Botanical Assessment for the proposed development of a solar facility on Portion 8 of Farm Spes Bona 2355, Bloemfontein, Free State Province

Botanical Surveys & Tours

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Report compiled for: EnviroAfrica CC
Client: Keren Energy

June 2022; November 2022

National Legislation and Regulations governing this report

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC to provide specialist botanical consulting services for the assessment of the area for the proposed development of a solar farm on Portion 8 of Farm 2355, Bloemfontein, Free State Province.

Details of Specialist

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Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 40 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 600 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Curriculum Vitae – Appendix 1

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the study was carried out under the aegis of, Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald nor Bergwind Botanical Surveys and Tours CC have any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Bergwind Botanical Surveys & Tours CC, its staff and appointed associates, reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation

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Declaration of independence:

I David Jury McDonald, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

13 June 2022; 7 November 2022

Date:

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1. Background and Brief

Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC on behalf of Keren Renewable Energy Pty Ltd (the 'Applicant') to undertake a botanical assessment to determine the botanical sensitivity and suitability of the area proposed for development of a solar facility on Portion 8 of Farm 2355, Bloemfontein, Free State Province. The solar facility would be connected to the Eskom Harvard Substation that is near the site of the proposed solar facility.

2. Terms of Reference

- Take cognizance of, and comply with, the substantive content requirements outlined within Appendix 6 of GN R982, as amended (i.e. GN 326), which outlines the legal minimum requirements for specialist studies in terms of the 2014 NEMA EIA Regulations, as amended;
- Adhere to the protocols applicable to specialist for environmental impact assessments
- Investigate the area proposed for the solar farm and determine its botanical sensitivity and possible constraints that would prevent solar farm development.
- Described the local and regional context of the vegetation communities and plant species within the affected areas.
- The ecosystem status and conservation value of the vegetation communities, including the whether the potentially affected areas comprise critically endangered or endangered ecosystem(s) listed in terms of Section 52 of the NEMBA;
- Record any rare or endangered species encountered or likely to be or have been present;
- The presence of and proximity of the proposed site to protected area(s) identified in terms of NEMPAA and proximity to a Biosphere Reserve (where relevant) (within, at least, a 20km radius of the site).

3. Project Area

3.1 Locality and Extent

Farm Spes Bona 2355, is approximately 10 km west of Bloemfontein, in the Free State Province (Figure 1). The entire parent farm (Figure 2) is 1478 ha in extent (Figures 1--3). Importantly, this farm is near the Eskom Harvard Substation, and a suitable connection point for any solar PV plant that may be built in the area, to the national grid.

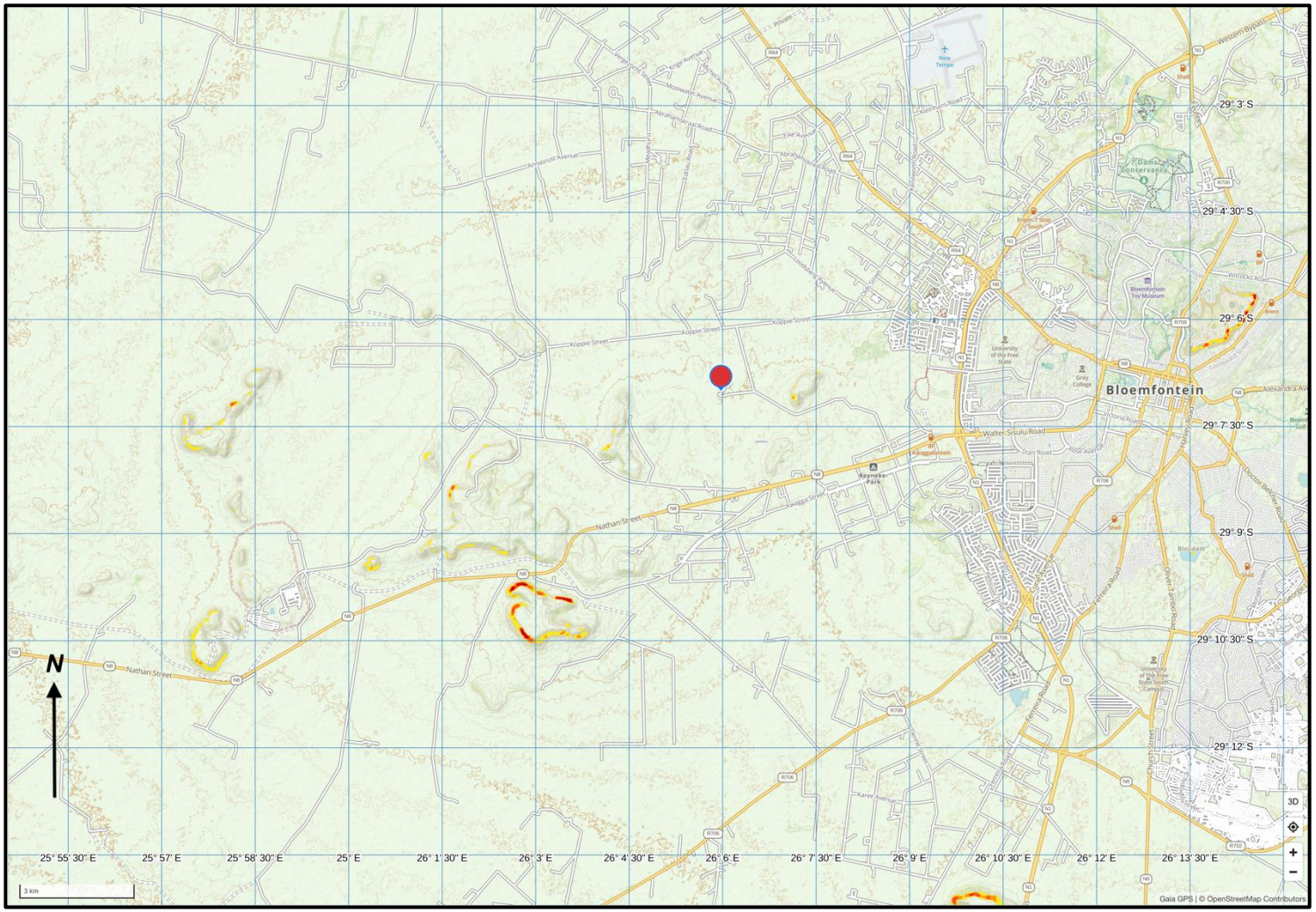

Figure 1. Topographical map of the general location of Portion 8 of Spes Bona 2355, Bloemfontein where the Harvard 2 Solar PV facility is proposed to be constructed. (Map source: GAIA GPS).

