Attachment A. Land Use Consistency Review

March 14, 2022

Ostrea Solar, LLC Project

Prepared for:

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Acronyms and Abbreviations

Notation	Definition
AC	Alternating Current
AG	Agriculture
ASC	Application for Site Certification
BESS	Battery energy storage system
BPA	Bonneville Power Administration
CCR	Cypress Creek Renewables, LLC
CUP	Conditional Use Permit
ED	Economic Development
EFSEC	State of Washington Energy Facility Site Evaluation Council
GMA	Growth Management Act of the State of Washington
kV	Kilovolt
LU-G	General Land Use
MPE	The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
NH	Natural Hazard
NRCS	Natural Resource Conservation Service
NS	Natural Setting
Project	Ostrea Solar, LLC Project
Project Site Control Boundary	Total of the leased areas and easements for the Project
PV	Photovoltaic
RCW	Revised Code of Washington
ROW	Right-of-way
SR	State Route
Study Area	Analysis Area for land use review
TRC	TRC Environmental Corporation
USDA	U.S. Department of Agriculture
UT	Utilities
WAC	Washington Administrative Code
YCC	Yakima County Code

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). TRC Environmental Corporation (TRC) was contracted by CCR to conduct a review of land policies and regulations that are applicable to the Project. The land use analysis provides an overview of the regulatory context for energy facility siting and land use entitlement in general in Yakima County.

