:53 |
| 739 | 52:01 |
| 740 | 44:40 |
| 741 | 36:28 |
| 742 | 54:20 |
| 743 | 17:31 |
| 744 | 11:40 |
| 745 | 12:44 |
| 746 | 45:47 |
| 747 | 40:01 |
| 748 | 55:34 |
| 749 | 44:24 |
| 750 | 106:01 |
| 751 | 151:47 |
| 752 | 89:11 |
| 753 | 14:06 |
| 754 | 15:59 |
| 755 | 12:11 |
| 756 | 18:35 |
| 757 | 20:54 |
| 758 | 18:00 |
| 759 | 17:29 |
| 760 | 17:13 |
| 761 | 19:07 |
| 762 | 13:34 |
| 763 | 8:10 |
| 764 | 12:04 |
| 765 | 16:30 |
| 766 | 18:25 |
| 767 | 14:42 |
| 768 | 4:21 |
| 769 | 5:54 |
| 770 | 9:06 |
| 771 | 4:14 |
| 772 | 0:42 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 773 | 0:35 |
| 774 | 0:38 |
| 775 | 0:48 |
| 776 | 4:41 |
| 777 | 1:11 |
| 778 | 4:41 |
| 779 | 22:22 |
| 780 | 10:17 |
| 781 | 30:15 |
| 782 | 34:05 |
| 783 | 33:59 |
| 784 | 25:49 |
| 785 | 21:07 |
| 786 | 20:19 |
| 787 | 22:10 |
| 788 | 17:59 |
| 789 | 13:20 |
| 790 | 20:05 |
| 791 | 29:30 |
| 792 | 30:03 |
| 793 | 32:30 |
| 794 | 11:52 |
| 795 | 33:19 |
| 796 | 26:04 |
| 797 | 26:25 |
| 798 | 27:26 |
| 799 | 23:16 |
| 800 | 26:47 |
| 801 | 19:54 |
| 802 | 19:28 |
| 803 | 19:58 |
| 804 | 17:50 |
| 805 | 18:30 |
| 806 | 18:40 |
| 807 | 15:24 |
| 808 | 14:16 |
| 809 | 13:40 |
| 810 | 14:00 |
| 811 | 15:11 |
| 812 | 10:17 |
| 813 | 11:27 |
| 814 | 12:53 |
| 815 | 14:03 |
| 816 | 6:51 |
| 817 | 5:45 |
| 818 | 7:51 |
| 819 | 7:59 |
| 820 | 12:21 |
| 821 | 12:07 |
| 822 | 10:53 |
| 823 | 9:47 |
| 824 | 11:05 |
| 825 | 10:12 |
| 826 | 8:48 |
| 827 | 9:17 |
| 828 | 11:10 |
| 829 | 13:09 |
| 830 | 8:49 |
| 831 | 10:17 |
| 832 | 7:53 |
| 833 | 9:31 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 834 | 9:12 |
| 835 | 9:11 |
| 836 | 8:43 |
| 837 | 9:15 |
| 838 | 9:56 |
| 839 | 10:36 |
| 840 | 12:06 |
| 841 | 13:47 |
| 842 | 12:19 |
| 843 | 10:32 |
| 844 | 14:58 |
| 845 | 15:31 |
| 846 | 14:02 |
| 847 | 13:39 |
| 848 | 13:39 |
| 849 | 19:53 |
| 850 | 14:26 |
| 851 | 23:27 |
| 852 | 22:16 |
| 853 | 27:05 |
| 854 | 24:02 |
| 855 | 29:45 |
| 856 | 27:09 |
| 857 | 27:56 |
| 858 | 24:00 |
| 859 | 19:27 |
| 860 | 21:23 |
| 861 | 19:25 |
| 862 | 20:17 |
| 863 | 15:33 |
| 864 | 15:26 |
| 865 | 19:05 |
| 866 | 18:34 |
| 867 | 17:48 |
| 868 | 15:23 |
| 869 | 16:32 |
| 870 | 15:59 |
| 871 | 12:09 |
| 872 | 11:30 |
| 873 | 12:38 |
| 874 | 10:49 |
| 875 | 12:27 |
| 876 | 14:23 |
| 877 | 11:24 |
| 878 | 12:47 |
| 879 | 12:32 |
| 880 | 12:45 |
| 881 | 13:02 |
| 882 | 12:33 |
| 883 | 9:18 |
| 884 | 9:01 |
| 885 | 8:24 |
| 886 | 11:07 |
| 887 | 8:52 |
| 888 | 7:34 |
| 889 | 8:27 |
| 890 | 9:02 |
| 891 | 9:27 |
| 892 | 9:35 |
| 893 | 9:52 |
| 894 | 11:01 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 895 | 11:17 |
| 896 | 12:23 |
| 897 | 12:36 |
| 898 | 12:22 |
| 899 | 11:52 |
| 900 | 8:18 |
| 901 | 12:19 |
| 902 | 7:59 |
| 903 | 7:36 |
| 904 | 7:48 |
| 905 | 7:01 |
| 906 | 6:21 |
| 907 | 7:10 |
| 908 | 9:45 |
| 909 | 9:53 |
| 910 | 9:15 |
| 911 | 9:46 |
| 912 | 6:26 |
| 913 | 8:02 |
| 914 | 10:55 |
| 915 | 8:51 |
| 916 | 12:29 |
| 917 | 14:07 |
| 918 | 14:27 |
| 919 | 12:59 |
| 920 | 11:48 |
| 921 | 14:29 |
| 922 | 14:28 |
| 923 | 16:40 |
| 924 | 13:24 |
| 925 | 12:51 |
| 926 | 18:46 |
| 927 | 15:41 |
| 928 | 28:06 |
| 929 | 38:01 |
| 930 | 54:10 |
| 931 | 24:37 |
| 932 | 35:51 |
| 933 | 20:01 |
| 934 | 19:52 |
| 935 | 18:53 |
| 936 | 7:24 |
| 937 | 8:07 |
| 938 | 7:55 |
| 939 | 14:03 |
| 940 | 17:21 |
| 941 | 35:24 |
| 942 | 72:10 |
| 943 | 9:06 |
| 944 | 10:40 |
| 945 | 13:52 |
| 946 | 9:30 |
| 947 | 17:07 |
| 948 | 15:23 |
| 949 | 17:37 |
| 950 | 19:45 |
| 951 | 19:24 |
| 952 | 29:08 |
| 953 | 37:54 |
| 954 | 34:43 |
| 955 | 30:11 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 956 | 28:29 |
| 957 | 25:05 |
| 958 | 26:22 |
| 959 | 27:48 |
| 960 | 29:35 |
| 961 | 32:36 |
| 962 | 35:42 |
| 963 | 30:04 |
| 964 | 26:56 |
| 965 | 24:33 |
| 966 | 29:49 |
| 967 | 32:30 |
| 968 | 34:03 |
| 969 | 24:54 |
| 970 | 24:07 |
| 971 | 12:50 |
| 972 | 9:49 |
| 973 | 9:42 |
| 974 | 13:01 |
| 975 | 13:40 |
| 976 | 8:54 |
| 977 | 31:52 |
| 978 | 20:43 |
| 979 | 19:12 |
| 980 | 14:03 |
| 981 | 13:48 |
| 982 | 19:33 |
| 983 | 10:54 |
| 984 | 9:45 |
| 985 | 7:22 |
| 986 | 7:56 |
| 987 | 6:43 |
| 988 | 6:22 |
| 989 | 6:30 |
| 990 | 6:07 |
| 991 | 5:36 |
| 992 | 5:04 |
| 993 | 4:35 |
| 994 | 4:40 |
| 995 | 4:08 |
| 996 | 4:00 |
| 997 | 6:52 |
| 998 | 8:16 |
| 999 | 3:28 |
| 1000 | 2:09 |
| 1001 | 0:00 |
| 1002 | 2:45 |
| 1003 | 4:36 |
| 1004 | 0:00 |
| 1005 | 0:00 |
| 1006 | 0:00 |
| 1007 | 0:00 |
| 1008 | 0:00 |
| 1009 | 0:00 |
| 1010 | 0:00 |
| 1011 | 0:00 |
| 1012 | 10:40 |
| 1013 | 46:35 |
| 1014 | 14:45 |
| 1015 | 26:27 |
| 1016 | 116:40 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1017 | 4:35 |
| 1018 | 9:28 |
| 1019 | 11:12 |
| 1020 | 20:58 |
| 1021 | 16:14 |
| 1022 | 172:16 |
| 1023 | 10:20 |
| 1024 | 45:47 |
| 1025 | 29:10 |
| 1026 | 43:01 |
| 1027 | 39:39 |
| 1028 | 36:13 |
| 1029 | 46:07 |
| 1030 | 13:21 |
| 1031 | 15:50 |
| 1032 | 24:45 |
| 1033 | 65:47 |
| 1034 | 6:58 |
| 1035 | 3:55 |
| 1036 | 2:44 |
| 1037 | 2:53 |
| 1038 | 2:39 |
| 1039 | 1:50 |
| 1040 | 1:08 |
| 1041 | 15:01 |
| 1042 | 15:27 |
| 1043 | 12:12 |
| 1044 | 10:23 |
| 1045 | 24:20 |
| 1046 | 23:56 |
| 1047 | 31:34 |
| 1048 | 12:49 |
| 1049 | 9:33 |
| 1050 | 8:18 |
| 1051 | 14:14 |
| 1052 | 6:43 |
| 1053 | 5:54 |
| 1054 | 4:17 |
| 1055 | 5:18 |
| 1056 | 1:12 |
| 1057 | 1:17 |
| 1058 | 0:00 |
| 1059 | 1:20 |
| 1060 | 0:00 |
| 1061 | 0:00 |
| 1062 | 19:36 |
| 1063 | 21:46 |
| 1064 | 19:59 |
| 1065 | 16:53 |
| 1066 | 12:27 |
| 1067 | 11:32 |
| 1068 | 11:57 |
| 1069 | 12:24 |
| 1070 | 12:14 |
| 1071 | 12:33 |
| 1072 | 12:51 |
| 1073 | 13:12 |
| 1074 | 14:12 |
| 1075 | 13:40 |
| 1076 | 13:44 |
| 1077 | 13:18 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1078 | 12:13 |
| 1079 | 11:09 |
| 1080 | 10:52 |
| 1081 | 9:41 |
| 1082 | 9:02 |
| 1083 | 9:13 |
| 1084 | 11:39 |
| 1085 | 10:54 |
| 1086 | 10:11 |
| 1087 | 9:14 |
| 1088 | 9:08 |
| 1089 | 9:09 |
| 1090 | 9:13 |
| 1091 | 9:32 |
| 1092 | 6:24 |
| 1093 | 9:08 |
| 1094 | 8:40 |
| 1095 | 9:39 |
| 1096 | 11:02 |
| 1097 | 11:09 |
| 1098 | 11:33 |
| 1099 | 11:34 |
| 1100 | 9:14 |
| 1101 | 9:20 |
| 1102 | 10:05 |
| 1103 | 9:52 |
| 1104 | 11:55 |
| 1105 | 10:42 |
| 1106 | 9:52 |
| 1107 | 8:44 |
| 1108 | 8:56 |
| 1109 | 9:14 |
| 1110 | 9:57 |
| 1111 | 11:11 |
| 1112 | 12:53 |
| 1113 | 14:39 |
| 1114 | 16:00 |
| 1115 | 14:46 |
| 1116 | 11:38 |
| 1117 | 7:23 |
| 1118 | 12:35 |
| 1119 | 12:25 |
| 1120 | 12:57 |
| 1121 | 12:28 |
| 1122 | 13:46 |
| 1123 | 10:24 |
| 1124 | 9:15 |
| 1125 | 9:33 |
| 1126 | 12:34 |
| 1127 | 10:53 |
| 1128 | 8:26 |
| 1129 | 8:11 |
| 1130 | 7:18 |
| 1131 | 6:46 |
| 1132 | 7:16 |
| 1133 | 9:24 |
| 1134 | 9:17 |
| 1135 | 6:42 |
| 1136 | 4:52 |
| 1137 | 5:39 |
| 1138 | 5:32 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1139 | 4:45 |
| 1140 | 4:42 |
| 1141 | 4:15 |
| 1142 | 4:19 |
| 1143 | 12:10 |
| 1144 | 12:06 |
| 1145 | 4:31 |
| 1146 | 5:09 |
| 1147 | 5:45 |
| 1148 | 5:16 |
| 1149 | 4:45 |
| 1150 | 7:19 |
| 1151 | 9:50 |
| 1152 | 6:36 |
| 1153 | 4:18 |
| 1154 | 1:19 |
| 1155 | 1:56 |
| 1156 | 5:42 |
| 1157 | 3:18 |
| 1158 | 8:29 |
| 1159 | 4:24 |
| 1160 | 5:30 |
| 1161 | 2:53 |
| 1162 | 1:51 |
| 1163 | 1:58 |
| 1164 | 2:29 |
| 1165 | 3:35 |
| 1166 | 7:40 |
| 1167 | 11:16 |
| 1168 | 7:44 |
| 1169 | 1:12 |
| 1170 | 2:24 |
| 1171 | 4:36 |
| 1172 | 6:03 |
| 1173 | 6:51 |
| 1174 | 7:09 |
| 1175 | 7:29 |
| 1176 | 7:13 |
| 1177 | 7:12 |
| 1178 | 5:51 |
| 1179 | 4:36 |
| 1180 | 6:30 |
| 1181 | 5:52 |
| 1182 | 5:12 |
| 1183 | 4:14 |