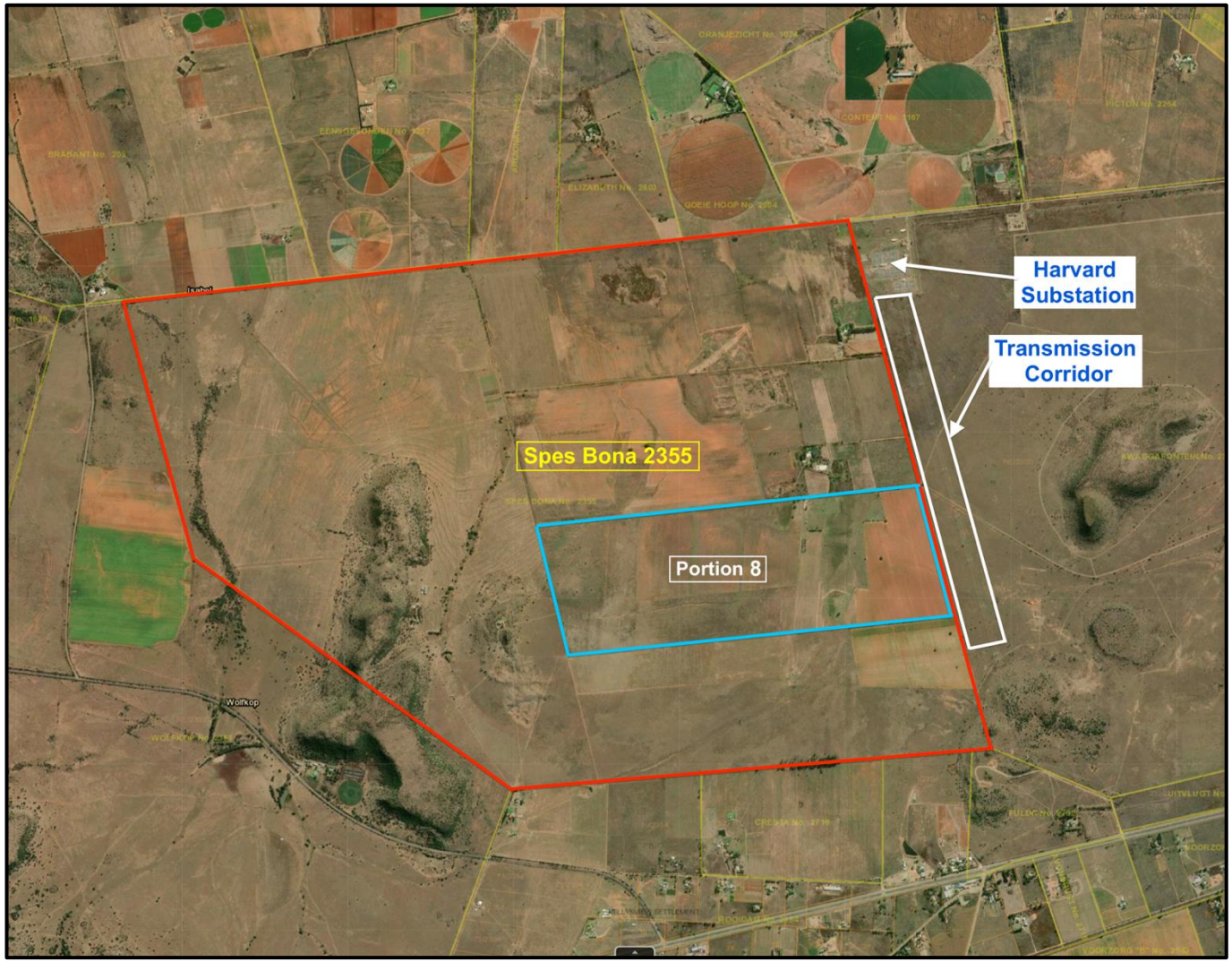

Figure 2. Aerial image (Google Earth ™) of Spes Bona 2355 showing the parent farm and Portion 8.

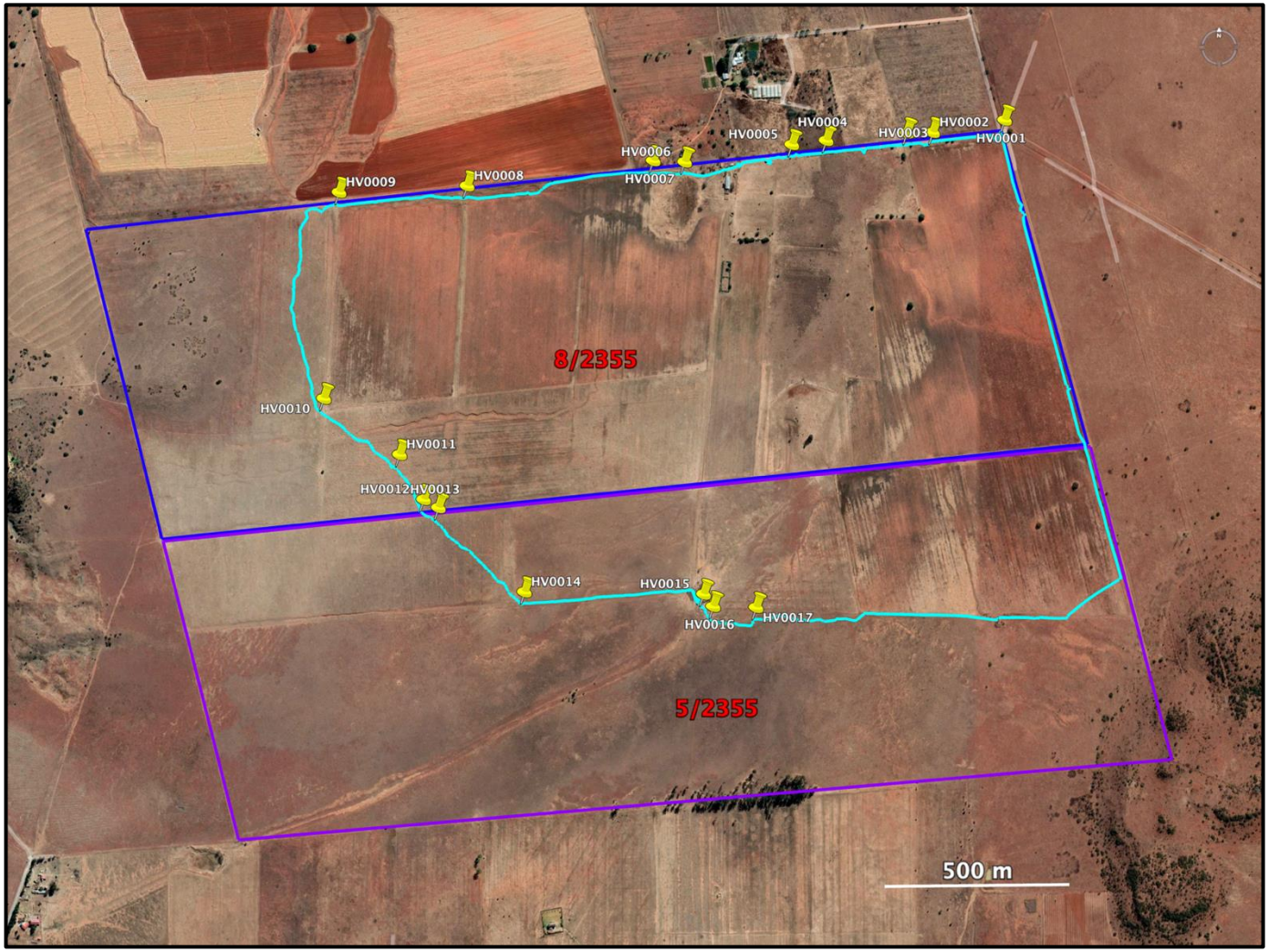

Figure 3. Aerial photograph (Google Earth ™ with the botanical survey track (light blue) and waypoints (yellow pins) recorded at Spes Bon 2355, Portions 5 & 8 on 19 January 2022.

3.2 Topography, Geology and Soils

The topography of Spes Bona is relatively flat with a slight slope downwards from the east to a low point in the centre and then the terrain rises gradually to the west. The lower central area accumulates water in the summer rainfall period resulting in seasonally wet conditions.

The underlying geology of Spes Bona 2355 consists of sediments of the Adelaide Subgroup, of the Beaufort Group which in turn is part of the Karoo Supergroup. The Adelaide Subgroup was laid down in the Late Permian Period and consists of mud-rock and sandstone. The Adelaide Subgroup sediments were in turn later intruded by Karoo Dolerite during the Jurassic Period, forming extensive dolerite sills, resulting in ridges and koppies. Such a dolerite koppies are seen at the western boundary (northwest corner) and southeast corner of Portion 8 of Spes Bona 2355 (Figure 4).

The red sandy soils at 8/2355 (Figure 5) reflect their derivation from the red parent material of the Adelaide Subgroup.

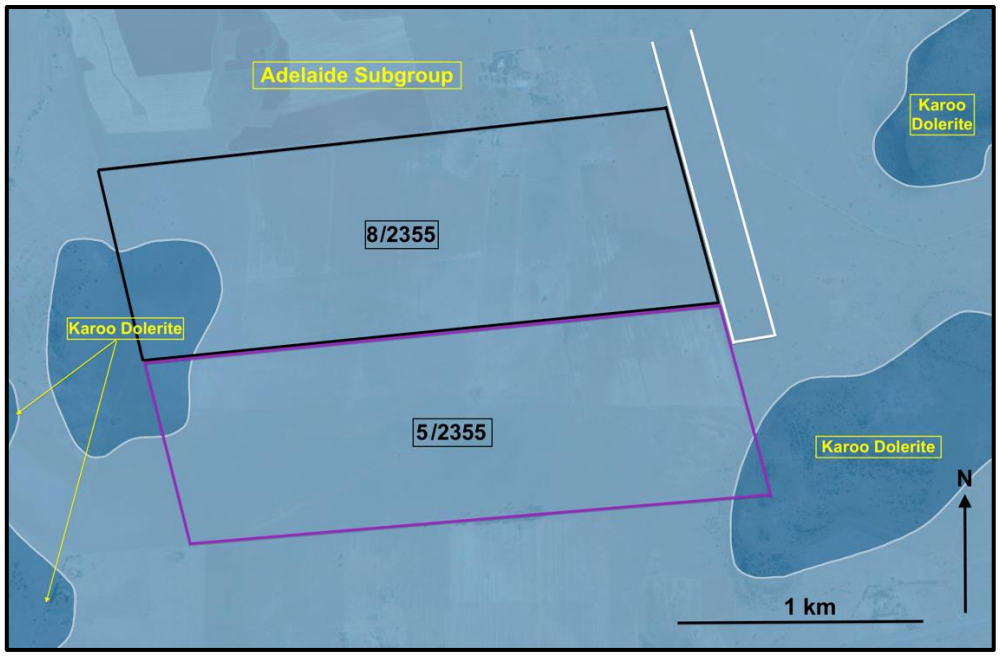

Figure 4. Portions 5 & 8 of Spes Bona 2355 area located mainly on sediments of the Adelaide Subgroup of the Beaufort Group, Karoo Supergroup. These land portions impinge marginally on Karoo Dolerite.

Figure 5. The track over red sandy soil between the boundary of Portion 8 Spes Bona 2355 and the cultivated field on the left.