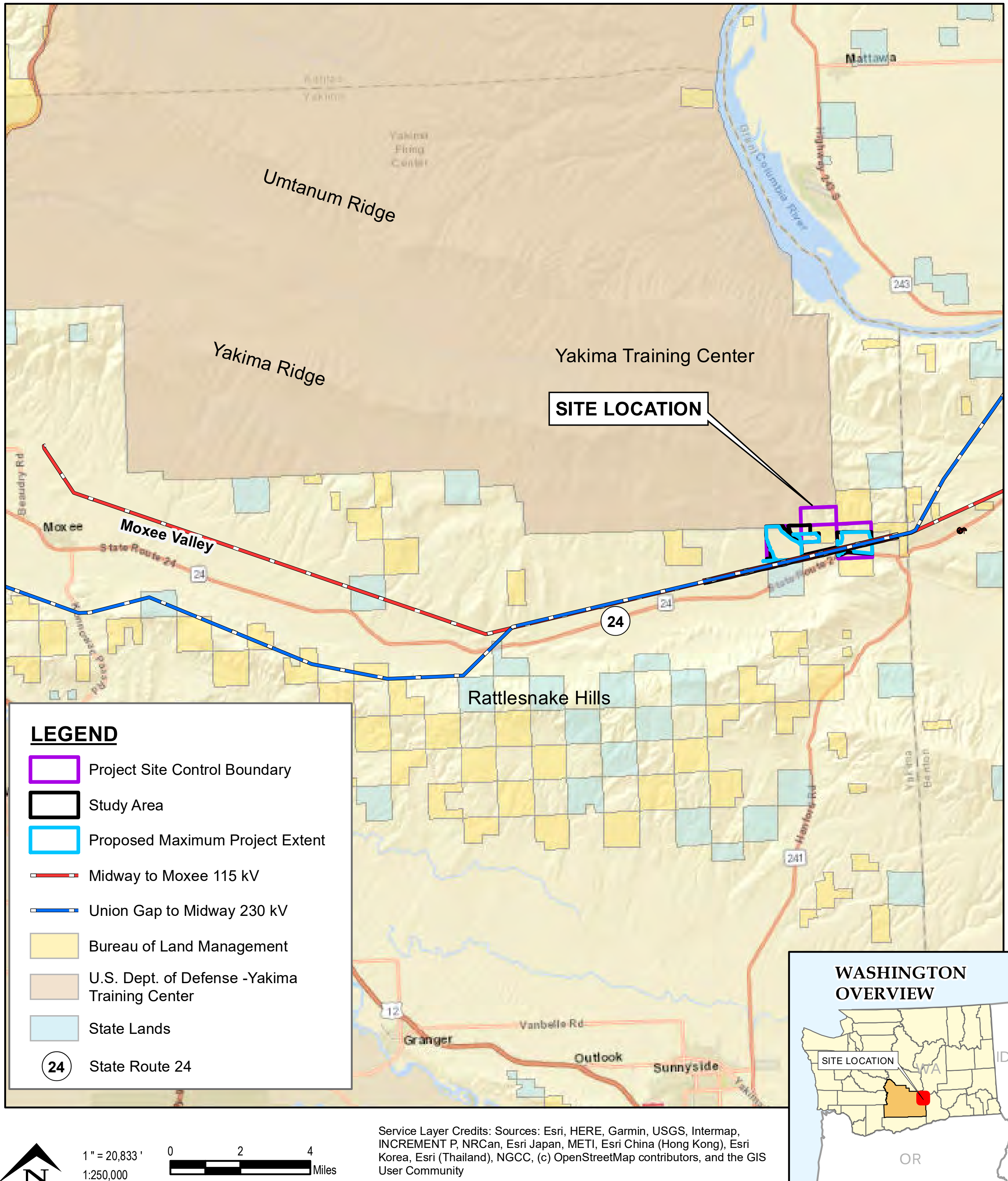
1.1 Background

The Project is situated north of Washington State Route (SR) 24, south of the Yakima Training Center, and approximately 22 miles east of the town of Moxee, in Yakima County, Washington (Figure 1-1). The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1-1). Within the Project Site Control Boundary, a smaller Study Area (1,123 acres) was defined for land use review (Figure 1-1). The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.

The Project will use solar photovoltaic (PV) panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts of alternating current (AC) solar capacity at the point of interconnection to the electric power grid. The Project will interconnect through a line tap to Bonneville Power Administration's (BPA's) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project. BPA's Moxee to Midway 115 kV transmission line connects to BPA's Moxee substation, which is approximately 23 miles west and north of the Project and BPA's shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based on the final approved design for the Project.

A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. If required, the BESS will be located to the west of the substation (for AC coupled) or as smaller battery cabinets collocated throughout the MPE at the inverter pad locations (for Direct Current coupled).

An operations and maintenance trailer and employee parking will be located just west of the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the O&M trailer footprint will be used as a construction laydown yard. Access to the Project will be from SR-24 on the west side of the eastern most parcel in the MPE.



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TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROJECT OVERVIEW MAP

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APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE: Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd	

FIGURE 1-1

2.0 Land Use

The Project Site Control Boundary is in unincorporated lands of Yakima County. Land use and potential development of unincorporated lands are ordinarily subject to entitlement review by Yakima County, which is guided by the general goals and policies of the Yakima County Comprehensive Plan and the zoning regulations and standards of the Yakima County Code (YCC). Although CCR is requesting State preemption of local regulations through the certification process of the Energy Facility Site Evaluation Council (EFSEC), State procedures require EFSEC to consider local agency or community interests as part of its process.

The land use review summarizes state and local statutes, ordinances, and policies. Specific regulations or policies applicable to the proposed Project are identified, followed by an evaluation of whether or how the Project would be consistent with the specified regulations or policies.

2.1.1 Permitting and Regulatory Requirements

2.1.1.1 Energy Facilities – Site Locations (RCW Chapter 80.50)

In adopting Revised Code of Washington (RCW) Chapter 80.50, the Washington State Legislature found that “the present and predicted growth in energy demands in the state of Washington requires the development of a procedure for the selection and utilization of sites for energy facilities and the identification of a state position with respect to each proposed site” (RCW 80.50.010). In addition to recognizing the State’s energy needs, the intent of the statute was to ensure efficient decision-making with respect to energy facilities and to meet customer demand for energy at a reasonable cost while also protecting the quality, cleanliness, and public enjoyment of the natural environment. The statute created EFSEC and authorized EFSEC to receive, hear, and make recommendations to the State Governor’s Office with respect to disposition on energy facility siting applications (RCW 80.50.040). Pursuant to RCW 80.50.060(2) and 80.50.110(2), applicants for alternative energy facilities may request certification through EFSEC in lieu of pursuing zoning or land use permit approval through the local planning agency. However, if EFSEC approves the certification request, the Council must give consideration to the purposes of local agency’s laws, ordinances, rules, or regulations (Washington Administrative Code [WAC] 463-28-070).