| 1184 | 3:23 |
| 1185 | 3:10 |
| 1186 | 2:56 |
| 1187 | 3:11 |
| 1188 | 0:00 |
| 1189 | 0:00 |
| 1190 | 3:07 |
| 1191 | 4:09 |
| 1192 | 6:09 |
| 1193 | 5:02 |
| 1194 | 0:00 |
| 1195 | 2:45 |
| 1196 | 2:38 |
| 1197 | 3:02 |
| 1198 | 2:34 |
| 1199 | 2:25 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1200 | 2:35 |
| 1201 | 2:08 |
| 1202 | 2:57 |
| 1203 | 3:02 |
| 1204 | 3:10 |
| 1205 | 3:40 |
| 1206 | 3:32 |
| 1207 | 4:12 |
| 1208 | 2:24 |
| 1209 | 2:23 |
| 1210 | 2:16 |
| 1211 | 2:11 |
| 1212 | 2:13 |
| 1213 | 2:15 |
| 1214 | 2:20 |
| 1215 | 2:21 |
| 1216 | 2:23 |
| 1217 | 2:30 |
| 1218 | 2:26 |
| 1219 | 2:40 |
| 1220 | 3:00 |
| 1221 | 2:36 |
| 1222 | 2:44 |
| 1223 | 2:45 |
| 1224 | 2:27 |
| 1225 | 2:15 |
| 1226 | 2:12 |
| 1227 | 2:11 |
| 1228 | 4:52 |
| 1229 | 4:20 |
| 1230 | 3:36 |
| 1231 | 3:59 |
| 1232 | 2:26 |
| 1233 | 2:22 |
| 1234 | 2:26 |
| 1235 | 2:23 |
| 1236 | 2:27 |
| 1237 | 2:04 |
| 1238 | 2:10 |
| 1239 | 2:02 |
| 1240 | 2:05 |
| 1241 | 2:02 |
| 1242 | 1:56 |
| 1243 | 1:55 |
| 1244 | 1:49 |
| 1245 | 1:47 |
| 1246 | 1:53 |
| 1247 | 1:56 |
| 1248 | 1:56 |
| 1249 | 2:00 |
| 1250 | 1:45 |
| 1251 | 1:46 |
| 1252 | 1:51 |
| 1253 | 1:35 |
| 1254 | 1:40 |
| 1255 | 1:41 |
| 1256 | 1:47 |
| 1257 | 1:52 |
| 1258 | 1:55 |
| 1259 | 2:02 |
| 1260 | 1:59 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1261 | 2:06 |
| 1262 | 2:07 |
| 1263 | 2:10 |
| 1264 | 2:16 |
| 1265 | 2:21 |
| 1266 | 2:02 |
| 1267 | 2:00 |
| 1268 | 1:58 |
| 1269 | 1:55 |
| 1270 | 1:52 |
| 1271 | 1:50 |
| 1272 | 1:39 |
| 1273 | 2:02 |
| 1274 | 2:05 |
| 1275 | 1:58 |
| 1276 | 2:04 |
| 1277 | 2:09 |
| 1278 | 2:10 |
| 1279 | 1:54 |
| 1280 | 1:57 |
| 1281 | 2:01 |
| 1282 | 2:24 |
| 1283 | 1:59 |
| 1284 | 2:01 |
| 1285 | 0:00 |
| 1286 | 0:00 |
| 1287 | 0:00 |
| 1288 | 0:00 |
| 1289 | 0:00 |
| 1290 | 2:47 |
| 1291 | 2:48 |
| 1292 | 0:00 |
| 1293 | 0:00 |
| 1294 | 2:00 |
| 1295 | 2:02 |
| 1296 | 2:05 |
| 1297 | 2:03 |
| 1298 | 2:04 |
| 1299 | 2:00 |
| 1300 | 1:54 |
| 1301 | 1:09 |
| 1302 | 2:12 |
| 1303 | 2:16 |
| 1304 | 2:19 |
| 1305 | 2:33 |
| 1306 | 2:25 |
| 1307 | 8:09 |
| 1308 | 2:26 |
| 1309 | 2:13 |
| 1310 | 1:41 |
| 1311 | 1:30 |
| 1312 | 1:46 |
| 1313 | 2:24 |
| 1314 | 2:02 |
| 1315 | 0:54 |
| 1316 | 3:38 |
| 1317 | 3:46 |
| 1318 | 4:17 |
| 1319 | 4:29 |
| 1320 | 3:16 |
| 1321 | 3:34 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 1322 | 3:38 |
| 1323 | 4:14 |
| 1324 | 2:15 |
| 1325 | 0:29 |
| 1326 | 0:38 |
| 1327 | 1:31 |
| 1328 | 0:51 |
| 1329 | 0:26 |
| 1330 | 0:00 |
| 1331 | 0:28 |
| 1332 | 0:21 |
| 1333 | 1:30 |
| 1334 | 1:14 |
| 1335 | 1:16 |
| 1336 | 1:40 |
| 1337 | 2:20 |
| 1338 | 0:00 |
| 1339 | 2:00 |
| 1340 | 2:14 |
| 1341 | 0:00 |
| 1342 | 0:00 |
| 1343 | 0:00 |
| 1344 | 2:12 |
| 1345 | 1:11 |
| 1346 | 0:47 |
| 1347 | 0:55 |
| 1348 | 1:07 |
| 1349 | 1:15 |
| 1350 | 1:12 |
| 1351 | 3:51 |
| 1352 | 3:33 |
| 1353 | 2:27 |
| 1354 | 1:46 |
| 1355 | 1:21 |
| 1356 | 0:59 |
| 1357 | 0:47 |
| 1358 | 0:22 |
| 1359 | 0:00 |
| 1360 | 0:00 |
| 1361 | 0:00 |
| 1362 | 0:00 |
| 1363 | 0:34 |
| 1364 | 3:00 |
| 1365 | 5:22 |
| 1366 | 4:23 |
| 1367 | 2:58 |
| 1368 | 0:28 |
| 1369 | 0:20 |
| 1370 | 0:00 |
| 1371 | 3:08 |
| 1372 | 3:49 |
| 1373 | 4:25 |
| 1374 | 2:03 |
| 1375 | 2:04 |
| 1376 | 1:35 |
| 1377 | 1:39 |
| 1378 | 4:16 |
| 1379 | 1:15 |
| 1380 | 0:05 |
| 1381 | 0:00 |
| 1382 | 0:00 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1383 | 0:00 |
| 1384 | 2:21 |
| 1385 | 2:25 |
| 1386 | 2:23 |
| 1387 | 2:29 |
| 1388 | 2:39 |
| 1389 | 3:01 |
| 1390 | 3:19 |
| 1391 | 3:43 |
| 1392 | 3:43 |
| 1393 | 4:06 |
| 1394 | 4:26 |
| 1395 | 3:11 |
| 1396 | 3:29 |
| 1397 | 3:37 |
| 1398 | 3:46 |
| 1399 | 3:46 |
| 1400 | 3:52 |
| 1401 | 4:03 |
| 1402 | 4:11 |
| 1403 | 4:30 |
| 1404 | 4:27 |
| 1405 | 4:36 |
| 1406 | 4:54 |
| 1407 | 5:10 |
| 1408 | 5:44 |
| 1409 | 6:04 |
| 1410 | 6:13 |
| 1411 | 6:41 |
| 1412 | 6:56 |
| 1413 | 4:37 |
| 1414 | 4:54 |
| 1415 | 5:37 |
| 1416 | 5:50 |
| 1417 | 6:49 |
| 1418 | 7:27 |
| 1419 | 8:14 |
| 1420 | 8:38 |
| 1421 | 9:03 |
| 1422 | 9:11 |
| 1423 | 9:17 |
| 1424 | 9:47 |
| 1425 | 10:32 |
| 1426 | 10:50 |
| 1427 | 10:45 |
| 1428 | 9:55 |
| 1429 | 8:02 |
| 1430 | 8:13 |
| 1431 | 8:08 |
| 1432 | 8:23 |
| 1433 | 8:38 |
| 1434 | 8:36 |
| 1435 | 8:47 |
| 1436 | 8:46 |
| 1437 | 8:55 |
| 1438 | 8:51 |
| 1439 | 8:52 |
| 1440 | 9:06 |
| 1441 | 9:03 |
| 1442 | 8:49 |
| 1443 | 8:46 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 1444 | 9:46 |
| 1445 | 9:24 |
| 1446 | 12:39 |
| 1447 | 11:05 |
| 1448 | 12:06 |
| 1449 | 9:20 |
| 1450 | 5:23 |
| 1451 | 4:36 |
| 1452 | 1:41 |
| 1453 | 1:57 |
| 1454 | 1:59 |
| 1455 | 2:12 |
| 1456 | 2:13 |
| 1457 | 2:12 |
| 1458 | 3:28 |
| 1459 | 4:31 |
| 1460 | 4:54 |
| 1461 | 4:43 |
| 1462 | 4:40 |
| 1463 | 2:14 |
| 1464 | 7:21 |
| 1465 | 6:55 |
| 1466 | 6:26 |
| 1467 | 5:10 |
| 1468 | 7:28 |
| 1469 | 2:49 |
| 1470 | 3:37 |
| 1471 | 2:20 |
| 1472 | 1:57 |
| 1473 | 1:50 |
| 1474 | 1:44 |
| 1475 | 1:38 |
| 1476 | 1:46 |
| 1477 | 1:43 |
| 1478 | 1:39 |
| 1479 | 1:31 |
| 1480 | 1:40 |
| 1481 | 1:37 |
| 1482 | 1:24 |
| 1483 | 1:05 |
| 1484 | 0:58 |
| 1485 | 1:01 |
| 1486 | 0:54 |
| 1487 | 0:55 |
| 1488 | 1:02 |
| 1489 | 1:01 |
| 1490 | 1:07 |
| 1491 | 1:14 |
| 1492 | 1:14 |
| 1493 | 1:21 |
| 1494 | 1:34 |
| 1495 | 2:36 |
| 1496 | 3:43 |
| 1497 | 3:46 |
| 1498 | 4:00 |
| 1499 | 2:34 |
| 1500 | 2:21 |
| 1501 | 2:58 |
| 1502 | 3:18 |
| 1503 | 3:54 |
| 1504 | 4:12 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1505 | 4:18 |
| 1506 | 4:28 |
| 1507 | 4:37 |
| 1508 | 4:50 |
| 1509 | 4:18 |
| 1510 | 3:45 |
| 1511 | 5:55 |
| 1512 | 7:09 |
| 1513 | 22:46 |
| 1514 | 21:00 |
| 1515 | 34:05 |
| 1516 | 36:13 |
| 1517 | 42:29 |
| 1518 | 30:11 |
| 1519 | 22:42 |
| 1520 | 24:18 |
| 1521 | 25:17 |
| 1522 | 25:39 |
| 1523 | 34:38 |
| 1524 | 40:20 |
| 1525 | 40:33 |
| 1526 | 65:58 |
| 1527 | 65:47 |
| 1528 | 70:28 |
| 1529 | 49:19 |
| 1530 | 109:08 |
| 1531 | 117:52 |
| 1532 | 80:03 |
| 1533 | 11:41 |
| 1534 | 15:49 |
| 1535 | 27:16 |
| 1536 | 22:23 |
| 1537 | 25:42 |
| 1538 | 79:17 |
| 1539 | 20:04 |
| 1540 | 19:32 |
| 1541 | 2:14 |
| 1542 | 2:13 |
| 1543 | 2:15 |
| 1544 | 2:17 |
| 1545 | 2:14 |
| 1546 | 3:30 |
| 1547 | 3:40 |
| 1548 | 3:50 |
| 1549 | 3:53 |
| 1550 | 3:46 |
| 1551 | 3:58 |
| 1552 | 4:12 |
| 1553 | 4:10 |
| 1554 | 4:25 |
| 1555 | 4:02 |
| 1556 | 4:37 |
| 1557 | 4:59 |
| 1558 | 5:06 |
| 1559 | 5:26 |
| 1560 | 5:36 |
| 1561 | 4:51 |
| 1562 | 4:39 |
| 1563 | 4:43 |
| 1564 | 4:26 |
| 1565 | 5:45 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1566 | 7:27 |
| 1567 | 7:31 |
| 1568 | 7:33 |
| 1569 | 6:38 |
| 1570 | 6:02 |
| 1571 | 5:32 |
| 1572 | 4:02 |
| 1573 | 5:30 |
| 1574 | 5:38 |
| 1575 | 4:58 |
| 1576 | 7:44 |
| 1577 | 7:20 |
| 1578 | 7:31 |
| 1579 | 7:15 |
| 1580 | 7:16 |
| 1581 | 7:11 |
| 1582 | 7:08 |
| 1583 | 7:40 |
| 1584 | 5:28 |
| 1585 | 5:26 |
| 1586 | 4:46 |
| 1587 | 5:17 |
| 1588 | 5:04 |
| 1589 | 6:05 |
| 1590 | 6:10 |
| 1591 | 6:32 |
| 1592 | 6:58 |
| 1593 | 7:09 |
| 1594 | 7:11 |
| 1595 | 7:28 |
| 1596 | 7:58 |
| 1597 | 7:18 |
| 1598 | 6:22 |
| 1599 | 6:35 |
| 1600 | 6:54 |
| 1601 | 7:13 |
| 1602 | 7:36 |
| 1603 | 8:02 |
| 1604 | 8:16 |
| 1605 | 8:14 |
| 1606 | 8:48 |
| 1607 | 9:30 |
| 1608 | 9:44 |
| 1609 | 9:58 |
| 1610 | 10:13 |
| 1611 | 11:40 |
| 1612 | 12:04 |
| 1613 | 12:28 |
| 1614 | 25:10 |
| 1615 | 22:16 |
| 1616 | 28:36 |
| 1617 | 28:45 |
| 1618 | 31:59 |
| 1619 | 40:31 |
| 1620 | 42:52 |
| 1621 | 39:44 |
| 1622 | 4:48 |
| 1623 | 0:00 |
| 1624 | 0:00 |
| 1625 | 0:00 |
| 1626 | 1:37 |