3.3 Climate

Spes Bona 2355 is located in the summer rainfall region and the climate is classified as warm-temperate. Overall mean annual precipitation (MAP) is 495 mm and temperatures are high in summer and low in winter with severe frosts on average for 40 days of the year. The climate diagram (Figure 6) shows the complete lack of rainfall in winter and rain mainly occurring from November to March.

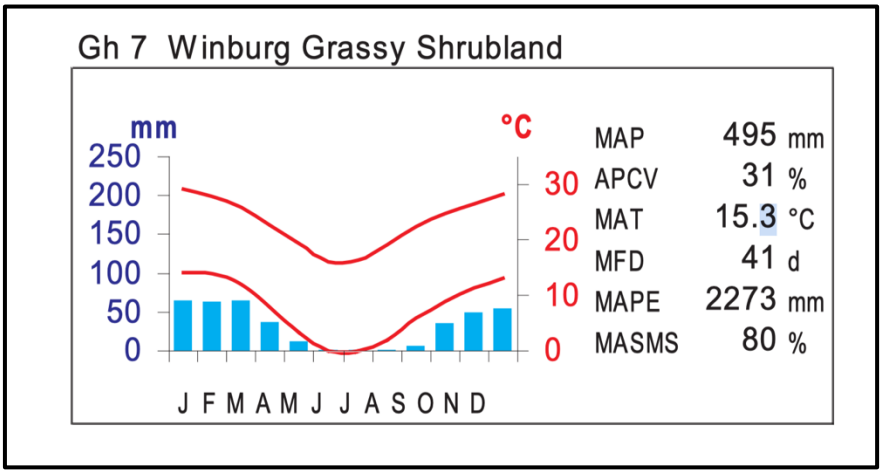

Figure 6. Climate diagram for Winburg Grassy Shrubland the vegetation in the study area (Mucina *et al.* 2006 in Mucina & Rutherford, 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

4. Methods

4.1 Desk-top analysis and reporting

Prior to going to Spes Bona 2355 in August 2022, the site was investigated using Google Earth Pro ™ satellite imagery. The natural vegetation that would occur at the farm was determined using the National Vegetation Map (SANBI, 2018) (referred to as VEGMAP). This map was overlaid on Google Earth imagery for vegetation mapping.

The National Web-based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool) was applied to the study area to determine the sensitivity of the habitat and as a basis for checking the condition and sensitivity status during fieldwork.

4.2 Field Sampling

Since the vegetation was not in a growth phase in August 2021, during the preliminary site visit, the study area was revisited on 19 January 2022 during the summer rainfall period. This was the ideal time for the investigation since the vegetation was in the growth phase due to the summer rains. Season of survey was therefore **not a limitation**.

The study area was accessed on foot. The method used was a 'rapid-assessment technique' in which site observations and numerous photographs were taken at waypoints distributed along the survey route. The survey track and waypoints are shown in Figure 3.

5. Disturbance regime

Portion 8 of Spes Bona 2355 has been actively farmed at least since the 1980's as determined from Google Earth imagery. The natural vegetation has been transformed by ploughing and planting of maize. The ploughed areas are to the east of the 'centrally located' wetland and to the west of the wetland up to the doleritic soils in the northwest corner. The most westerly camp shows signs of historical cultivation but is now fallow and has reverted to grassy shrubland, although somewhat degraded. In the currently cultivated fields there is no remaining indigenous vegetation apart from some isolated trees of *Ziziphus mucronata* and *Searsia lancea* (see Table 1). The major change in the disturbance regime from 2009 to the present, is the more formal buffering of a seasonal

watercourse running from west to east in the central west part of the land portion (Figures 7 & 8).

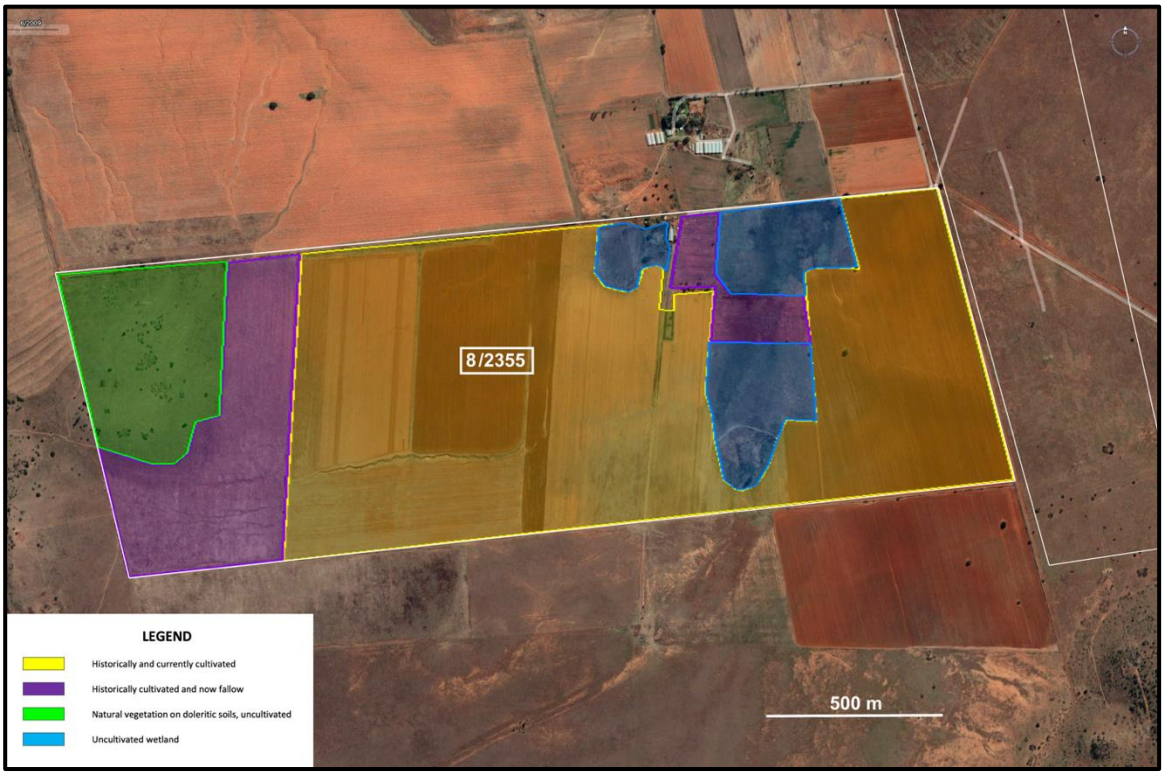

Figure 7. The disturbance regime at Portion 8 of Spes Bona 2355 in 2009.

Figure 8. The disturbance regime at Portion 8 of Spes Bona 2355 in 2022.

6. Botanical evaluation of the study area

6.1 General description

The vegetation of the entire farm Spes Bona 2355 falls within the Grassland Biome and firmly within an area mapped as Winburg Grassy Shrubland (Gh7) (SANBI, 2018) (Figure 9). This was confirmed during the field-survey.

Winburg Grassy Shrubland, as the name indicates, is a low shrubland-grassland formation, where the dominant grasses are C4 grasses. These are grasses adapted to warm-temperate to sub-tropical conditions.

Species listed for this vegetation type by Mucina *et al.* (2006) include the following:

Trees: *Celtis africana, Cussonia paniculata, Pittosporum viridiflorum, Scolopia zeyheri, Searsia lancea, Ziziphus mucronata*.

Tall shrubs: *Buddleja saligna, Diospyros lycioides subsp. lycioides, Euclea crispa subsp. ovata, Grewia occidentalis, Gymnosporia buxifolia, Gymnosporia polyacantha, Olea europaea subsp. africana, Searsia burchellii, Searsia erosa, Tarchonanthus camphoratus.*

Low shrubs: *Anthospermum rigidum subsp. pumilum*, *Asparagus laricinus*, *Asparagus cooperi*, *Berkheya annectens*, *Chrysocoma ciliata*, *Clutia pulchella*, *Euryops empetrifolius*, *Felicia filifolia subsp. filifolia*, *Felicia muricata*, *Helichrysum dregeanum*, *Nenax microphylla, Osyris lanceolata*, *Pentzia globosa*, *Rosenia humilis*, *Selago saxatilis*, *Solanum tomentosum var. coccineum.*

Graminoids: *Aristida adscencionis, Aristida congesta, Aristida diffusa, Cymbopogon pospischilii, Cynodon dactylon, Cynodon incompletus, Digitaria argyrograpta, Elionurus muticus, Enneapogon scoparius, Eragrostis chloromelas, Eragrostis lehmanniana, Eragrostis micrantha, Eragrostis obtusa, Eragrostis plana, Eragrostis superba, Eragrostis trichophora, Eustachys paspaloides, Heteropogon contortus, Panicum stapfianum, Setaria lindenbergiana, Setaria sphacelata, Sporobolus fimbriatus, Themeda triandra, Tragus berteronianus, Tragus koelerioides, Tragus racemosus, Triraphis andropogonoides.*

Herbs: *Berkheya onopordifolia* var. *onopordifolia, Hermannia coccocarpa*, *Indigofera alternans, Mohria caffrorum*, *Pupalia lappacea, Salvia repens.*