2.1.1.2 Growth Management Act of the State of Washington (RCW Chapter 36.70A)

Initially adopted by the Washington State Legislature in 1990 and subsequently amended, the Growth Management Act (GMA) requires cities and counties to prepare comprehensive land use plans in coordination with the public and other jurisdictions, and that are consistent with statewide land use goals. The intent of the GMA is “to recognize the importance of rural lands and rural character to Washington’s economy, its people, and its environment, while respecting regional differences” (RCW 36.70A.011). Thus, in their respective comprehensive plans, local agencies should include provisions that balance commercial and residential development with the State’s intent to preserve rural-based economies, rural lifestyles, open space conservation, habitat preservation, and private land stewardship. The statute applies to each local agency in a county with a population of 50,000 or more people and that has met certain milestones for population growth over time (RCW 36.70A.040[3]).

The GMA requires that local agencies, by way of their comprehensive plans, "designate critical areas, agricultural lands, forestlands and mineral resource lands, and adopt development regulations conserving these designated agricultural lands, forestlands, and mineral resources lands and protecting these designated critical areas" (RCW 36.70A.040[3]). The statute authorizes the Department of Commerce to define guidelines for how to categorize lands into one of these categories. The GMA also requires counties to define urban growth boundaries and to adopt countywide planning policies that define the framework upon which city and county comprehensive plans are developed and adopted.

The comprehensive plan must include, at minimum, a land use element that: 1) designates the general distribution, location, intensity and extent of agricultural, residential, commercial, industrial, and public uses of land under the respective agency's jurisdiction; 2) provides for protection of groundwater and surface water quality and quantity; and 3) estimates future population growth and land planning approaches that promote physical activity. Other mandatory comprehensive plan elements listed in RCW 36.70A.070 include housing, capital facilities, utilities (including electrical, telecommunications and natural gas lines), rural lands, transportation, economic development, and parks and recreation. Local agencies may include in their comprehensive plans, subarea plans or other optional elements (such as conservation or solar energy) that address other topics that the agency determines are relevant to its physical development. Subsequent decisions of the local decision-making body with respect to proposed public and private development projects should be consistent with the overall goals, policies, and objectives of the comprehensive plan.

2.1.1.3 Horizon 2040, Yakima County Comprehensive Plan (2017)

With an estimated population of 243,231 in 2015, long-range planning in Yakima County is subject to the GMA. In 2017, Yakima County adopted an update to its Comprehensive Plan, entitled *Horizon 2040.* In accordance with the requirements of the GMA, Chapter 5, Land Use Element, of the *Horizon 2040* describes existing land uses in the unincorporated areas of the county. The Land Use Element categorizes each land use as primarily either Urban lands, Rural lands, or Economic Resource lands according to the existing use and character of the site (RCW 36.70A.040[3]). As described on page 5-3 of the Comprehensive Plan:

- ***Urban lands*** *are those included within the Urban Growth Area of one of Yakima County's fourteen incorporated cities. They are typified by growth patterns that have made or will make an intensive use of land for buildings, structures, and impermeable surfaces. As a result, other uses, such as the production of food, become incompatible.*
- ***Rural lands*** *are those areas outside of both the Urban Growth Areas and the resource lands. Rural areas allow low to moderate densities that can be supported and sustained without urban services -- primarily water and sewer service. By state law, development in rural areas cannot occur if it is urban in nature.*
- ***Economic Resource lands*** *are those lands important and necessary for their ability to sustain the long-term commercial production of agricultural goods, forest products and mineral commodities.*

The Land Use Element of *Horizon 2040* guides future land use decisions by establishing goals and policies for development of unincorporated lands for the 20-year vision horizon of the comprehensive plan. Goals provide broad statements of community aspirations, while policies are the commitment to an action (such as adoption of a standard or amendment of a development regulation) in support of the achievement of the goal. Other elements of *Horizon*

2040 include Natural Settings (NS), Natural Hazards (NH), Economic Development, Capital Facilities, Housing, Parks and Open Space, Utilities, and Transportation.