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# SHADOW - Main Result

## Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1627 | 3:39 |
| 1628 | 3:44 |
| 1629 | 4:46 |
| 1630 | 9:45 |
| 1631 | 10:23 |
| 1632 | 10:36 |
| 1633 | 9:42 |
| 1634 | 55:17 |
| 1635 | 48:22 |
| 1636 | 53:06 |
| 1637 | 40:47 |
| 1638 | 40:35 |
| 1639 | 38:18 |
| 1640 | 34:58 |
| 1641 | 29:55 |
| 1642 | 28:56 |
| 1643 | 29:34 |
| 1644 | 25:28 |
| 1645 | 26:47 |
| 1646 | 23:28 |
| 1647 | 22:23 |
| 1648 | 20:44 |
| 1649 | 25:31 |
| 1650 | 26:18 |
| 1651 | 24:57 |
| 1652 | 18:15 |
| 1653 | 17:07 |
| 1654 | 15:24 |
| 1655 | 13:40 |
| 1656 | 13:21 |
| 1657 | 17:01 |
| 1658 | 9:11 |
| 1659 | 8:45 |
| 1660 | 8:07 |
| 1661 | 8:14 |
| 1662 | 7:54 |
| 1663 | 7:37 |
| 1664 | 7:24 |
| 1665 | 7:40 |
| 1666 | 7:26 |
| 1667 | 8:31 |
| 1668 | 8:05 |
| 1669 | 9:04 |
| 1670 | 9:01 |
| 1671 | 8:44 |
| 1672 | 8:40 |
| 1673 | 8:19 |
| 1674 | 8:22 |
| 1675 | 7:08 |
| 1676 | 6:30 |
| 1677 | 6:40 |
| 1678 | 5:04 |
| 1679 | 3:18 |
| 1680 | 5:13 |
| 1681 | 5:04 |
| 1682 | 4:16 |
| 1683 | 4:29 |
| 1684 | 4:12 |
| 1685 | 4:02 |
| 1686 | 3:57 |
| 1687 | 3:58 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 1688 | 4:04 |
| 1689 | 4:08 |
| 1690 | 4:06 |
| 1691 | 4:09 |
| 1692 | 4:15 |
| 1693 | 3:52 |
| 1694 | 3:48 |
| 1695 | 3:53 |
| 1696 | 3:51 |
| 1697 | 3:49 |
| 1698 | 3:43 |
| 1699 | 3:36 |
| 1700 | 3:40 |
| 1701 | 3:38 |
| 1702 | 3:43 |
| 1703 | 3:30 |
| 1704 | 3:29 |
| 1705 | 3:27 |
| 1706 | 3:27 |
| 1707 | 3:24 |
| 1708 | 2:13 |
| 1709 | 2:07 |
| 1710 | 2:08 |
| 1711 | 2:07 |
| 1712 | 2:02 |
| 1713 | 1:55 |
| 1714 | 1:52 |
| 1715 | 1:52 |
| 1716 | 1:51 |
| 1717 | 1:56 |
| 1718 | 1:55 |
| 1719 | 1:43 |
| 1720 | 1:43 |
| 1721 | 1:42 |
| 1722 | 1:41 |
| 1723 | 2:14 |
| 1724 | 3:01 |
| 1725 | 2:45 |
| 1726 | 2:30 |
| 1727 | 2:37 |
| 1728 | 3:02 |
| 1729 | 2:35 |
| 1730 | 3:02 |
| 1731 | 2:30 |
| 1732 | 1:29 |
| 1733 | 3:19 |
| 1734 | 1:10 |
| 1735 | 1:18 |
| 1736 | 2:54 |
| 1737 | 4:41 |
| 1738 | 4:41 |
| 1739 | 5:03 |
| 1740 | 7:21 |
| 1741 | 7:30 |
| 1742 | 7:35 |
| 1743 | 4:38 |
| 1744 | 5:31 |
| 1745 | 4:45 |
| 1746 | 4:11 |
| 1747 | 5:55 |
| 1748 | 7:12 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1749 | 2:27 |
| 1750 | 1:59 |
| 1751 | 2:04 |
| 1752 | 3:07 |
| 1753 | 7:40 |
| 1754 | 7:33 |
| 1755 | 7:04 |
| 1756 | 6:16 |
| 1757 | 5:41 |
| 1758 | 8:25 |
| 1759 | 9:33 |
| 1760 | 6:42 |
| 1761 | 2:07 |
| 1762 | 2:11 |
| 1763 | 3:19 |
| 1764 | 3:25 |
| 1765 | 3:36 |
| 1766 | 3:40 |
| 1767 | 3:51 |
| 1768 | 3:55 |
| 1769 | 4:04 |
| 1770 | 4:05 |
| 1771 | 4:08 |
| 1772 | 4:10 |
| 1773 | 4:15 |
| 1774 | 5:08 |
| 1775 | 5:14 |
| 1776 | 5:54 |
| 1777 | 6:02 |
| 1778 | 6:06 |
| 1779 | 6:13 |
| 1780 | 6:28 |
| 1781 | 6:32 |
| 1782 | 6:35 |
| 1783 | 7:07 |
| 1784 | 7:18 |
| 1785 | 8:01 |
| 1786 | 8:18 |
| 1787 | 8:44 |
| 1788 | 9:49 |
| 1789 | 9:54 |
| 1790 | 10:09 |
| 1791 | 10:08 |
| 1792 | 10:30 |
| 1793 | 9:18 |
| 1794 | 8:54 |
| 1795 | 8:35 |
| 1796 | 8:26 |
| 1797 | 16:34 |
| 1798 | 16:30 |
| 1799 | 11:45 |
| 1800 | 12:29 |
| 1801 | 6:26 |
| 1802 | 9:27 |
| 1803 | 8:39 |
| 1804 | 9:19 |
| 1805 | 9:51 |
| 1806 | 9:39 |
| 1807 | 9:53 |
| 1808 | 7:37 |
| 1809 | 6:44 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1810 | 7:03 |
| 1811 | 6:33 |
| 1812 | 8:20 |
| 1813 | 8:46 |
| 1814 | 10:38 |
| 1815 | 11:02 |
| 1816 | 10:44 |
| 1817 | 11:00 |
| 1818 | 10:42 |
| 1819 | 11:26 |
| 1820 | 11:48 |
| 1821 | 11:20 |
| 1822 | 11:03 |
| 1823 | 10:40 |
| 1824 | 10:33 |
| 1825 | 7:51 |
| 1826 | 7:23 |
| 1827 | 6:11 |
| 1828 | 4:24 |
| 1829 | 4:18 |
| 1830 | 4:23 |
| 1831 | 3:58 |
| 1832 | 3:48 |
| 1833 | 4:07 |
| 1834 | 4:07 |
| 1835 | 4:21 |
| 1836 | 5:03 |
| 1837 | 5:07 |
| 1838 | 4:21 |
| 1839 | 5:26 |
| 1840 | 6:06 |
| 1841 | 6:17 |
| 1842 | 6:30 |
| 1843 | 6:53 |
| 1844 | 7:02 |
| 1845 | 7:18 |
| 1846 | 7:42 |
| 1847 | 8:17 |
| 1848 | 8:34 |
| 1849 | 10:02 |
| 1850 | 10:20 |
| 1851 | 10:33 |
| 1852 | 9:46 |
| 1853 | 10:02 |
| 1854 | 12:00 |
| 1855 | 11:17 |
| 1856 | 11:20 |
| 1857 | 11:36 |
| 1858 | 10:45 |
| 1859 | 14:08 |
| 1860 | 13:52 |
| 1861 | 13:46 |
| 1862 | 13:41 |
| 1863 | 13:26 |
| 1864 | 10:24 |
| 1865 | 10:15 |
| 1866 | 10:02 |
| 1867 | 9:43 |
| 1868 | 9:36 |
| 1869 | 9:28 |
| 1870 | 9:01 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1871 | 8:46 |
| 1872 | 8:11 |
| 1873 | 8:16 |
| 1874 | 9:35 |
| 1875 | 10:54 |
| 1876 | 7:06 |
| 1877 | 7:27 |
| 1878 | 8:54 |
| 1879 | 8:53 |
| 1880 | 8:24 |
| 1881 | 7:43 |
| 1882 | 7:15 |
| 1883 | 6:05 |
| 1884 | 6:31 |
| 1885 | 5:59 |
| 1886 | 5:51 |
| 1887 | 5:30 |
| 1888 | 5:27 |
| 1889 | 5:18 |
| 1890 | 5:14 |
| 1891 | 6:38 |
| 1892 | 9:25 |
| 1893 | 10:10 |
| 1894 | 8:54 |
| 1895 | 14:33 |
| 1896 | 14:16 |
| 1897 | 13:34 |
| 1898 | 13:09 |
| 1899 | 12:41 |
| 1900 | 12:12 |
| 1901 | 9:56 |
| 1902 | 9:51 |
| 1903 | 9:06 |
| 1904 | 8:15 |
| 1905 | 8:16 |
| 1906 | 9:07 |
| 1907 | 8:08 |
| 1908 | 7:50 |
| 1909 | 9:19 |
| 1910 | 12:14 |
| 1911 | 15:07 |
| 1912 | 14:33 |
| 1913 | 13:53 |
| 1914 | 13:32 |
| 1915 | 15:54 |
| 1916 | 16:20 |
| 1917 | 25:02 |
| 1918 | 7:11 |
| 1919 | 7:21 |
| 1920 | 7:21 |
| 1921 | 5:09 |
| 1922 | 4:47 |
| 1923 | 5:20 |
| 1924 | 4:41 |
| 1925 | 4:54 |
| 1926 | 3:20 |
| 1927 | 3:42 |
| 1928 | 3:26 |
| 1929 | 3:21 |
| 1930 | 4:40 |
| 1931 | 4:15 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 1932 | 3:36 |
| 1933 | 2:21 |
| 1934 | 2:11 |
| 1935 | 2:04 |
| 1936 | 2:21 |
| 1937 | 1:59 |
| 1938 | 1:55 |
| 1939 | 1:52 |
| 1940 | 1:46 |
| 1941 | 1:48 |
| 1942 | 0:57 |
| 1943 | 0:49 |
| 1944 | 0:50 |
| 1945 | 0:48 |
| 1946 | 0:45 |
| 1947 | 0:46 |
| 1948 | 5:23 |
| 1949 | 8:49 |
| 1950 | 9:38 |
| 1951 | 12:51 |
| 1952 | 15:33 |
| 1953 | 14:45 |
| 1954 | 11:58 |
| 1955 | 9:38 |
| 1956 | 10:21 |
| 1957 | 6:20 |
| 1958 | 5:31 |
| 1959 | 3:10 |
| 1960 | 3:29 |
| 1961 | 2:18 |
| 1962 | 2:07 |
| 1963 | 2:09 |
| 1964 | 5:52 |
| 1965 | 12:54 |
| 1966 | 10:46 |
| 1967 | 36:49 |
| 1968 | 34:24 |
| 1969 | 33:32 |
| 1970 | 30:11 |
| 1971 | 29:30 |
| 1972 | 28:50 |
| 1973 | 27:04 |
| 1974 | 25:04 |
| 1975 | 22:38 |
| 1976 | 19:51 |
| 1977 | 19:03 |
| 1978 | 18:46 |
| 1979 | 21:30 |
| 1980 | 20:16 |
| 1981 | 19:55 |
| 1982 | 20:40 |
| 1983 | 20:10 |
| 1984 | 20:28 |
| 1985 | 20:53 |
| 1986 | 21:24 |
| 1987 | 21:26 |
| 1988 | 22:41 |
| 1989 | 24:14 |
| 1990 | 22:49 |
| 1991 | 25:43 |
| 1992 | 26:27 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 1993 | 30:31 |
| 1994 | 30:17 |
| 1995 | 23:40 |
| 1996 | 40:38 |
| 1997 | 50:21 |
| 1998 | 50:37 |
| 1999 | 35:53 |
| 2000 | 32:43 |
| 2001 | 23:06 |
| 2002 | 50:08 |
| 2003 | 21:49 |
| 2004 | 23:11 |
| 2005 | 21:19 |
| 2006 | 20:59 |
| 2007 | 27:39 |
| 2008 | 27:37 |
| 2009 | 25:36 |
| 2010 | 28:22 |
| 2011 | 28:15 |
| 2012 | 26:35 |
| 2013 | 24:05 |
| 2014 | 22:17 |
| 2015 | 36:17 |
| 2016 | 35:15 |
| 2017 | 24:23 |
| 2018 | 23:41 |
| 2019 | 23:31 |
| 2020 | 23:43 |
| 2021 | 3:08 |
| 2022 | 3:04 |
| 2023 | 3:10 |
| 2024 | 3:01 |
| 2025 | 3:04 |
| 2026 | 3:04 |
| 2027 | 3:09 |
| 2028 | 3:09 |
| 2029 | 3:15 |
| 2030 | 3:07 |
| 2031 | 3:20 |
| 2032 | 3:29 |
| 2033 | 3:31 |
| 2034 | 3:29 |
| 2035 | 3:37 |
| 2036 | 3:37 |
| 2037 | 3:40 |
| 2038 | 3:38 |
| 2039 | 3:30 |
| 2040 | 3:28 |
| 2041 | 3:23 |
| 2042 | 3:40 |
| 2043 | 3:57 |
| 2044 | 0:00 |
| 2045 | 0:00 |
| 2046 | 0:00 |
| 2047 | 0:00 |
| 2048 | 0:00 |
| 2049 | 0:00 |
| 2050 | 3:54 |
| 2051 | 3:52 |
| 2052 | 5:28 |
| 2053 | 5:21 |