Geophytic herbs: *Oxalis corniculata, Oxalis depressa*

Succulent herbs: *Crassula lanceolata*

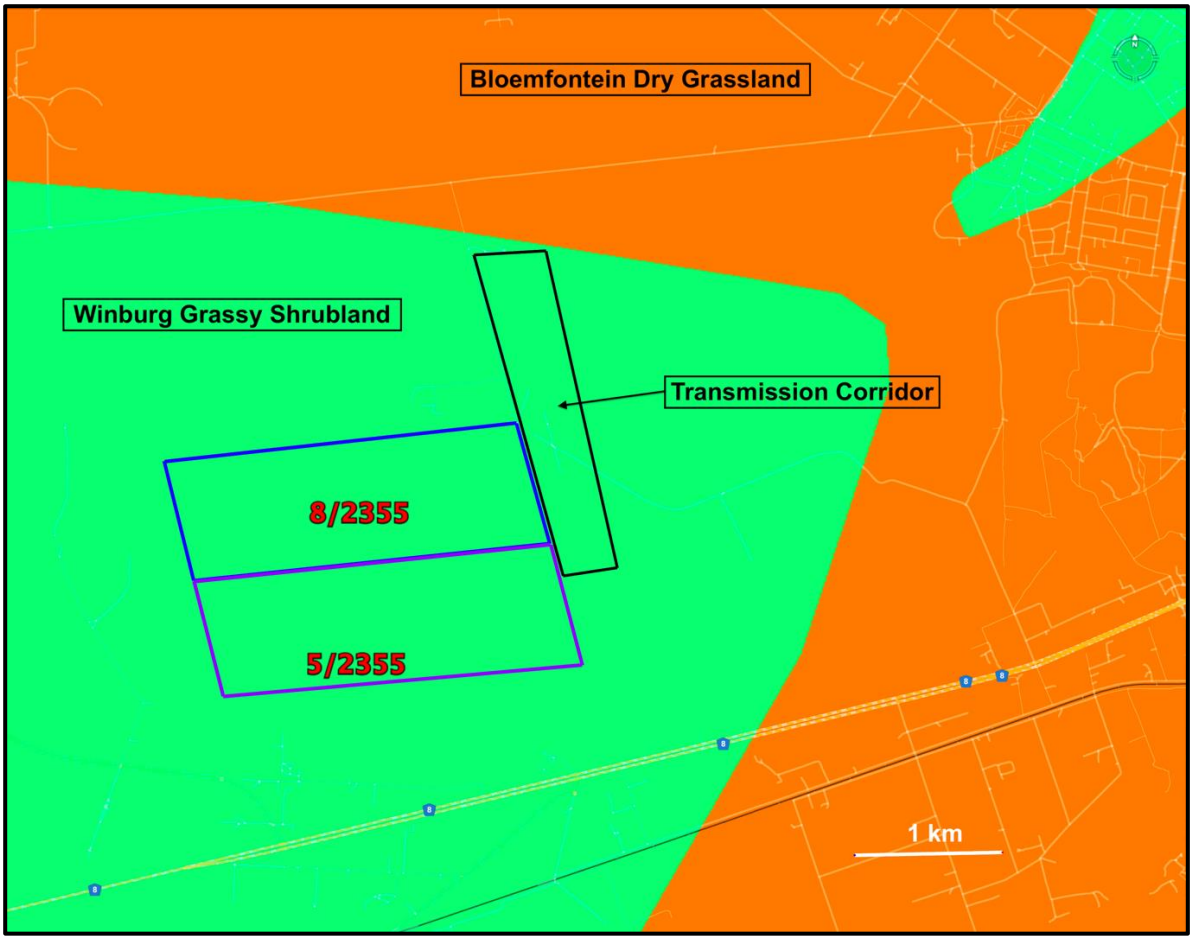

Figure 9. Extract from the Vegetation Map of South Africa, Lesotho & Swaziland (Mucina *et al.* 2005; SANBI, 2018) (VEGMAP) indicating the location of Portions 5 & 8 of Spes Bona 2355, as well as the Transmission Corridor, all in Winburg Grassy Shrubland.

6.2 Vegetation recorded at sample waypoints

Reference should be made to Figure 3 for the location of the respective waypoints. The co-ordinates of the waypoints with photographic illustrations to represent the vegetation found are presented in Table 1. No sample waypoints were recorded in the Transmission Corridor but photographs were taken of the vegetation which is much less disturbed that in the portions of Spes Bona 2355 where the solar facilities are proposed.

Table 1. The vegetation and habitat found at the sample waypoints in Portion 8 of Spes Bona 2355 the Harvard SPV1 would be built.

Waypoint	Co-ordinates	Notes	Illustration
HV1	S 29° 07' 00.55" E 26° 06' 30.19"	This waypoint was recorded at the entrance to Portion 8 of Farm Spes Bona 2355. A strip of grassland has been left along the fences, along which there are tracks. Cultivated maize fields are about 15 m from the boundaries. The grassy strips are dominated by *Eragrostis curvula*. The cultivated lands near this waypoint were fallow at the time of the survey and a ruderal plant community represented by species such as *Arctotis venusta*, *Bidens pilosa*, *Conyza bonariensis*, *Helichrysum arenarium* and *Tagetes minuta.* *Searsia lancea* and *Ziziphus mucronata* trees were found along the northern boundary of the field as well as in the field. Wherever possible these trees should be kept. However, they are not protected or rare so no permits would be required for their removal, if necessary.	 

HV2	S 29° 07' 01.63" E 26° 06' 23.00"	There had been recent good rains before the survey and the disturbed edge of the field had a strong new growth of *Tagetes minuta. Helichrysum rugulosum* is present in the unploughed area.	
HV3	S 29° 07 '01.66" E 26° 06' 20.42"	This waypoint was at the gate on the track between the fenced camps. The camp to the southwest of the gate was not ploughed because it is inundated in the rainy season (summer). *Themeda triandra* was dominant in places but it was the presence of the rush, *Juncus* cf. *effusus* that indicated seasonally wet conditions.	 

HV4	S 29° 07'02.33" E 26° 06' 12.35"	Low-lying area in the grassland. This is really a seasonal wetland with the rush *Juncus* cf. *effusus*. Other species recorded in the near vicinity were, *Asparagus laricinus*, *Berkheya onopordifolia, Gomphocarpus fruticosus* and *Vernonia bonariensis*.	 

HV5	S 29° 07’ 02.69“ E 26° 06’ 08.92”	The grassland at this waypoint was dominated by *Eragrostis plana* indicating seasonally moist to wet soil. The non-graminoid plants included, *Asparagus laricinus, Chrysocoma ciliata, Helichrysum arenarium, Helichrysum rugulosum, Juncus* cf. *effusus, Papaver aculeatum, Robinia pseudacacia, Salvia runcinata, Selago saxatilis*, *Tagetes minuta, Vernonia bonariensis, Ziziphus mucronata.*	 

HV6	S 29° 07’ 04.22“ E 26° 05’ 58.20”	This area was under water at the time of the survey. Considered to be a seasonal wetland.	 
HV7	S 29° 07’ 04.10“ E 26° 05’ 55.06”	From this location southwards are cultivated fields with maize monoculture.	

HV8	S 28° 07' 06.31" E 26° 05' 36.46"	This location was in an uncultivated strip between the mealie fields. This is an important natural corridor that is important even though the dominant *Eragrostis lehmanniana* indicates that the soils has been disturbed.	
HV9	S 29° 07' 06.86" E 26° 05' 23.65"	This location was at the camp boundary fence where the camp to the right (west) has been cultivated in the past but is now fallow. Plant species recorded in the fallow field are, *Arctotis venusta, Aristida adscencionis, Aristida diffusa, Aristida junciformis, Bidens Pilosa, Chrysocoma ciliata, Digitaria eriantha, Eragrostis curvula, Eragrostis lehmanniana, Eragrostis superba, Felicia muricata, Helichrysum arenarium, Helichrysum rugulosum, Hermannia coccocarpa, Hermannia comosa, Hertia pallens, Heteropogon contortus, Hyparrhenia hirta, Melinis repens, Salvia runcinata, Selago saxatilis, Setaria* cf. *megaphylla, Tagetes minuta, Themeda triandra* and *Wahlenbergia* sp.	 

HV10	S 29° 07' 24.88" E 26° 05' 22.12"	Towards the western end of 8/2355, now fallow right through to the eastern end. Additional species found here are, *Cymbopogon pospischilii, Chloris virgata* and *Hibiscus cf. trionum.*	 

HV12	S 29° 07’ 33.71“ E 26° 05’ 32.11”	At the camp boundary where the Eskom line runs. The veld is fallow; grassy with extensive patches of *Helichrysum rugulosum*. Other species include *Aristida adscencionis, Bulbine abyssinica* and *Eragrostis lehmanniana.*	  

7. Conservation Status and Vegetation Sensitivity

7.1 National Web-based Environmental Screening Tool

The National Web-based Environmental Screening Tool was applied to Portion 8 of Spes Bona 2355, where the Harvard SPV1 is proposed to be built. The result from the screening tool for the plant species sensitivity theme (Figure 10) is that the sensitivity is **MEDIUM**.