2.1.1.4 YCC Title 19, Unified Land Development Code

Land use goals and policies of *Horizon 2040* are implemented in part through codified text in the YCC Title 19, Unified Development Code. YCC Title 19 establishes land use zoning districts that apply to properties in the unincorporated areas of Yakima County. Permitted, conditionally permitted, and prohibited uses of land are prescribed for each zoning district, and development regulations such as minimum yards, maximum building height, maximum lot coverage, and off-street parking and signage criteria are also specified for each zoning district or land use.

2.2 Results

2.2.1 Horizon 2040 (Yakima County, WA Comprehensive Plan)

As explained in the following paragraphs, the Project is consistent with applicable land use goals and policies of *Horizon 2040.* Central to the Project is the provision of a renewable energy source in Yakima County as an alternative to energy derived from fossil fuels, a finite resource that contributes carbon and other emissions affecting air quality and global warming. The Project implements Environment Visioning Goal 5.F, which directs the County to "[c]onsider energy supply alternatives and energy conservation opportunities." Additional goals and policies that are related to the Project are discussed below.

2.2.2 Land Use Element

The Study Area consists of Economic Resource lands outside any incorporated City boundary. It is approximately 19 miles outside the nearest Moxee community Urban Growth Area (Map 5.8.4.1-5 from *Horizon 2040*). In *Horizon 2040,* Economic Resource lands are further characterized by type of resource, with the plan identifying these lands as either Agricultural Resource Areas, Forest Resource Areas, or Mineral Resource Areas.

The Study Area is designated as Agricultural Resource on Map 5.9.6-1 (Future Land Use) of *Horizon 2040*. Yakima County applies the Agricultural Resource lands designation based on the criteria listed below (excerpted from section 5.10.3 of *Horizon 2040*):

1. *Generally meets criteria for agricultural resource lands of long-term commercial significance as defined by state laws and regulations.*
   a. *May contain prime soils according to the Natural Resource Conservation Service.*
   b. *May include "pockets" of non-agricultural land uses.*
   c. *May contain high-value crops; specifically, areas where tree fruits vineyards, hopyards, specialty field crops, and dairies are located.*
   d. *May include a variety of residential uses related to agricultural activities including farm worker housing and family farm dwellings.*
   e. *May include compatible uses such as the marketing of regional agricultural products from one or more producers; the production, marketing, and distribution of value-added agricultural products; or packing and cold storage plants.*

f. *May include non-agricultural accessory uses or activities as long as they are consistent with the size, scale, and intensity of the existing agricultural use on a property.*

2. *Lands historically zoned Exclusive Agricultural or General Agricultural.*
3. *Lands located within an irrigation district and receiving water, or*
4. *Lands where dryland farming, pasture or grazing outside of irrigation districts is predominant.*
5. *Lands enrolled in one of the current use assessment programs.*
6. *Lands located outside established Urban Growth Areas.*
7. *Criteria for de-designating agricultural resource lands shall follow the "Agricultural Resource De-Designation Analytical Process" found below. The agricultural resource de-designation criteria will be used for plan amendments and updates to change a land use from Agricultural Resource to another land use designation. The agricultural de-designation process shall not apply when re-designating agricultural resource lands to some other Horizon 2040 Economic Resource Land designation.* [Note: 'De-designating agricultural resource lands' is a process conducted when the county initiates a plan amendment or an update to a land use designation. As the proposed Project is allowed within the current zoning under a Type 3 Conditional Use Permit (CUP) de-designation is not relevant to the Project.]

The Agricultural Resource category is intended to implement the GMA planning goal to maintain and enhance natural resource-based industries, including agricultural industries that support the County's economic base. In general, Agricultural Resource lands are so designated because they have been found to be important to the long-term commercial production of agricultural products including animal, fruit, vegetable, grain, floral, and ornamental horticultural products.

2.2.2.1 Horizon 2040 Visioning Goals: Land Use – Agriculture and Resource

Horizon 2040 includes the following Agricultural Resource Area Visioning Goals and Policies that are related to the Project.