To be continued on next page...

## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2054 | 5:09 |
| 2055 | 4:48 |
| 2056 | 4:33 |
| 2057 | 4:19 |
| 2058 | 4:23 |
| 2059 | 4:22 |
| 2060 | 4:37 |
| 2061 | 4:47 |
| 2062 | 3:27 |
| 2063 | 0:00 |
| 2064 | 0:00 |
| 2065 | 4:38 |
| 2066 | 3:06 |
| 2067 | 6:13 |
| 2068 | 4:43 |
| 2069 | 5:00 |
| 2070 | 5:04 |
| 2071 | 4:50 |
| 2072 | 4:59 |
| 2073 | 5:23 |
| 2074 | 5:22 |
| 2075 | 5:41 |
| 2076 | 5:52 |
| 2077 | 4:36 |
| 2078 | 4:36 |
| 2079 | 2:59 |
| 2080 | 4:50 |
| 2081 | 2:52 |
| 2082 | 4:48 |
| 2083 | 4:54 |
| 2084 | 6:05 |
| 2085 | 5:57 |
| 2086 | 5:34 |
| 2087 | 5:32 |
| 2088 | 5:29 |
| 2089 | 5:44 |
| 2090 | 7:27 |
| 2091 | 6:40 |
| 2092 | 4:35 |
| 2093 | 6:21 |
| 2094 | 7:37 |
| 2095 | 7:46 |
| 2096 | 7:52 |
| 2097 | 8:12 |
| 2098 | 9:21 |
| 2099 | 9:02 |
| 2100 | 8:40 |
| 2101 | 9:25 |
| 2102 | 8:56 |
| 2103 | 7:17 |
| 2104 | 7:07 |
| 2105 | 6:53 |
| 2106 | 8:00 |
| 2107 | 8:10 |
| 2108 | 10:44 |
| 2109 | 12:23 |
| 2110 | 12:25 |
| 2111 | 10:47 |
| 2112 | 11:22 |
| 2113 | 9:37 |
| 2114 | 10:02 |

To be continued on next page...

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2115 | 8:59 |
| 2116 | 8:30 |
| 2117 | 5:33 |
| 2118 | 13:01 |
| 2119 | 13:49 |
| 2120 | 13:42 |
| 2121 | 13:05 |
| 2122 | 12:55 |
| 2123 | 11:56 |
| 2124 | 11:45 |
| 2125 | 12:35 |
| 2126 | 10:13 |
| 2127 | 10:05 |
| 2128 | 9:49 |
| 2129 | 4:24 |
| 2130 | 9:03 |
| 2131 | 10:23 |
| 2132 | 10:44 |
| 2133 | 11:43 |
| 2134 | 10:37 |
| 2135 | 9:48 |
| 2136 | 11:16 |
| 2137 | 11:07 |
| 2138 | 11:19 |
| 2139 | 11:23 |
| 2140 | 11:50 |
| 2141 | 11:47 |
| 2142 | 11:20 |
| 2143 | 10:27 |
| 2144 | 0:00 |
| 2145 | 0:00 |
| 2146 | 0:00 |
| 2147 | 0:00 |
| 2148 | 2:45 |
| 2149 | 3:27 |
| 2150 | 3:46 |
| 2151 | 3:21 |
| 2152 | 3:14 |
| 2153 | 3:59 |
| 2154 | 3:58 |
| 2155 | 4:10 |
| 2156 | 4:20 |
| 2157 | 4:12 |
| 2158 | 4:34 |
| 2159 | 4:35 |
| 2160 | 3:43 |
| 2161 | 3:52 |
| 2162 | 3:54 |
| 2163 | 3:58 |
| 2164 | 3:16 |
| 2165 | 3:11 |
| 2166 | 4:50 |
| 2167 | 4:53 |
| 2168 | 4:14 |
| 2169 | 4:46 |
| 2170 | 5:01 |
| 2171 | 3:55 |
| 2172 | 3:37 |
| 2173 | 5:11 |
| 2174 | 5:26 |
| 2175 | 5:36 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2176 | 6:11 |
| 2177 | 6:35 |
| 2178 | 6:58 |
| 2179 | 6:59 |
| 2180 | 7:40 |
| 2181 | 8:19 |
| 2182 | 8:06 |
| 2183 | 8:09 |
| 2184 | 10:19 |
| 2185 | 9:12 |
| 2186 | 8:01 |
| 2187 | 7:52 |
| 2188 | 7:40 |
| 2189 | 7:46 |
| 2190 | 7:53 |
| 2191 | 8:12 |
| 2192 | 2:45 |
| 2193 | 0:00 |
| 2194 | 0:00 |
| 2195 | 0:00 |
| 2196 | 0:00 |
| 2197 | 0:00 |
| 2198 | 14:09 |
| 2199 | 10:06 |
| 2200 | 9:17 |
| 2201 | 9:07 |
| 2202 | 9:16 |
| 2203 | 8:58 |
| 2204 | 10:16 |
| 2205 | 11:39 |
| 2206 | 11:28 |
| 2207 | 9:15 |
| 2208 | 11:08 |
| 2209 | 8:41 |
| 2210 | 13:54 |
| 2211 | 15:34 |
| 2212 | 15:29 |
| 2213 | 11:01 |
| 2214 | 10:53 |
| 2215 | 10:18 |
| 2216 | 17:15 |
| 2217 | 16:50 |
| 2218 | 16:56 |
| 2219 | 14:14 |
| 2220 | 9:36 |
| 2221 | 13:30 |
| 2222 | 8:17 |
| 2223 | 5:39 |
| 2224 | 3:47 |
| 2225 | 17:25 |
| 2226 | 4:12 |
| 2227 | 6:22 |
| 2228 | 6:37 |
| 2229 | 6:10 |
| 2230 | 5:46 |
| 2231 | 6:42 |
| 2232 | 6:48 |
| 2233 | 6:51 |
| 2234 | 6:55 |
| 2235 | 6:41 |
| 2236 | 6:41 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| | Shadow, expected values |
|---|---|
| No. | Shadow hours per year [h/year] |
| 2237 | 7:47 |
| 2238 | 7:34 |
| 2239 | 8:23 |
| 2240 | 3:54 |
| 2241 | 5:01 |
| 2242 | 5:56 |
| 2243 | 1:27 |
| 2244 | 1:26 |
| 2245 | 1:26 |
| 2246 | 1:51 |
| 2247 | 1:34 |
| 2248 | 1:37 |
| 2249 | 4:06 |
| 2250 | 1:41 |
| 2251 | 1:41 |
| 2252 | 3:33 |
| 2253 | 1:50 |
| 2254 | 1:51 |
| 2255 | 1:54 |
| 2256 | 1:54 |
| 2257 | 1:44 |
| 2258 | 1:45 |
| 2259 | 1:38 |
| 2260 | 1:38 |
| 2261 | 1:32 |
| 2262 | 1:23 |
| 2263 | 1:53 |
| 2264 | 2:21 |
| 2265 | 2:24 |
| 2266 | 2:41 |
| 2267 | 2:31 |
| 2268 | 2:13 |
| 2269 | 2:05 |
| 2270 | 2:16 |
| 2271 | 2:15 |
| 2272 | 4:53 |
| 2273 | 3:37 |
| 2274 | 3:29 |
| 2275 | 3:26 |
| 2276 | 6:14 |
| 2277 | 2:50 |
| 2278 | 2:49 |
| 2279 | 2:58 |
| 2280 | 5:06 |
| 2281 | 6:01 |
| 2282 | 4:38 |
| 2283 | 4:28 |
| 2284 | 5:11 |
| 2285 | 11:36 |
| 2286 | 8:44 |
| 2287 | 7:27 |
| 2288 | 2:15 |
| 2289 | 0:00 |
| 2290 | 2:32 |
| 2291 | 0:45 |
| 2292 | 11:54 |
| 2293 | 17:24 |
| 2294 | 17:00 |
| 2295 | 17:32 |
| 2296 | 15:43 |
| 2297 | 15:37 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