From observations made in the field, there is a distinct lack of agreement with this rating which should be **LOW**. Significant areas of Portion 8 of Spes Bona 2355 have been historically disturbed and the secondary vegetation that has recolonized the disturbed areas are not as sensitive as the screening tool rates them.

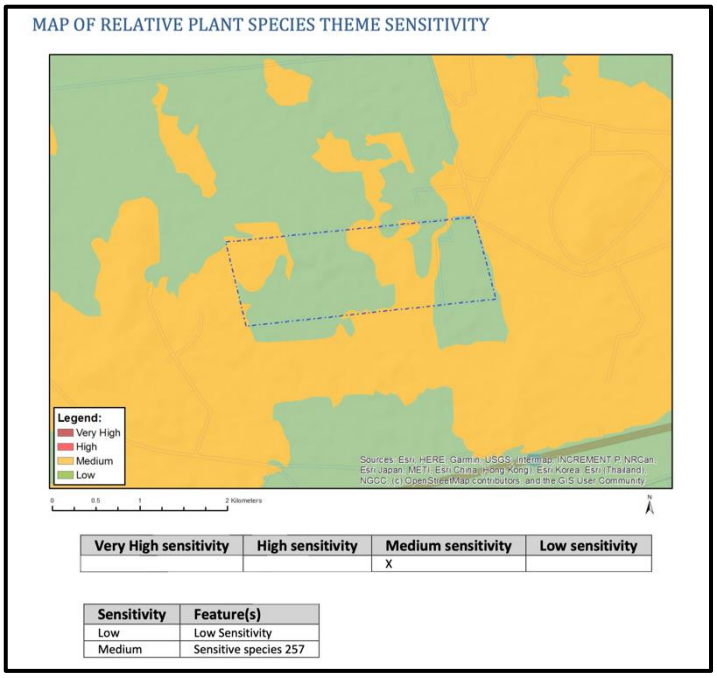

Figure 10. The map for relative plant species theme sensitivity produced by the National Web-based Environmental Screening Tool, indicating the Spes Bona 8/2355 has low to medium sensitivity.

Results were also obtained from the screening tool for the terrestrial biodiversity sensitivity for Portion 8 of Spes Bona 2355. Figure 11 indicates that the screening tool rates the entire land portion as having **LOW** terrestrial biodiversity sensitivity. Without a very detailed study of the flora and fauna, it is not possible to challenge this rating, however, taking the avifauna only into account this rating could be raised to **MEDIUM**.

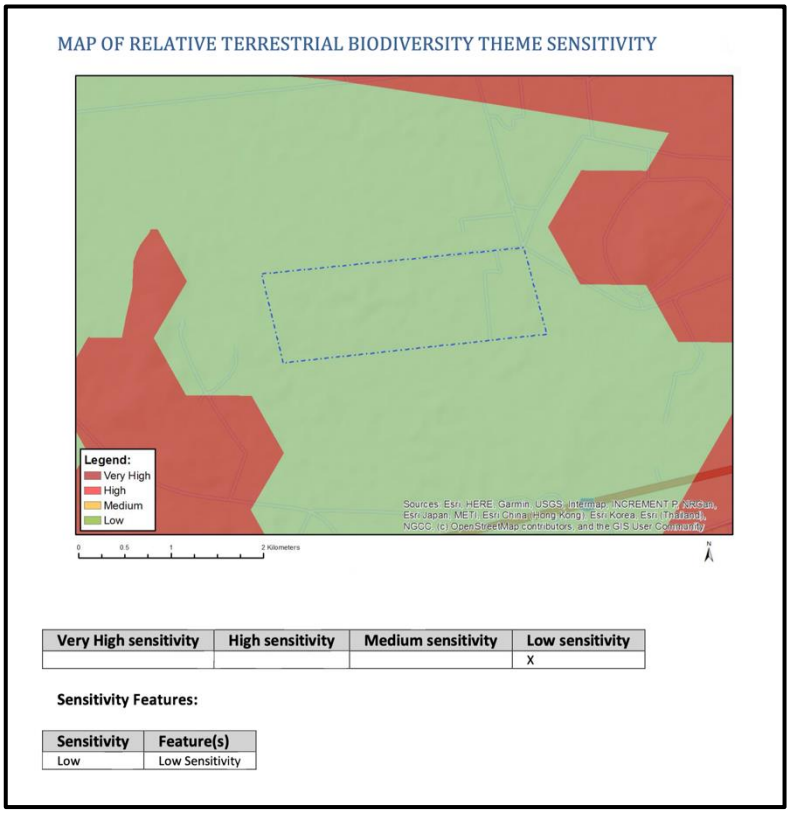

Figure 11. The map output from the National Web-based Environmental Screening Tool for the Relative Terrestrial Biodiversity Theme Sensitivity. It is indicated as being **Low**.

7.2 Threat Status

Winburg Grassy Shrubland is not threatened and is therefore not mentioned in the National List of Threatened Ecosystems (Government Gazette, 2011).

7.3 Critical Biodiversity Areas

The critical biodiversity areas (CBA) map for the Spes Bona 2355 study area (both portions 5 & 8) from the Department of Economic Development and Environmental Affairs, Free State Province, was overlaid on a Google Earth ™ image and examined to compare what was observed in the field with the aerial image with the overlaid CBA map (Figure 12). No critical biodiversity areas or ecological support areas have been identified in the Spes Bona 2355 study area. The land portions have been mapped as 'Other Natural' and 'Degraded'. For the major part of the Transmission Corridor, the area is mapped as 'Other Natural' with only a very small part being CBA1 (Figure 12). The field observations indicate that there is no difference between the small area in the Transmission Corridor mapped as CBA1 and the remainder of the area within the corridor.

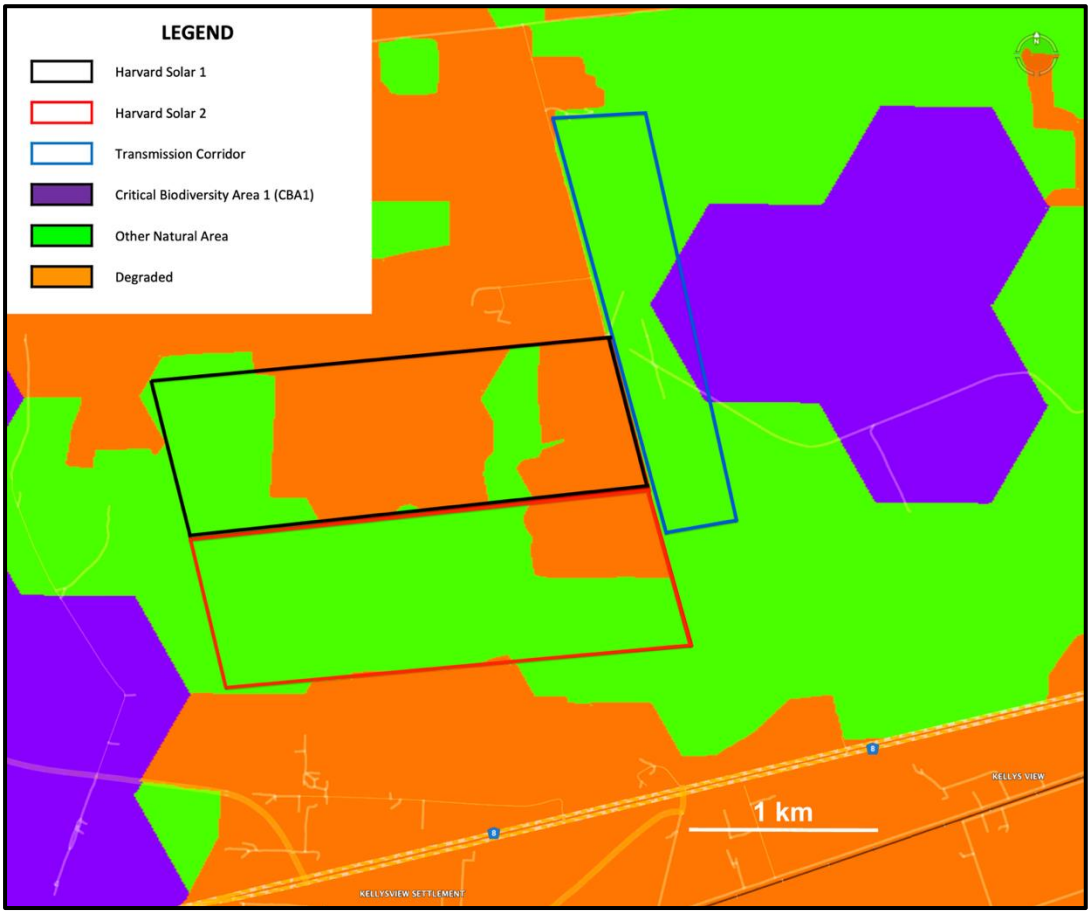

Figure 12. The Critical Biodiversity Map for the area at Portion 8 of Spes Bona 2355 (Harvard Solar 1), Portion 5 of Spes Bona 2355 (Harvard Solar 2) and the Transmission Corridor.