- Agriculture and Economic Base Visioning Goal 1.A: Promote the growth and development of business related to agriculture, together with other industries which are recognized as playing an important role in the regional economy which may assist and help maintain an economically viable agricultural base.
- Public Policy Goal 2.A: Preserve the rich, diverse base of natural resources in the valley.
- Public Policy Goal 2.D: Protect agricultural lands through realistic, county-wide zoning and other standards which promote agricultural uses, and minimize impacts by non-agricultural uses, and preserve individual property rights.

Analysis: The proposed Project is not agricultural. The solar power generation facility is representative of an alternative, renewable energy industry that would help to diversify the regional agricultural economy while supporting implementation of state goals for provision of affordable power. As a provider of renewable energy, the Project would help the State of Washington to meet its needs for power for agricultural as well as commercial and industrial business operations, and in this way, the Project would play a role in supporting the regional economy. Though the Study Area has an agricultural land use designation, only a portion of one of the parcels appears from aerial photography to have been used for agricultural activities beginning in 1962, and those activities ceased after 1982, leaving the parcel uncultivated for over 35 years. Additionally, there is no on-site water supply to facilitate active cultivation. The Project would facilitate the property owner's intent to develop the site with a revenue-generating Project on lands that have not in recent years generated revenue with agricultural development. Additionally, the Project would not remove the opportunity to re-establish agricultural uses in the future.

2.2.2.2 Goals and Policies for Resource Lands: Agricultural Resource Areas

Horizon 2040 includes the following Agricultural Resource Area goals and policies that are related to the Project.

> ***GOAL LU-ER-AG 1: Maintain and enhance productive agricultural lands and discourage uses that are incompatible with farming activities.***
>
> > <u>*Specific Policies Related to the Project:*</u>
> >
> > ***LU-ER-AG 1.1:*** *Encourage conservation of the County's high-quality agricultural lands for productive agricultural use and protect the opportunity for these lands to support the widest variety of agricultural crops.*
> >
> > ***LU-ER-AG 1.4:*** *Non-agricultural uses shall not be allowed in agricultural resource areas without site-specific review subject to standards related to 1) protections needed for agricultural uses and 2) the nature of the proposed non-agricultural use.*
> >
> > ***LU-ER-AG 1.6:*** *Establish a special exception process to review proposed non-agricultural uses which, by their nature, are especially sensitive to farm operations. Such uses may include schools, day care facilities, churches, medical clinics, outdoor recreational facilities, and similar uses. Include siting criteria, setbacks, and review procedures for new or expanded non-farmland uses to ensure that the non-farm use is located on the least productive portion of the property and does not adversely impact or significantly interfere with adjacent or nearby farming operations.*
> >
> > ***LU-ER-AG 1.7:*** *Non-farm residences and uses within or adjacent to agricultural lands of long-term commercial significance shall be located, designed and subject to special setbacks and other appropriate buffers to minimize conflicts with agricultural practices and other activities associated with agricultural lands. A 150-foot setback from the adjoining agricultural activity shall be required for all non-farm related uses, except where it can be demonstrated that a smaller setback will not interfere with accepted farm practices. Considerations in reducing the setback may include the size or shape of the parcel, historic use, natural features, physical barriers, crop type and structures on the adjoining resource parcel, location of structures on adjoining properties, proposed site design, and use of screening, berms, barriers, and landscaping.*

<u>Analysis</u>: The proposed Project would install a solar power generation facility, a non-agricultural use of land, on property designated in *Horizon 2040* as Agricultural Resource. Adopted comprehensive plan Policy LU-ER-AG 1.1 specifically calls upon the County to "[e]ncourage conservation of the County's high-quality agricultural lands for productive agricultural use." As such, the Project is potentially inconsistent with the comprehensive plan

Goal LU-ER-AG 1 and Policy LU-ER-AG1.1. Consistent with Policy LU-ER-AG1.4, the following paragraphs provide a site-specific evaluation of the proposed Project and its potential to indefinitely affect agricultural activities within or outside the Study Area.