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| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2298 | 19:37 |
| 2299 | 16:29 |
| 2300 | 19:43 |
| 2301 | 39:36 |
| 2302 | 38:37 |
| 2303 | 32:17 |
| 2304 | 23:29 |
| 2305 | 26:10 |
| 2306 | 202:59 |
| 2307 | 328:45 |
| 2308 | 80:32 |
| 2309 | 63:43 |
| 2310 | 154:32 |
| 2311 | 67:15 |
| 2312 | 66:06 |
| 2313 | 12:38 |
| 2314 | 171:22 |
| 2315 | 293:32 |
| 2316 | 95:38 |
| 2317 | 219:43 |
| 2318 | 31:09 |
| 2319 | 27:28 |
| 2320 | 96:01 |
| 2321 | 64:51 |
| 2322 | 27:58 |
| 2323 | 92:35 |
| 2324 | 52:00 |
| 2325 | 18:35 |
| 2326 | 37:12 |
| 2327 | 20:27 |
| 2328 | 21:17 |
| 2329 | 42:33 |
| 2330 | 19:34 |
| 2331 | 17:18 |
| 2332 | 21:47 |
| 2333 | 86:04 |
| 2334 | 145:52 |
| 2335 | 84:43 |
| 2336 | 34:04 |
| 2337 | 50:41 |
| 2338 | 69:11 |
| 2339 | 24:27 |
| 2340 | 22:58 |
| 2341 | 22:23 |
| 2342 | 29:35 |
| 2343 | 25:55 |
| 2344 | 13:05 |
| 2345 | 12:03 |
| 2346 | 20:31 |
| 2347 | 20:03 |
| 2348 | 49:17 |
| 2349 | 61:45 |
| 2350 | 237:00 |
| 2351 | 256:29 |
| 2352 | 8:18 |
| 2353 | 8:07 |
| 2354 | 8:35 |
| 2355 | 9:53 |
| 2356 | 10:16 |
| 2357 | 81:22 |
| 2358 | 226:06 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

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| No. | Shadow, expected values Shadow hours per year [h/year] |
|---|---|
| 2359 | 110:25 |
| 2360 | 153:56 |
| 2361 | 73:01 |
| 2362 | 86:11 |
| 2363 | 47:56 |
| 2364 | 19:48 |
| 2365 | 14:16 |
| 2366 | 1:59 |
| 2367 | 1:38 |
| 2368 | 1:33 |
| 2369 | 0:00 |
| 2370 | 9:49 |
| 2371 | 7:40 |
| 2372 | 2:22 |
| 2373 | 2:25 |
| 2374 | 3:17 |
| 2375 | 4:32 |
| 2376 | 0:00 |
| 2377 | 0:00 |
| 2378 | 4:54 |
| 2379 | 4:48 |
| 2380 | 4:22 |
| 2381 | 1:18 |
| 2382 | 6:04 |
| 2383 | 7:21 |
| 2384 | 0:00 |
| 2385 | 8:06 |
| 2386 | 6:48 |
| 2387 | 8:28 |
| 2388 | 5:31 |
| 2389 | 5:38 |
| 2390 | 5:36 |
| 2391 | 7:14 |
| 2392 | 10:14 |
| 2393 | 32:48 |
| 2394 | 37:17 |
| 2395 | 34:56 |
| 2396 | 28:34 |
| 2397 | 19:47 |
| 2398 | 30:17 |
| 2399 | 27:24 |
| 2400 | 25:10 |
| 2401 | 35:10 |
| 2402 | 66:12 |
| 2403 | 8:10 |
| 2404 | 335:05 |
| 2405 | 87:05 |
| 2406 | 66:18 |
| 2407 | 1:34 |
| 2408 | 0:57 |
| 2409 | 1:03 |
| 2410 | 0:20 |
| 2411 | 0:30 |
| 2412 | 6:09 |
| 2413 | 6:42 |
| 2414 | 10:18 |
| 2415 | 57:07 |
| 2416 | 42:02 |
| 2417 | 17:23 |
| 2418 | 47:41 |
| 2419 | 47:49 |

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

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| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2420 | 62:26 |
| 2421 | 40:06 |
| 2422 | 43:51 |
| 2423 | 48:36 |
| 2424 | 27:45 |
| 2425 | 98:28 |
| 2426 | 0:00 |
| 2427 | 0:00 |
| 2428 | 0:00 |
| 2429 | 0:31 |
| 2430 | 0:27 |
| 2431 | 0:57 |
| 2432 | 0:12 |
| 2433 | 1:04 |
| 2434 | 31:13 |
| 2435 | 181:23 |
| 2436 | 209:39 |
| 2437 | 25:51 |
| 2438 | 5:49 |
| 2439 | 17:33 |
| 2440 | 15:07 |
| 2441 | 64:49 |
| 2442 | 99:22 |
| 2443 | 84:07 |
| 2444 | 95:24 |
| 2445 | 97:47 |
| 2446 | 122:17 |
| 2447 | 117:26 |
| 2448 | 96:03 |
| 2449 | 158:09 |
| 2450 | 222:07 |
| 2451 | 28:15 |
| 2452 | 29:36 |
| 2453 | 10:41 |
| 2454 | 0:27 |
| 2455 | 5:21 |
| 2456 | 6:53 |
| 2457 | 6:48 |
| 2458 | 81:58 |
| 2459 | 89:25 |
| 2460 | 70:57 |
| 2461 | 98:08 |
| 2462 | 178:05 |
| 2463 | 24:56 |
| 2464 | 15:01 |
| 2465 | 37:22 |
| 2466 | 133:01 |
| 2467 | 15:45 |
| 2468 | 31:35 |
| 2469 | 76:17 |
| 2470 | 174:55 |
| 2471 | 5:08 |
| 2472 | 5:41 |
| 2473 | 82:44 |
| 2474 | 15:06 |
| 2475 | 89:10 |
| 2476 | 130:14 |
| 2477 | 65:09 |
| 2478 | 18:01 |
| 2479 | 19:05 |
| 2480 | 20:59 |

To be continued on next page...

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2481 | 83:21 |
| 2482 | 50:10 |
| 2483 | 47:46 |
| 2484 | 41:45 |
| 2485 | 52:41 |
| 2486 | 69:23 |
| 2487 | 118:49 |
| 2488 | 46:40 |
| 2489 | 37:00 |
| 2490 | 42:21 |
| 2491 | 68:35 |
| 2492 | 63:51 |
| 2493 | 17:40 |
| 2494 | 28:33 |
| 2495 | 17:45 |
| 2496 | 86:34 |
| 2497 | 92:25 |
| 2498 | 84:51 |
| 2499 | 49:01 |
| 2500 | 40:06 |
| 2501 | 190:06 |
| 2502 | 41:38 |
| 2503 | 41:56 |
| 2504 | 33:15 |
| 2505 | 131:19 |
| 2506 | 102:27 |
| 2507 | 198:57 |
| 2508 | 109:29 |
| 2509 | 22:16 |
| 2510 | 51:04 |
| 2511 | 11:14 |
| 2512 | 11:33 |
| 2513 | 76:18 |
| 2514 | 8:44 |
| 2515 | 13:55 |
| 2516 | 10:27 |
| 2517 | 9:01 |
| 2518 | 289:32 |
| 2519 | 218:56 |
| 2520 | 103:25 |
| 2521 | 130:17 |
| 2522 | 69:18 |
| 2523 | 0:00 |
| 2524 | 0:00 |
| 2525 | 0:00 |
| 2526 | 0:00 |
| 2527 | 0:00 |
| 2528 | 0:00 |
| 2529 | 0:46 |
| 2530 | 0:00 |
| 2531 | 4:03 |
| 2532 | 3:14 |
| 2533 | 6:16 |
| 2534 | 9:02 |
| 2535 | 6:32 |
| 2536 | 5:14 |
| 2537 | 3:31 |
| 2538 | 15:35 |
| 2539 | 16:12 |
| 2540 | 13:34 |
| 2541 | 9:30 |

To be continued on next page...

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## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2542 | 11:42 |
| 2543 | 7:04 |
| 2544 | 7:47 |
| 2545 | 7:52 |
| 2546 | 7:55 |
| 2547 | 8:22 |
| 2548 | 7:26 |
| 2549 | 6:34 |
| 2550 | 15:57 |
| 2551 | 28:57 |
| 2552 | 1:45 |
| 2553 | 4:28 |
| 2554 | 2:55 |
| 2555 | 2:28 |
| 2556 | 10:41 |
| 2557 | 9:37 |
| 2558 | 8:59 |
| 2559 | 6:09 |
| 2560 | 4:38 |
| 2561 | 3:47 |
| 2562 | 26:03 |
| 2563 | 96:19 |
| 2564 | 278:40 |
| 2565 | 93:46 |
| 2566 | 152:15 |
| 2567 | 45:42 |
| 2568 | 49:05 |
| 2569 | 36:39 |
| 2570 | 0:46 |
| 2571 | 0:57 |
| 2572 | 12:15 |
| 2573 | 6:20 |
| 2574 | 0:00 |
| 2575 | 20:10 |
| 2576 | 20:53 |
| 2577 | 20:10 |
| 2578 | 20:23 |
| 2579 | 21:04 |
| 2580 | 21:00 |
| 2581 | 0:00 |
| 2582 | 3:13 |
| 2583 | 16:56 |
| 2584 | 5:37 |
| 2585 | 5:28 |
| 2586 | 17:06 |
| 2587 | 126:23 |
| 2588 | 175:02 |
| 2589 | 67:14 |
| 2590 | 85:45 |
| 2591 | 3:36 |
| 2592 | 3:43 |
| 2593 | 1:26 |
| 2594 | 1:37 |
| 2595 | 9:16 |
| 2596 | 4:46 |
| 2597 | 42:57 |
| 2598 | 0:00 |
| 2599 | 0:00 |
| 2600 | 0:00 |
| 2601 | 0:00 |
| 2602 | 0:00 |

To be continued on next page...