7.4 Sensitivity Mapping based on field observations

From the field-survey a map has been compiled that represents the status as determined from 'on-the-ground' observations (Figure 13). This map indicates areas of **High Sensitivity** where no SPV installations should be built, **Moderate to High Sensitivity** areas (the greater part of the Transmission Corridor falls in this category), areas of **Moderate Sensitivity** that are buildable with mitigation, **Low Sensitivity** areas that are not currently cultivated and **Very Low Sensitivity** areas that where building of SPV's (and transmission line infrastructure) may be built without constraints.

On reconsidering the map in Figure 13, it was realised that the seasonal watercourse and the seasonal wetland on Portions 5 & 8 Spes Bona were not taken into consideration. A revised botanical sensitivity map is shown in Figure 14, that takes the aquatic features into consideration. This map is more accurate than the first approximation maps (Figure 13) and aligns with the map of the freshwater specialist.

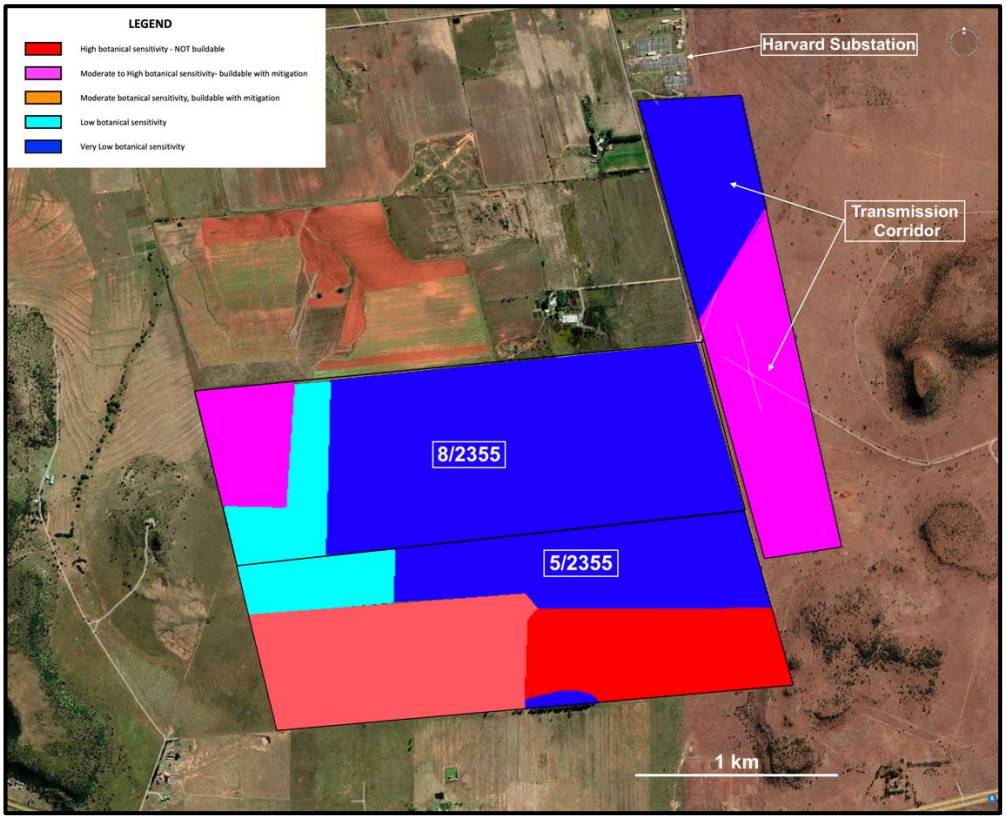

Figure 13. The first map compiled for the sensitivity of Portions 5 & 8 of Spes Bona 2355 and the Transmission Corridor.

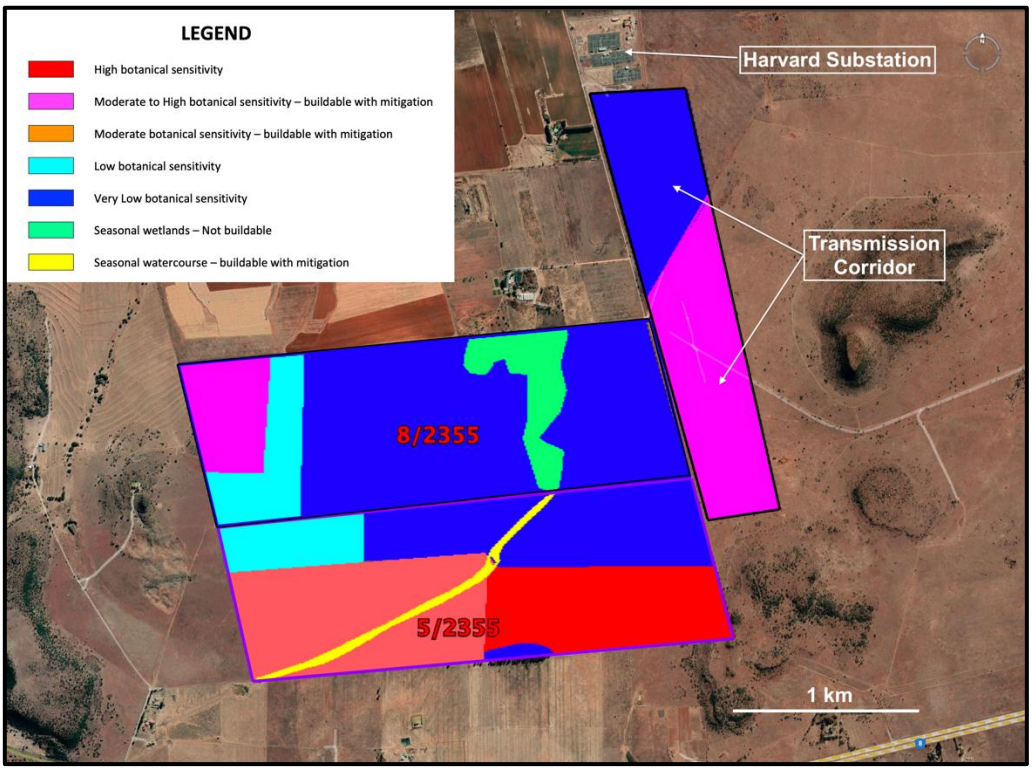

Figure 14. The second (revised) map compiled for the sensitivity of Portions 5 & 8 of Spes Bona 2355 and the Transmission Corridor.

8. Plant Species of Conservation Concern

No plant species of conservation concern were recorded on Portion 8 of Spes Bona 2355.

9. The proposed Harvard 1 Solar PV layout

The sensitivity map (Figure 13) was presented to the proponents of the Harvard 1 and Harvard 2 SPV installations and the botanical sensitivity of Portion 8 and Portion 8 of Spes Bona 2355, was taken into account. The sensitivity map (Figure 14) was compiled after the layout was compiled and is considered retrospectively. The areas of botanically sensitive vegetation are excluded in the proposed layout of the Harvard 1 (Portion 8) and Harvard 2 (Portion 5) Solar PV facilities.

The proposed layout of the SPV installation, on-site switching unit and the grid connection along the Transmission Corridor is given in Figure 15.