Provisions in WAC 365-196-815 provide for cities and counties planning under the GMA to adopt regulations that assure the conservation of designated agricultural land, but these provisions also allow for innovative zoning techniques on agricultural lands with poor soils or that are otherwise not suitable for agricultural purposes. Yakima County's regulations pursuant to WAC 365-196-815 are codified in YCC 19.11.020 and include consideration of factors such as agricultural productivity of on-site soils, presence of steep slopes, lack of irrigation water, and minimization of land use conflicts with agricultural uses on surrounding properties.

The Study Area has 11 soil types, of which the most prominent are Moxee silt loam, 2 to 15 percent slopes (46 percent) and Willis silt loam, 8 to 15 percent slopes (30 percent). Of these two soil types, only the Willis silt loam is classified by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) as farmland of unique importance. USDA NRCS classifies the Moxee silt loam as "not prime farmland." The remaining 24 percent of the Study Area is composed of nine other soil map units. Approximately 52 percent of the Study Area is classified as "not prime farmland," 30 percent is classified as "farmland of unique importance," and 17 percent of the Study Area is classified as "farmland of statewide importance." The remaining 1 percent is classified as "prime farmland if irrigated." No irrigation systems are in place at the Study Area; therefore, the 1 percent of the area classified as "prime farmland if irrigated" would not qualify as prime farmland (USDA NRCS 2021).

TRC prepared a Phase I Environmental Site Assessment for the three parcels that were the original Project Site Control Boundary in September 2020. In 2021, additional parcels were added to the Project Site Control Boundary (Yakima County assessor parcel numbers 23121022002, 23121023001, 23121023001, 23121031001, and 23121041002). The associated parcels are shown in Figure 2-1. A Phase I Environmental Site Assessment was prepared for the current Project Site Control Boundary with these additional parcels and was completed January 2022. The Phase I Environmental Site Assessment included a description of historical uses of the property based on historic topographic maps and aerial photography from 1949 through 2017, property owner interviews, and on-site observations. The Phase I Environmental Site Assessment notes that the Project Site Control Boundary has been largely undeveloped, vacant land since at least 1917. Several dirt, unimproved, or four-wheel drive roads are shown on various topographic maps or aerial photographs between 1917 and 2017, and east-west extending transmission lines existing on the property are visible in their current location by 1951. A roadway at the northern boundary of the site, corresponding with the boundary of the Yakima Training Center, is visible in the 1964 aerial photograph (TRC 2020).

Aerial photographs show changes in land use at the southwestern parcel of the Study Area between 1955 and 1964. Prior to 1964, the southwestern portion of the Study Area appeared to be undeveloped land. Between 1964 and at least 1982, this portion of the Study Area appeared to be used for agricultural purposes. By 1990 and up through 2017, this portion of the Study Area does not appear to be significantly different than the other portions of the Study Area and surrounding areas that did not appear to be utilized for agriculture (TRC 2020).