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7/24/2021 7:18 PM/3.4.388

## SHADOW - Main Result

Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2603 | 0:00 |
| 2604 | 0:00 |
| 2605 | 8:45 |
| 2606 | 10:39 |
| 2607 | 11:49 |
| 2608 | 0:00 |
| 2609 | 0:00 |
| 2610 | 50:57 |
| 2611 | 87:28 |
| 2612 | 56:40 |
| 2613 | 201:44 |
| 2614 | 170:58 |
| 2615 | 35:44 |
| 2616 | 31:57 |
| 2617 | 25:55 |
| 2618 | 11:31 |
| 2619 | 2:54 |
| 2620 | 2:09 |
| 2621 | 3:32 |
| 2622 | 1:37 |
| 2623 | 1:20 |
| 2624 | 0:00 |
| 2625 | 0:00 |
| 2626 | 0:00 |
| 2627 | 0:00 |
| 2628 | 0:00 |
| 2629 | 0:00 |
| 2630 | 17:48 |
| 2631 | 2:47 |
| 2632 | 1:56 |
| 2633 | 3:46 |
| 2634 | 2:15 |
| 2635 | 2:09 |
| 2636 | 4:24 |
| 2637 | 4:37 |
| 2638 | 5:31 |
| 2639 | 5:24 |
| 2640 | 5:17 |
| 2641 | 6:15 |
| 2642 | 2:56 |
| 2643 | 16:01 |
| 2644 | 16:29 |
| 2645 | 118:31 |
| 2646 | 54:22 |
| 2647 | 80:51 |
| 2648 | 21:18 |
| 2649 | 46:07 |
| 2650 | 53:26 |
| 2651 | 59:22 |
| 2652 | 24:48 |
| 2653 | 104:02 |
| 2654 | 25:04 |
| 2655 | 24:15 |
| 2656 | 46:44 |
| 2657 | 17:17 |
| 2658 | 9:40 |
| 2659 | 7:06 |
| 2660 | 3:11 |
| 2661 | 0:00 |
| 2662 | 214:19 |
| 2663 | 225:28 |

To be continued on next page...

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Shadow, expected values<br>Shadow hours per year [h/year] |
|---|---|
| 2664 | 192:20 |
| 2665 | 111:15 |
| 2666 | 0:00 |
| 2667 | 0:00 |
| 2668 | 1:04 |
| 2669 | 1:05 |
| 2670 | 0:59 |
| 2671 | 5:43 |
| 2672 | 5:54 |
| 2673 | 5:54 |
| 2674 | 5:33 |
| 2675 | 5:04 |
| 2676 | 5:08 |
| 2677 | 6:31 |
| 2678 | 6:33 |
| 2679 | 4:19 |
| 2680 | 4:25 |
| 2681 | 7:15 |
| 2682 | 12:24 |
| 2683 | 8:57 |
| 2684 | 11:00 |
| 2685 | 9:12 |
| 2686 | 2:51 |
| 2687 | 3:08 |
| 2688 | 2:37 |
| 2689 | 2:00 |
| 2690 | 1:44 |

Total amount of flickering on the shadow receptors caused by each WTG

| No. | Name | Worst case [h/year] | Expected [h/year] |
|---|---|---|---|
| 1 | D1 | 420:49 | 174:41 |
| 2 | D2 | 566:52 | 202:04 |
| 3 | D3 | 285:55 | 97:10 |
| 4 | D4 | 568:50 | 202:18 |
| 5 | D5 | 1326:17 | 519:29 |
| 6 | D6 | 1244:20 | 381:52 |
| 7 | D7 | 352:29 | 151:44 |
| 8 | D8 | 385:53 | 154:47 |
| 9 | D9 | 564:07 | 159:33 |
| 10 | D10 | 159:53 | 67:58 |
| 11 | D11 | 795:31 | 281:20 |
| 12 | D12 | 428:07 | 168:13 |
| 13 | D13 | 189:45 | 62:55 |
| 14 | D14 | 227:14 | 73:18 |
| 15 | D15 | 315:49 | 130:54 |
| 16 | D16 | 660:24 | 236:48 |
| 17 | D17 | 486:13 | 171:21 |
| 18 | D18 | 210:48 | 73:39 |
| 19 | D19 | 231:24 | 84:49 |
| 20 | C1 | 313:44 | 106:10 |
| 21 | C2 | 744:00 | 285:45 |
| 22 | C3 | 277:43 | 97:20 |
| 23 | C5 | 133:21 | 48:30 |
| 24 | C6 | 295:15 | 102:17 |
| 25 | C7 | 213:33 | 73:24 |
| 26 | C8 | 268:00 | 90:22 |
| 27 | C10 | 1365:12 | 512:46 |
| 28 | C11 | 628:07 | 223:21 |
| 29 | C12 | 1071:25 | 432:54 |

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## SHADOW - Main Result

### Calculation: 0599549 - Huadian Wind Power Project - Real Case

...continued from previous page

| No. | Name | Worst case [h/year] | Expected [h/year] |
|---|---|---|---|
| 30 | C16 | 1886:45 | 700:22 |
| 31 | C19 | 274:31 | 91:25 |
| 32 | B1 | 388:53 | 136:52 |
| 33 | B2 | 999:51 | 322:31 |
| 34 | B7 | 628:00 | 242:30 |
| 35 | B9 | 1298:11 | 397:18 |
| 36 | B10 | 1971:27 | 706:30 |
| 37 | B11 | 1049:46 | 347:49 |
| 38 | B13 | 1353:41 | 443:15 |
| 39 | B14 | 591:20 | 177:39 |
| 40 | B15 | 287:13 | 95:37 |
| 41 | B17 | 309:30 | 110:17 |
| 42 | B18 | 215:46 | 79:40 |
| 43 | B19 | 1164:28 | 391:51 |
| 44 | A2 | 1367:18 | 430:14 |
| 45 | A5 | 368:24 | 140:51 |
| 46 | A6 | 696:22 | 252:36 |
| 47 | A7 | 376:50 | 129:15 |
| 48 | A9 | 893:55 | 376:05 |
| 49 | A10 | 328:33 | 117:00 |
| 50 | A11 | 576:37 | 235:13 |
| 51 | A12 | 265:24 | 83:06 |
| 52 | A15 | 186:26 | 60:05 |
| 53 | A17 | 818:49 | 289:33 |
| 54 | A18 | 394:13 | 156:18 |
| 55 | A19 | 430:03 | 191:17 |
| 56 | C4 | 168:01 | 57:54 |
| 57 | C9 | 245:31 | 93:11 |
| 58 | C13 | 102:43 | 34:01 |
| 59 | C14 | 1407:58 | 473:39 |
| 60 | C15 | 680:24 | 285:34 |
| 61 | C17 | 532:33 | 207:55 |
| 62 | B3 | 1297:07 | 529:12 |
| 63 | B4 | 241:43 | 83:40 |
| 64 | B5 | 1954:50 | 667:18 |
| 65 | B6 | 1206:03 | 459:09 |
| 66 | B8 | 1774:17 | 680:43 |
| 67 | B16 | 795:49 | 271:06 |
| 68 | A1 | 1307:24 | 503:38 |
| 69 | A3 | 197:02 | 63:45 |
| 70 | A8 | 292:13 | 95:04 |
| 71 | A13 | 338:56 | 131:01 |
| 72 | A14 | 986:42 | 327:14 |
| 73 | A16 | 283:25 | 95:24 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

# APPENDIX N BOUNDARY MAP OF UXO CLEARANCE

## BẢNG TỔNG HỢP DIỆN TÍCH ĐÃ DÒ TÌM, XỬ LÝ BMVN (ĐỢT 1)

*Căn cứ Quy trình dò tìm xử lý bom mìn, vật nổ còn sót lại sau chiến tranh.*

*Căn cứ Bản vẽ thiết kế do Chủ đầu tư cung cấp;*

*Căn cứ Khối lượng thực tế thi công;*

| TT | Tên dự án | Diện tích rà phá BMVN (ha) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Theo Hợp đồng | | | Thực hiện | | | Còn lại | | |
| | | Độ sâu 3m | Độ sâu 5m | Tổng | Độ sâu 3m | Độ sâu 5m | Tổng | Độ sâu 3m | Độ sâu 5m | Tổng |
| 1 | Dự án: Nhà máy điện gió Krông Búk 1 | 3,62 | 6,75 | 10,37 | 3,62 | 6,75 | 10,37 | - | - | - |
| 2 | Dự án: Nhà máy điện gió Krông Búk 2 | 4,50 | 6,75 | 11,25 | 4,50 | 6,75 | 11,25 | - | - | - |
| 3 | Dự án Nhà máy điện gió Cư Né 1 | 6,92 | 10,41 | 17,33 | 6,92 | 10,41 | 17,33 | - | - | - |
| 4 | Dự án: Nhà máy điện gió Cư Né 2 | 4,55 | 7,13 | 11,68 | 4,55 | 7,13 | 11,68 | - | - | - |
| | **Tổng cộng:** | **19,59** | **31,04** | **50,63** | **19,59** | **31,04** | **50,63** | - | - | - |