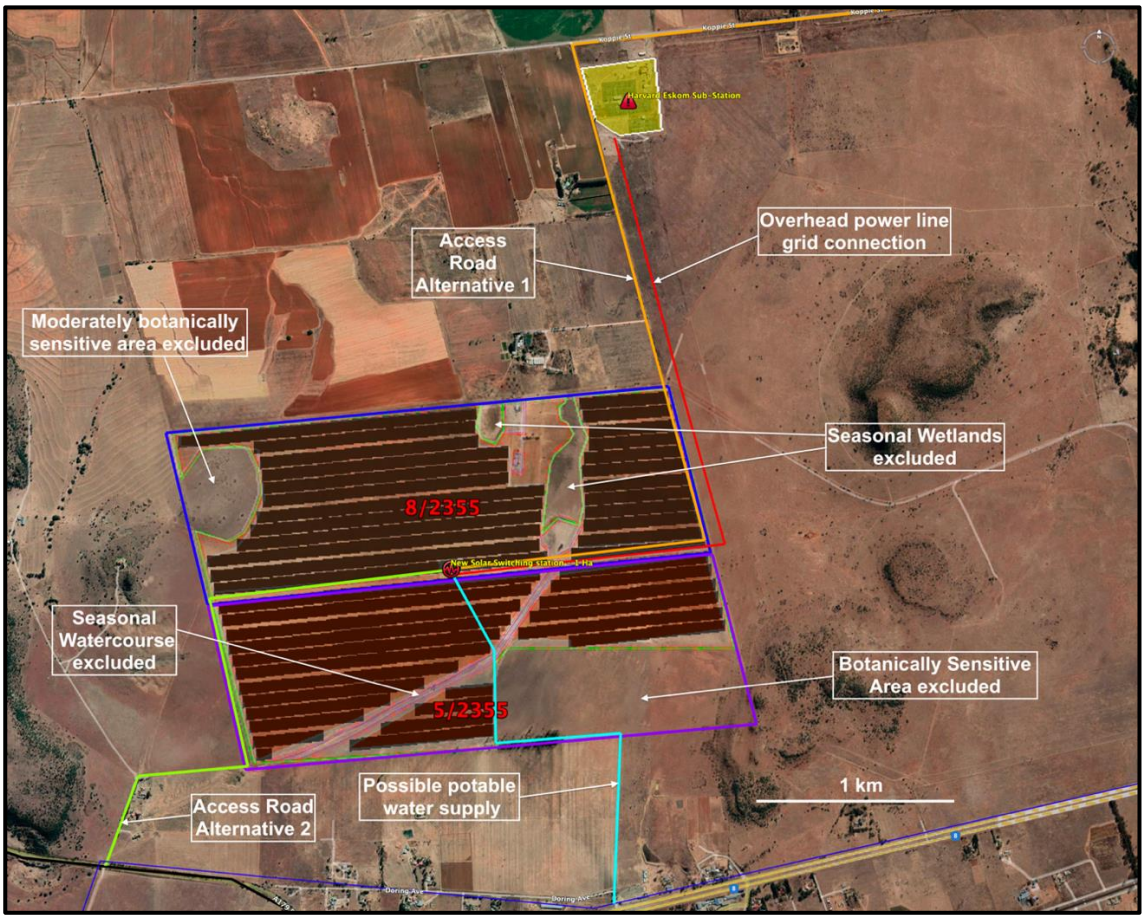

Figure 15. The proposed layout (dark parallel lines) of the Harvard 1 SPV (on Portion 8) and Harvard 2 SPV (on Portion 5).

10. Impact Assessment

The No Go alternative, the development of the entire site (Alternative 1) and Alternative 2 (the preferred alternative), i.e. construction and operation of the Harvard 1 Solar PV facility are assessed. Reference should be made to Figure 15 for the location of the Harvard 1 Solar PV on Portion 8 of Spes Bona 2355.

10.1 The No Go Alternative

In the case of the No-Go Alternative, neither Alternative 1 nor Alternative 2 (the Harvard 1 Solar PV facility) would not be built and there would be very little change to the *status quo*. The farming operation would continue as it is at present. The No Go alternative is assessed in Tables 2 & 3.

10.2 Direct Impacts: The preferred alternative – Harvard 1

The direct impact of the Harvard 1 Solar PV Alternative 1 on natural vegetation on Portion 8 of Spes Bona 2355 would be **Medium Negative** during the construction phase without mitigation but no mitigation would be possible so the impact would remain **Medium Negative** (Table 2). For Alternative 2 (preferred) the construction phase would have a **Low Negative** impact without mitigation and with mitigation it would be **Very Low Negative**. The mitigation would be avoidance of construction in the sensitive area of Portion 8 of Spes Bona 2355.

During the operational phase (Table 3), for Alternative 1 the impact would be **Medium negative** before mitigation and would remain so because no mitigation would be possible. All Winburg Grassy Shrubland would have been removed. In the operational phase for Alternative 2 (preferred), the impact prior to mitigation would be **Low Negative** and after mitigation it would be **Very Low Negative**. There is not much scope for mitigation during the operational phase for Alternative 2 but application of best practice management of the area that would not be developed of Portion 8 of Spes Bona 2355 to ensure that it is not overgrazed or otherwise negatively impacted would be recommended.

Table 2. Impact: The loss of Winburg Grassy Shrubland on Portion 8 Farm Spes Bona 2355 during the construction phase of Harvard 1 Solar PV Facility.

CRITERIA	**'NO GO' ALTERNATIVE**	**Alternative 1: HARVARD 1 Portion 8 of Spes Bona 2355**		**Alternative 2: (preferred) HARVARD 1 Portion 8 of Spes Bona 2355**	
Nature of direct impact (local scale)	Loss of Winburg Grassy Shrubland				
		WITHOUT MITIGATION	**WITH MITIGATION**	**WITHOUT MITIGATION**	**WITH MITIGATION**
Extent	Local			Local	Local
Duration	Long-term			Long-term	Long-term
Intensity	Low			Very Low	Very Low
Probability of occurrence	Probable			Definite	Definite
Confidence	High			High	High
Significance	Very Low Negative			Very Low Negative	Very Low Negative
Nature of cumulative impact	Loss of Winburg Grassy Shrubland				
Cumulative impact prior to mitigation	N/A	Low negative		Very Low Negative	
Degree to which impact can be reversed	N/A	Low		Very Low	
Degree to which impact may cause irreplaceable loss of resources	N/A	Low		Very Low	
Degree to which impact can be mitigated	N/A	Low		Not required	
Proposed mitigation	N/A	Mitigation would not be possible; sensitive areas would be lost		N/A	
Cumulative impact post mitigation	N/A	N/A		Very Low Negative	
Significance of cumulative impact (broad scale) after mitigation.	N/A	Low Negative		Very Low Negative	

Table 3. Impact: The loss of Winburg Grassy Shrubland on Portion 8 Farm Spes Bona 2355 during the **operational phase** of Harvard 1 Solar PV Facility.

CRITERIA	**'NO GO' ALTERNATIVE**	**Alternative 1: Development of the entire farm**		**Alternative 2: HARVARD 1 Portion 8 of Spes Bona 2355**	
Nature of direct impact (local scale)	Loss of Winburg Grassy Shrubland				
		WITHOUT MITIGATION	**WITH MITIGATION**	**WITHOUT MITIGATION**	**WITH MITIGATION**
Extent	Local	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term	Long-term
Intensity	Low	Very Low	Very Low	Very Low	Very Low
Probability of occurrence	Probable	Not likely	Not likely	Definite	Definite
Confidence	High	High	High	High	High
Significance	Very Low Negative	Very Low Negative	Very Low Negative	Very Low Negative	Very Low Negative
Nature of cumulative impact	Loss of Winburg Grassy Shrubland				
Cumulative impact prior to mitigation	N/A	Low negative		Very Low Negative	
Degree to which impact can be reversed	N/A	Low		Very Low	
Degree to which impact may cause irreplaceable loss of resources	N/A	Low		Very Low	
Degree to which impact can be mitigated	N/A	Low		Not required	
Proposed mitigation	N/A	None possible		N/A	
Cumulative impact post mitigation	N/A	Low negative		Very Low Negative	
Significance of cumulative impact (broad scale) after mitigation	N/A	Low negative		Very Low Negative	

10.3 Direct Impacts: The Transmission Corridor

The vegetation in the Transmission Corridor has only ever been disturbed towards the northern end near the Harvard Substation. The vegetation in the very low sensitivity section has restored but is not as untrammelled as that in the section of the corridor that has moderate to high sensitivity due to never being cultivated. Despite the latter area having moderate to high botanical sensitivity, the impact of construction and operation of the overhead power lines in the corridor would have **Low Negative** impact since the vegetation would not be removed except at the foot of the pylons. The amount of vegetation that would be removed is negligible and as long as vehicle track under the power lines are kept to a minimum, very little negative impact would occur in the Transmission Corridor in the operational phase.

Table 4. Impact: The loss of Winburg Grassy Shrubland on the Transmission Corridor during the construction phase of Harvard 1 Solar PV Facility.

CRITERIA	**'NO GO' ALTERNATIVE**	**Transmission Corridor**	
Nature of direct impact (local scale)	Loss of Winburg Grassy Shrubland		
		WITHOUT MITIGATION	**WITH MITIGATION**
Extent	Local	Local	Local
Duration	Long-term	Long-term	Long-term
Intensity	Low	Very Low	Very Low
Probability of occurrence	Probable	Definite	Definite
Confidence	High	High	High
Significance	Very Low Negative	Low Negative	Very Low Negative
Nature of cumulative impact	Loss of Winburg Grassy Shrubland		
Cumulative impact prior to mitigation	N/A	Very Low Negative	
Degree to which impact can be reversed	N/A	Very Low	

Degree to which impact may cause irreplaceable loss of resources	N/A	Very Low
Degree to which impact can be mitigated	N/A	Not required
Proposed mitigation	N/A	N/A
Cumulative impact post mitigation	N/A	Very Low Negative
Significance of cumulative impact (broad scale) after mitigation	N/A	Very Low Negative

Table 5. Impact: The loss of Winburg Grassy Shrubland on the Transmission Corridor during the operational phase of Harvard 1 Solar PV Facility.

CRITERIA	**'NO GO' ALTERNATIVE**	**Transmission Corridor**	
Nature of direct impact (local scale)	Loss of Winburg Grassy Shrubland		
		WITHOUT MITIGATION	**WITH MITIGATION**
Extent	Local	Local	Local
Duration	Long-term	Long-term	Long-term
Intensity	Low	Very Low	Very Low
Probability of occurrence	Probable	Definite	Definite
Confidence	High	High	High
Significance	Very Low Negative	Low Negative	Very Low Negative
Nature of cumulative impact	Loss of Winburg Grassy Shrubland		
Cumulative impact prior to mitigation	N/A	Very Low Negative	
Degree to which impact can be reversed	N/A	Very Low	
Degree to which impact may cause irreplaceable loss of resources	N/A	Very Low	

Degree to which impact can be mitigated	N/A	Not required
Proposed mitigation	N/A	N/A
Cumulative impact post mitigation	N/A	Very Low Negative
Significance of cumulative impact (broad scale) after mitigation	N/A	Very Low Negative

11. Mitigation

Alternative 1 is unlikely to be implemented so mitigation would not be required. The main mitigation in the construction phase of Alternative 2 (preferred) would be to avoid any disturbance of the area set aside for no development. Not much other mitigation would be possible.