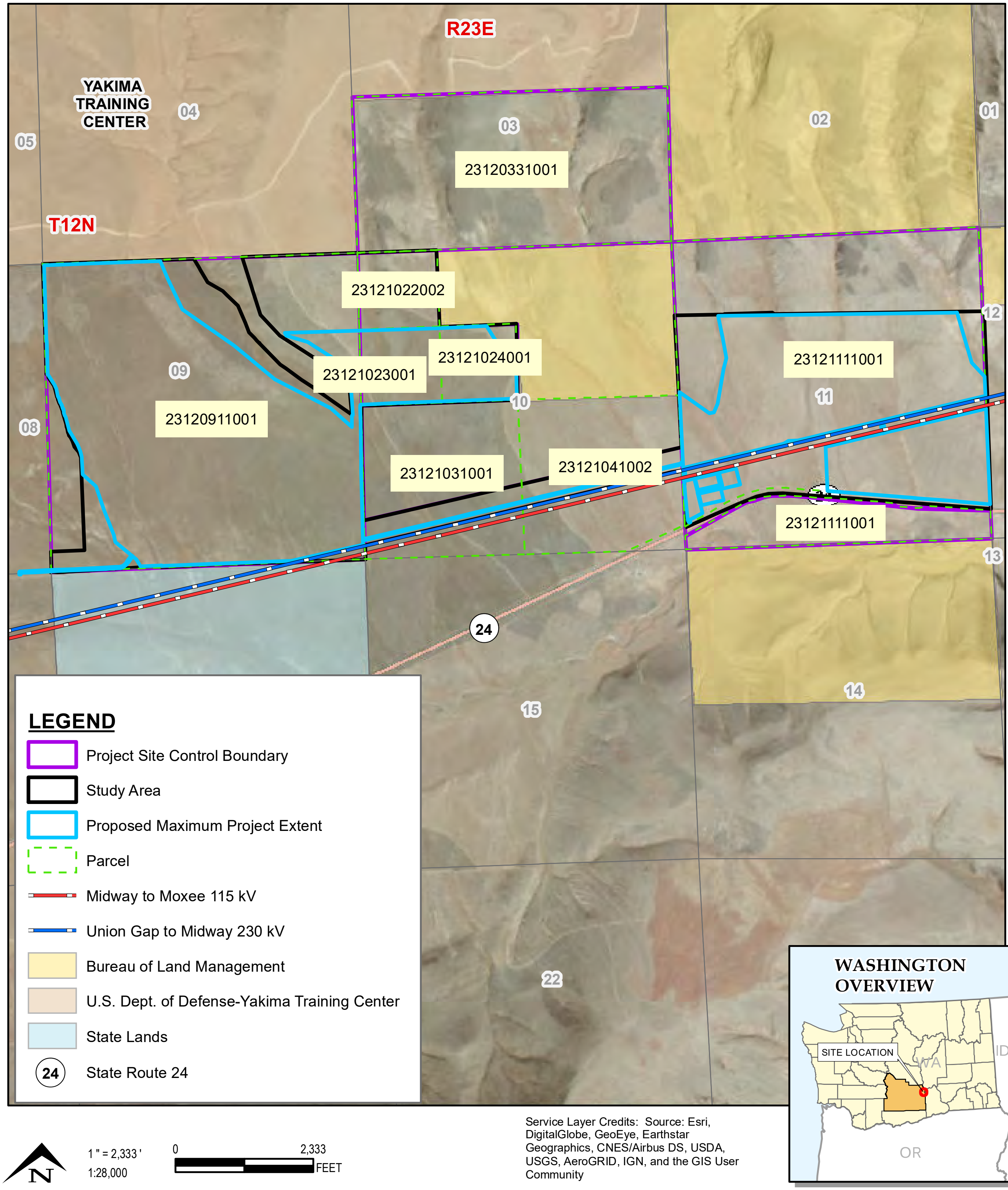
Table 2-1. Soils in the Study Area.

Soil Map Unit Symbol	Soil Map unit Name	Farmland Classification	Acres in Study Area	Percent of Study Area
35	Finley fine sandy loam, 0 to 5 percent slopes	Prime farmland if irrigated	11.4	1
65	Kiona stony silt loam, 15 to 45 percent slopes	Not prime farmland	17.7	2
83	Moxee silt loam, 2 to 15 percent slopes	Not prime farmland	512.8	46
127	Scooteney cobbly silt loam, 0 to 5 percent slopes	Not prime farmland	16.6	1
130	Selah silt loam, 8 to 15 percent slopes	Farmland of statewide importance	73.5	7
132	Shano silt loam, 2 to 5 percent slopes	Farmland of statewide importance	56.1	5
142	Starbuck silt loam, 2 to 15 percent slopes	Not prime farmland	17.1	2
143	Starbuck-Rock outcrop complex, 0 to 45 percent slopes	Not prime farmland	20.7	2
179	Warden silt loam, 8 to 15 percent slopes	Farmland of unique importance	0.3	<1
187	Willis silt loam, 2 to 5 percent slopes	Farmland of statewide importance	56.7	5
189	Willis silt loam, 8 to 15 percent slopes	Farmland of unique importance	340.1	30