**ĐẠI DIỆN ĐƠN VỊ THI CÔNG**
**GIÁM ĐỐC**

M.S.C.N: 0100108984-022 - C.T.T.N.H.H
XÍ NGHIỆP 319.7
CHI NHÁNH TỔNG CÔNG TY 319
Q.LONG BIÊN - TP HÀ NỘI

**Trần Văn Luyện**

# BẢNG TÍNH CHI TIẾT DIỆN TÍCH ĐÃ DÒ TÌM, XỬ LÝ BMVN (ĐỢT 1)

*(Kèm theo Bảng tổng hợp diện tích đã dò tìm, xử lý BMVN (Đợt 1))*

*Căn cứ Quy trình dò tìm xử lý bom mìn, vật nổ còn sót lại sau chiến tranh.*

*Căn cứ Bản vẽ thiết kế do Chủ đầu tư cung cấp;*

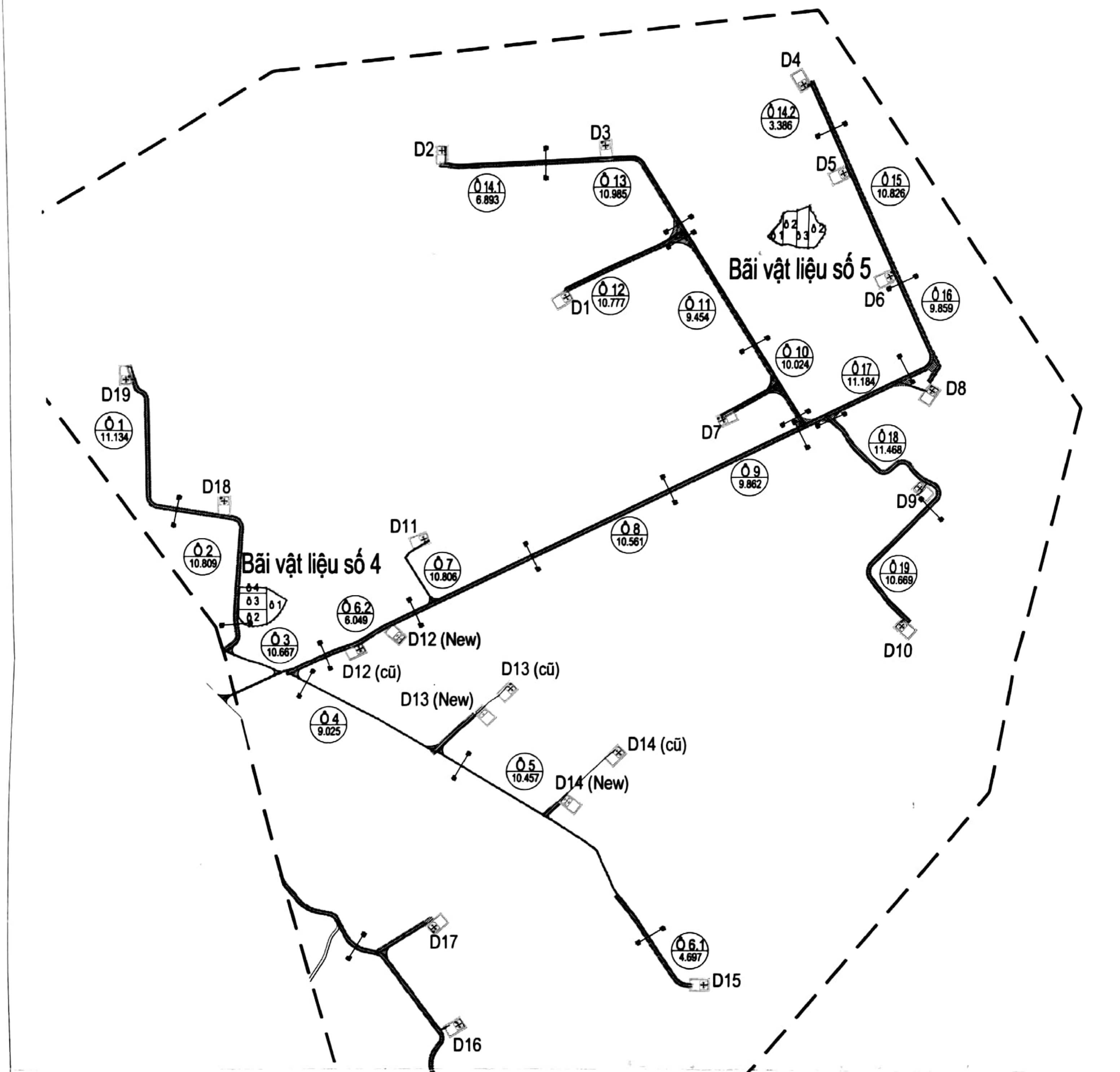
*Căn cứ Khối lượng thực tế thi công*

| TT | Hạng mục | Diện tích công trình (m2) | Diện tích HLAT (m2) | Tổng diện tích RPBMVN | Độ sâu RPBMVN (m) | Ghi chú |
|---|---|---|---|---|---|---|
| **A** | **Dự án: Nhà máy điện gió Krông Búk 1** | **77.367** | **26.367** | **103.734** | | |
| **I** | **Tua bin (18 trụ)** | 46.800 | 20.700 | 67.500 | 5 | HLAT 5m |
| **II** | **Bãi vật liệu** | | | | | |
| 1 | Bãi số 1 | 18.644 | 3.068 | 21.712 | 3 | |
| 2 | Bãi số 2 | 11.923 | 2.599 | 14.522 | 3 | |
| | **Tổng hợp (ha)** | | | **10,37** | | |
| | *Diện tích dò tìm đến độ sâu 3m (ha)* | | | *3,62* | | |
| | *Diện tích dò tìm đến độ sâu 5m (ha)* | | | *6,75* | | |
| **B** | **Dự án: Nhà máy điện gió Krông Búk 2** | **86.081** | **26.425** | **112.506** | | |
| **I** | **Tua bin (18 trụ)** | 46.800 | 20.700 | 67.500 | 5 | HLAT 5m |
| **II** | **Bãi vật liệu, đất kho bãi** | | | | | |
| 1 | Bãi số 3 | 17.860 | 2.616 | 20.476 | 3 | HLAT 5m |
| 2 | Đất kho bãi số 3 | 21.421 | 3.109 | 24.530 | 3 | HLAT 5m |
| | **Tổng hợp (ha)** | | | **4,50** | | |
| | *Diện tích dò tìm đến độ sâu 3m (ha)* | | | *4,50* | | |
| | *Diện tích dò tìm đến độ sâu 5m (ha)* | | | *0,00* | | |
| **C** | **Dự án: Nhà máy điện gió Cư Né 1** | **98.970** | **28.323** | **173.280** | | |
| **I** | **Tua bin (18 trụ)** | 46.800 | 20.700 | 67.500 | 5 | HLAT 5m |
| **II** | **Trạm biến áp, trạm trộn** | | | | | |
| 1 | Trạm biến áp | 27.580 | 3.470 | 31.050 | 5 | HLAT 5m |
| 2 | Trạm trộn | 4.098 | 1.418 | 5.516 | 5 | HLAT 5m |
| **III** | **Đất kho bãi, trại tạm thời** | 4.098 | | | | |
| 1 | Trại tạm thời | 16.394 | 2.735 | 19.129 | 3 | HLAT 5m |
| 2 | Đất kho bãi số 2 | 16.394 | 2.735 | 19.129 | 3 | HLAT 5m |
| 3 | Đất kho bãi số 1 | 26.410 | 4.511 | 30.921 | 3 | HLAT 5m |
| | **Tổng hợp (ha)** | | | **17,33** | | |
| | *Diện tích dò tìm đến độ sâu 3m (ha)* | | | *6,92* | | |
| | *Diện tích dò tìm đến độ sâu 5m (ha)* | | | *10,41* | | |
| **D** | **Dự án: Nhà máy điện gió Cư Né 2** | **89.207** | **27.562** | **116.792** | | |
| **I** | **Tua bin (19 trụ)** | 49.400 | 21.850 | 71.250 | 5 | HLAT 5m |
| **II** | **Bãi vật liệu** | | | | | |
| 1 | Bãi số 4 | 19.967 | 2.792 | 22.759 | 3 | HLAT 5m |
| 2 | Bãi số 5 | 19.840 | 2.920 | 22.760 | 3 | HLAT 5m |
| | **Tổng hợp (ha)** | | | **11,68** | | |
| | *Diện tích dò tìm đến độ sâu 3m (ha)* | | | *4,55* | | |
| | *Diện tích dò tìm đến độ sâu 5m (ha)* | | | *7,13* | | |

# BẢN VẼ HOÀN CÔNG RÀ PHÁ BOM MÌN, VẬT NỔ (TỔNG THỂ)

**Dự án Nhà máy điện gió Cư Né 2**

**Địa điểm: xã Cư Né, huyện Krông Búk, tỉnh Đắk Lắk**




## GHI CHÚ:

- Diện tích rà phá bom mìn, vật nổ đợt 1:
  + Thi công 19 vị trí tua bin.
  + Đất kho bãi số 4, số 5;
- Diện tích rà phá bom mìn, vật nổ đợt 2:
  + Đường giao thông+tuyến cáp.
  + Tua bin D12; D13 và D14 (do thay đổi vị trí)
- Pham vi rà phá bom mìn bao gồm diện tích công trình và Hành lang an toàn 5m tính từ mép công trình ra phía ngoài. Riêng tuyến cáp HLAT là 3m.
- Độ sâu:
  + Dò tìm đến độ sâu 5m đối với các vị trí tua bin;
  + Dò tìm đến độ sâu 3m đối với các tuyến đường giao thông, tuyến cáp, đất kho bãi, trại tạm thời ...

## KÍ HIỆU:

Ô thi công số

Ô 5

10.457

Phân chia phạm vi Ô thi công tuyến đường +tuyến cáp

Diện tích ô thi công (m2)

| XÍ NGHIỆP 319.7 - CHI NHÁNH TỔNG CÔNG TY 319 BQP | | |
|---|---|---|
| BẢN VẼ HOÀN CÔNG | | |
| NGƯỜI LẬP | CHỈ HUY TRƯỞNG CT | CÁN BỘ CHỦ ĐẦU TƯ |
| Hà Ngọc Tuấn | Ngô Huy Thắng | Đinh Hùng Dương |

# BẢN VẼ HOÀN CÔNG RÀ PHÁ BOM MÌN, VẬT NỔ (TỔNG THỂ)

**Dự án: Nhà máy điện gió Cư Né 1**

**Địa điểm: xã Cư Né, huyện Krông Búk, tỉnh Đắk Lắk**

## GHI CHÚ:

- Diện tích rà phá bom mìn, vật nổ đợt 1:
  + Thi công 18 vị trí tua bin.
  + Trạm biến áp; Trạm trộn; Đất kho bãi số 1, số 2; Trại tạm thời.
- Diện tích rà phá bom mìn, vật nổ đợt 2:
  + Đường giao thông+tuyến cáp.
  + Tua bin C5, C19 (do thay đổi vị trí) và C10 (Bổ sung)
- Phạm vi rà phá bom mìn bao gồm diện tích công trình và Hành lang an toàn 5m tính từ mép công trình ra phía ngoài. Riêng tuyến cáp HLAT là 3m.
- Độ sâu:
  + Dò tìm đến độ sâu 5m đối với các vị trí tua bin; Trạm biến áp; Trạm trộn
  + Dò tìm đến độ sâu 3m đối với các tuyến đường giao thông, tuyến cáp, bãi vật liệu, đất kho bãi, trại tạm thời ...

## KÍ HIỆU:

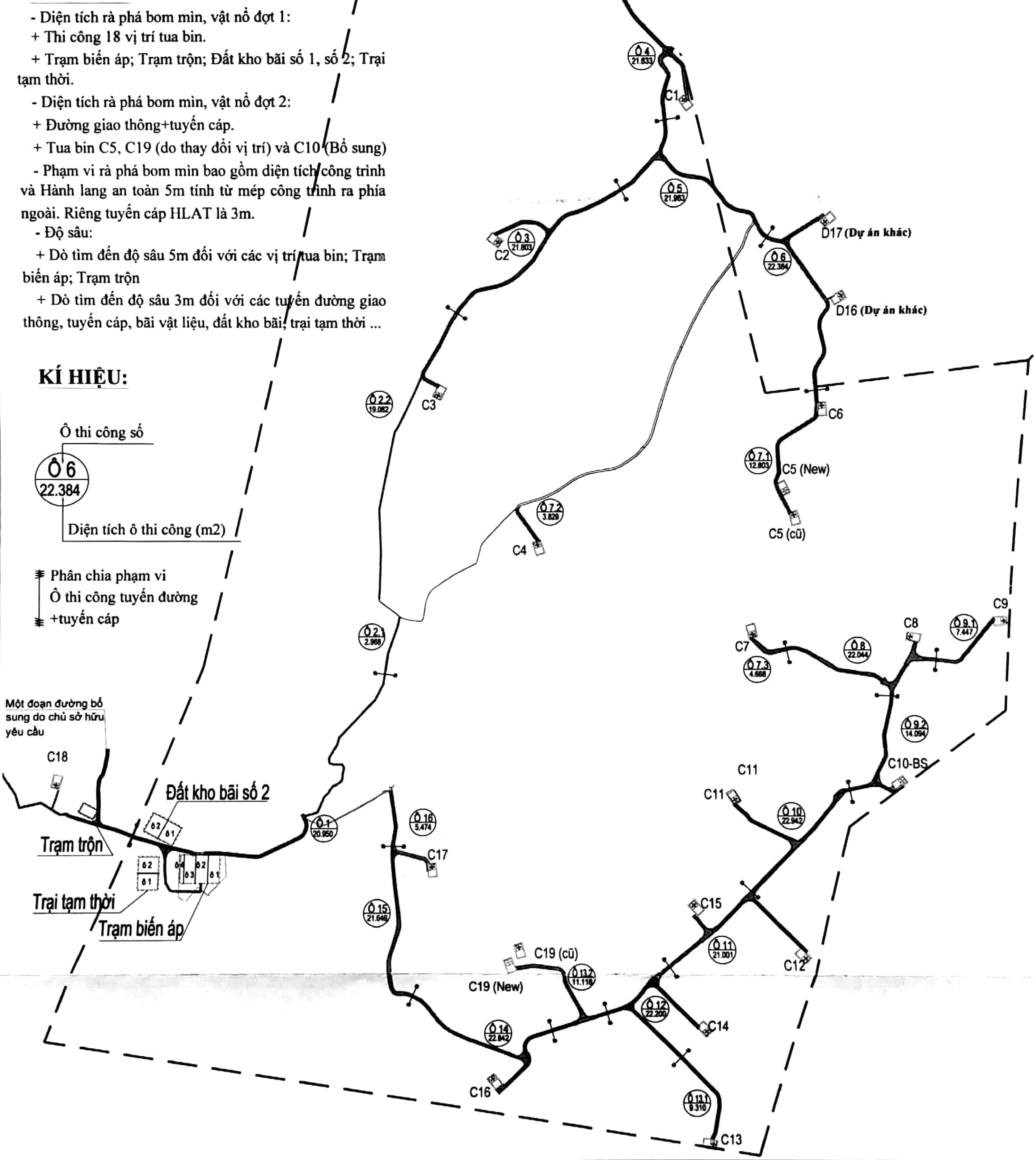
Ô thi công số

Ô 6

22.384

Diện tích ô thi công (m2)