In the operational phase, for Alternative 1, no mitigation would be required. For Alternative 2, it would also be necessary to once again ensure that the 'set aside' area is properly managed.

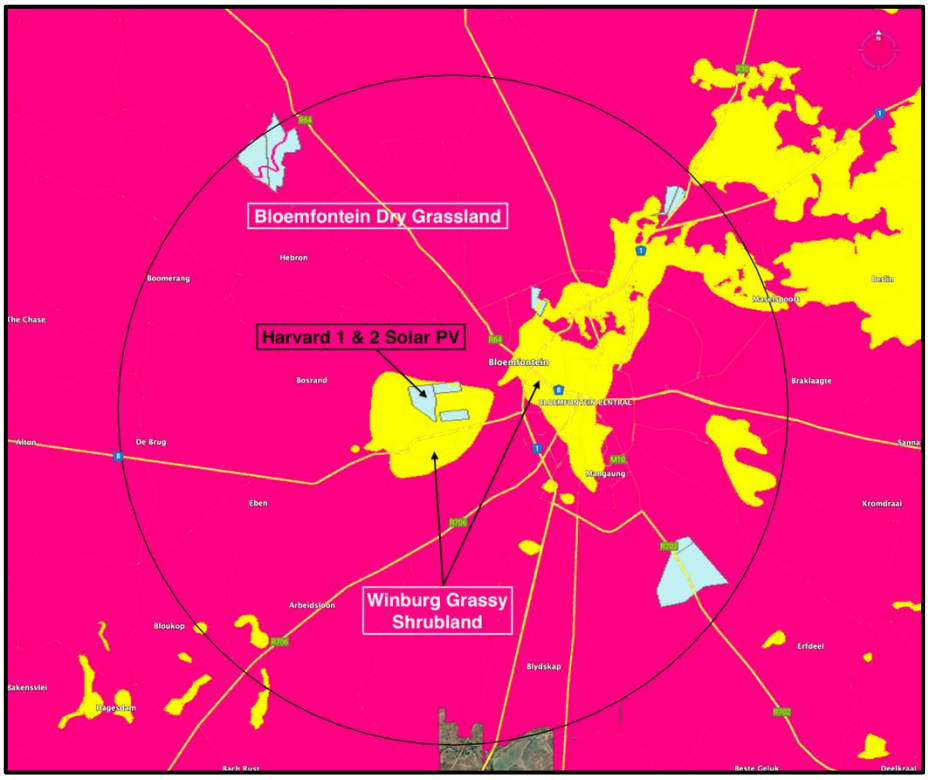

Figure 16. Portion of the VEGMAP showing Bloemfontein Dry Grassland (pink) and Winburg Grassy Shrubland (yellow). Four solar PV facilities (pale blue polygons) apart from Harvard 1 & 2 are shown within a 30 km radius of Harvard Solar PV.

12. Cumulative Impacts

Four other solar PV projects are scheduled for construction and operation within a 30 km radius of the Harvard 1 project (not including the Harvard 2 project). Of these, two would be constructed in Bloemfontein Dry Grassland and two partly in Winburg Grassy Shrubland and partly in Bloemfontein Dry Grassland (Figure 16). Winburg Grassy Shrubland is not a threatened vegetation type (ecosystem), so cumulative impacts would be **Low to Very Low Negative**.

13. Discussion and Recommendations

The botanical survey of Portion 8 of Farm Spes Bona 2355, Bloemfontein, was aimed at determining (i) the vegetation type(s) and condition; (ii) the veracity of the existing CBA map; (ii) the sensitivity of any vegetation and (iv) areas that could be considered for the construction of a PV facility.

As described, only one vegetation type, Winburg Grassy Shrubland, originally occurs on Portion 8 of Farm Spes Bona 2355. Owing to the widespread occurrence of this vegetation type, I hold the view that this vegetation is not threatened and since there is only a limited amount of low-sensitivity secondary vegetation of the above vegetation type in the western part of the land portion, the negative impact of the solar facility would be **Very Low**. No CBAs or ESAs would be impacted by the proposed infrastructure.

The Transmission Corridor has only been historically disturbed towards the northern end near the Harvard Substation. The construction and operation of the power lines would have a **Low Negative** impact on the natural Winburg Grassy Shrubland vegetation as it currently occurs since very little would be removed.

In view of the above, it is my professional view that the layout as given in Figure 15 would, from a botanical point of view, be acceptable for construction of the Harvard 1 Solar PV infrastructure. No mitigation would be necessary.

In addition, the negative impact of the grid connection on relatively undisturbed vegetation in the Transmission Corridor would also be within acceptable ‘low limits’.

14. Conclusions

This study is primarily a survey of the vegetation and habitat at Portion 8 of Spes Bona 2355 to determine the sensitivity of the vegetation and habitat, and the constraints on building the proposed solar PV infrastructure. Once those constraints were determined, the proposed layout of the solar facility was developed.

The general conclusion is that the proposed layouts took into account possible mitigation measures (avoidance of high sensitivity areas) prior to developing them. In this way, **Low Negative** impacts can be ensured and the acceptability of the proposed infrastructure is raised.

Cumulative impacts on the vegetation type would be **Low Negative**.

Overall, the proposed Harvard 1 Solar PV is completely acceptable from a botanical perspective and no further mitigation requirement was identified.

15. References

Government Gazette No. 34809. 2011. Threatened Terrestrial Ecosystems in South Africa.

Mucina, L., Rutherford, M.C., & Powrie, L.W. (Eds.). 2005. Vegetation map of South Africa, Lesotho, and Swaziland 1:1 000 000 scale sheet maps. South African National Biodiversity Institute, Pretoria. ISBN 1-919976-22-1.

Mucina, L. & Rutherford, M.C. 2006. (eds.) The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI) 2018, Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2012. Available from the Biodiversity GIS website http://bgis.sanbi.org/SpatialDataset/Detail/18.

Report submitted: 13 June 2022; 7 November 2022

Appendix 1: Curriculum Vitae

Dr David Jury McDonald Pr.Sci.Nat.

Name of Company: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

Work and Home Address: 14 A Thomson Road, Claremont, 7708

Tel: (021) 671-4056 **Mobile:** 082-876-4051 **Fax:** 086-517-3806

E-mail: dave@bergwind.co.za

Website: www.bergwind.co.za

Profession: Botanist / Vegetation Ecologist / Consultant / Tour Guide

Date of Birth: 7 August 1956

Employment history:

- 19 years with National Botanical Institute (now SA National Biodiversity Institute) as researcher in vegetation ecology.
- Five years as Deputy Director / Director Botanical & Communication Programmes of the Botanical Society of South Africa
- Sixteen years as private independent Botanical Specialist consultant (Bergwind Botanical Surveys & Tours CC)

Nationality: South African (ID No. 560807 5018 080)
Languages: English (home language) – speak, read and write
Afrikaans – speak, read and write

Membership in Professional Societies:

- South Africa Association of Botanists
- International Association for Impact Assessment (SA)
- South African Council for Natural Scientific Professions (**Ecological Science, Registration No. 400094/06**)
- Field Guides Association of Southern Africa

Key Qualifications:

- Qualified with a M. Sc. (1983) in Botany and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute).
- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.
- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications;

involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.

- Further tasks involved the day-to-day management of a large non-profit environmental organisation.
- **Independent botanical consultant** (2005 – to present) over 600 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is available on request.

Higher Education

Degrees obtained
and major subjects passed:

B.Sc. (1977), University of Natal, Pietermaritzburg
Botany III
Entomology II (Third year course)

B.Sc. Hons. (1978) University of Natal, Pietermaritzburg
Botany (Ecology /Physiology)

M.Sc. - (Botany), University of Cape Town, 1983.
Thesis title: 'The vegetation of Swartboschkloof, Jonkershoek, Cape Province'.

PhD (Botany), University of Cape Town, 1995.
Thesis title: 'Phytogeography endemism and diversity of the fynbos of the southern Langeberg'.

Certificate of Tourism: Guiding (Culture: Local)
Level: 4 Code: TGC7 (Registered Tour Guide: WC 2969).

Employment Record:

January 2006 – present: Independent specialist botanical consultant and tour guide in own company: **Bergwind Botanical Surveys & Tours CC**
August 2000 - 2005 : Deputy Director, later Director Botanical & Communication Programmes, Botanical Society of South Africa
January 1981 – July 2000 : Research Scientist (Vegetation Ecology) at National Botanical Institute
January 1979—Dec 1980 : National Military Service

Further information is available on my company website: www.bergwind.co.za