Phân chia phạm vi Ô thi công tuyến đường +tuyến cáp

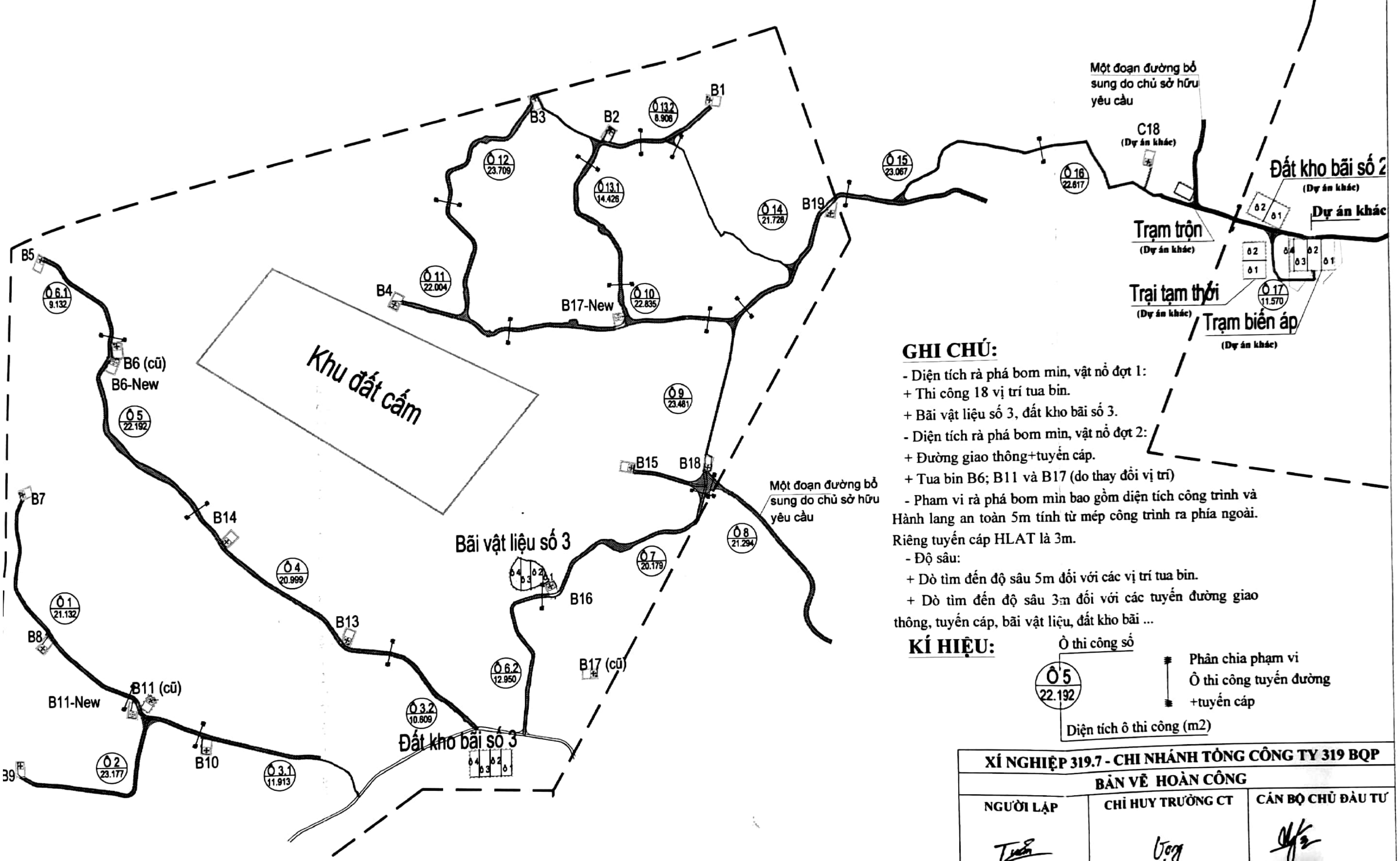



| XÍ NGHIỆP 319.7 - CHI NHÁNH TỔNG CÔNG TY 319 BQP | | |
|---|---|---|
| **BẢN VẼ HOÀN CÔNG** | | |
| NGƯỜI LẬP | CHỈ HUY TRƯỞNG CT | CÁN BỘ CHỦ ĐẦU TƯ |
| Tuấn | Hg | |
| Hà Ngọc Tuấn | Bùi Văn Hùng | Đinh Hùng Dương |

# BẢN VẼ HOÀN CÔNG RÀ PHÁ BOM MÌN, VẬT NỔ (TỔNG THỂ)

**Dự án Nhà máy điện gió Krông Búk 2**

**Địa điểm: xã Cư Pơng, xã Ea Sin, xã Cư Né, huyện Krông Búk, tỉnh Đắk Lắk**




## GHI CHÚ:

- Diện tích rà phá bom mìn, vật nổ đợt 1:
  + Thi công 18 vị trí tua bin.
  + Bãi vật liệu số 3, đất kho bãi số 3.
- Diện tích rà phá bom mìn, vật nổ đợt 2:
  + Đường giao thông+tuyến cáp.
  + Tua bin B6; B11 và B17 (do thay đổi vị trí)
- Phạm vi rà phá bom mìn bao gồm diện tích công trình và Hành lang an toàn 5m tính từ mép công trình ra phía ngoài. Riêng tuyến cáp HLAT là 3m.
- Độ sâu:
  + Dò tìm đến độ sâu 5m đối với các vị trí tua bin.
  + Dò tìm đến độ sâu 3m đối với các tuyến đường giao thông, tuyến cáp, bãi vật liệu, đất kho bãi ...

## KÍ HIỆU:

Ô thi công số

Ô 5
22.192

Diện tích ô thi công (m2)

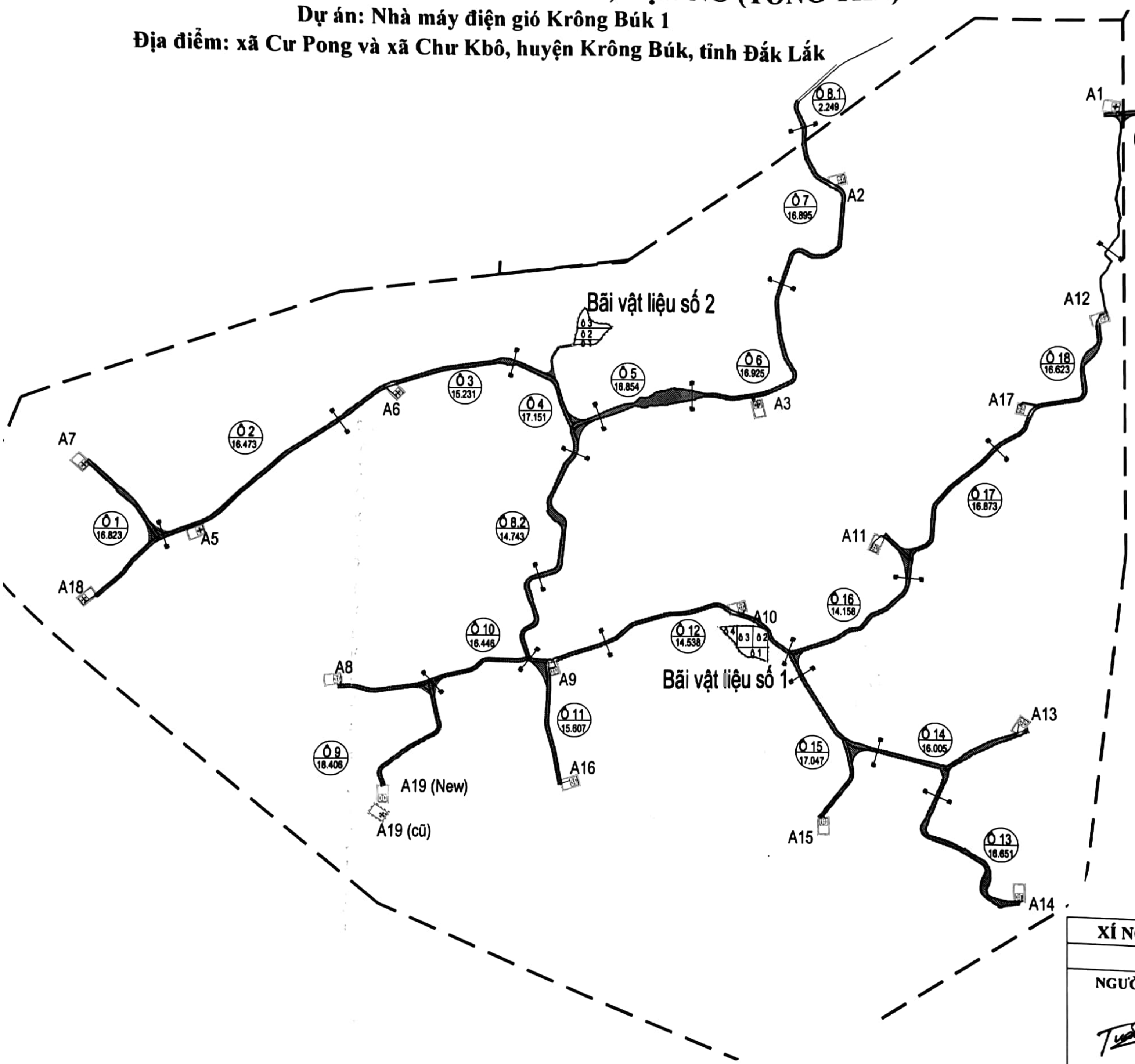
Phân chia phạm vi Ô thi công tuyến đường +tuyến cáp

| XÍ NGHIỆP 319.7 - CHI NHÁNH TỔNG CÔNG TY 319 BQP | | |
|---|---|---|
| BẢN VẼ HOÀN CÔNG | | |
| NGƯỜI LẬP | CHỈ HUY TRƯỞNG CT | CÁN BỘ CHỦ ĐẦU TƯ |
| Hà Ngọc Tuấn | Đinh Thế Vọng | Đinh Hùng Dương |

# BẢN VẼ HOÀN CÔNG RÀ PHÁ BOM MÌN, VẬT NỔ (TỔNG THỂ)

**Dự án: Nhà máy điện gió Krông Búk 1**

**Địa điểm: xã Cư Pong và xã Chư Kbô, huyện Krông Búk, tỉnh Đắk Lắk**




## GHI CHÚ:

- Diện tích rà phá bom mìn, vật nổ đợt 1:
+ Thi công 18 vị trí tua bin.
+ Bãi vật liệu số 1, bãi vật liệu số 2.
- Diện tích rà phá bom mìn, vật nổ đợt 2:
+ Đường giao thông+tuyến cáp.
+ Tua bin A19 (do thay đổi vị trí)
- Phạm vi rà phá bom mìn bao gồm diện tích công trình và Hành lang an toàn 5m tính từ mép công trình ra phía ngoài. Riêng tuyến cáp HLAT là 3m.
- Độ sâu:
+ Dò tìm đến độ sâu 5m đối với các vị trí tua bin.
+ Dò tìm đến độ sâu 3m đối với các tuyến đường giao thông, tuyến cáp, bãi vật liệu, ...

## KÍ HIỆU:

Ô thi công số

Ô 6
16.925

Diện tích ô thi công (m2)

Phân chia phạm vi Ô thi công tuyến đường +tuyến cáp

| XÍ NGHIỆP 319.7 - CHI NHÁNH TỔNG CÔNG TY 319 BQP | | |
|---|---|---|
| BẢN VẼ HOÀN CÔNG | | |
| NGƯỜI LẬP | CHỈ HUY TRƯỞNG CT | CÁN BỘ CHỦ ĐẦU TƯ |
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