Source USDA NRCS 2021

The Study Area is designated as an Agricultural Resource in *Horizon 2040.* Crop production has been notably absent from the properties for 40 years of available aerial photography, and weedy species are dominant in the previously plowed areas on the site. Although approximately 46 percent of the property is considered to be farmland of state or unique importance, there is no on-site water source so none of the site is irrigated, which diminishes the agricultural potential of the site. Therefore, use of the property for a non-agricultural solar energy facility would not affect current agricultural activities on-site to the detriment of the region's commercial agricultural economy. With a planned Project lifespan of 40 years, after which the solar array would be decommissioned and removed, the Project would not remove the opportunity to re-establish agricultural uses in the future, and in fact preserves the land for future agricultural use, consistent with the current intent of Policy LU-ER-AG 1.1.

The MPE would be constructed entirely within the 1,699-acre boundary of the Project Site Control Boundary. The Project would not introduce a population of residents to the area who otherwise might object to agricultural activities such as dust from plowing, crop applications, or harvesting; odors from livestock; or equipment noise. After construction, the Project facility would be generally static with little noise being generated except from routine operations and maintenance activities and associated vehicle trips by employees of the facility. Thus, the Project would not introduce a land use that would be incompatible with farming activities, disturbing to humans or livestock, or that would impair current or potential future use of adjacent properties for agricultural operations, consistent with comprehensive plan policies LU-ER-AG 1.6 and LU-ER-AG 1.7.



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PROJECT:
CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:
OSTREA PARCEL MAP

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CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE:	Fig 2-1 Ostrea Project Parcel Map Land Use.mxd

FIGURE 2-1

2.2.2.3 General Land Use Policies

Horizon 2040 includes the following General Land Use (LU-G) goals and policies that are related to the Project.

> ***GOAL LU-G 1: Ensure that proposed changes to land uses or zoning regulations do not have a negative impact on the Yakima Training Center's primary mission.***
>
> > <u>*Specific Policies Related to the Project*</u>*:*
> >
> > ***LU-G 1.1:*** *Notify the installation commander of the Yakima Training Center in the event of any proposed changes in land use or zoning within a 500-foot radius of the perimeter of the Training Center. A sixty-day response window will be provided to the installation commander to provide relevant comments or concerns.*
> >
> > ***LU-G 1.2:*** *New roads planned for the areas adjacent to the Yakima Training Center should not be adjacent or parallel to the Training Center perimeter nor closer than 300 feet at their closest point.*
> >
> > ***LU-G 1.4:*** *Require all habitable structures to be set back a minimum of 300 feet from the Yakima Training Center perimeter. Where a 300-foot setback is not possible on existing lots, the maximum setback possible should be applied. New development adjacent to the Yakima Training Center should be so configured to allow for the required 300-foot setback.*
> >
> > ***LU-G 1.5:*** *All new land uses proposed to be located in proximity to the Yakima Training Center should be evaluated as to their potential impact to the Training Center.*

<u>**Analysis**</u>: The northern boundary property lines of two Project parcels adjoin the southeastern property line of the Yakima Training Center. Preliminary communications with Yakima Training Center representatives did not result in notable land use conflicts with the facility, though comments were made regarding potential impacts due to reflectivity of the PV panels; these comments are addressed in the Glint and Glare Analysis Solar Glare Report (Application for Site Certification [ASC], Attachment H).

Detailed plans with specific dimensions of structure setbacks are yet to be developed for the Project. Preliminary site plans indicate that solar panels would not be installed within 300 feet of the Yakima Training Center property line as specified in Policy LU-G 1.4. Project access roads would also not be within 300 feet of the training center property.

2.2.3 Utilities Element

Horizon 2040 includes the following Utilities (UT) Element goals and policies that are related to the Project.

> ***GOAL UT 2: Reasonably protect the physical and natural environment while providing utilities.***
>
> > *Specific Policies Related to the Project:*
> >
> > ***UT 2.2:*** *Encourage private utility structures (e.g., electric substations) to have design and screening that is compatible in bulk and scale with surrounding land uses.*
> >
> > ***UT 2.3:*** *Assist and facilitate the siting of linear transmission facilities and utility-related infrastructure in a manner consistent with Horizon 2040 through land use planning and development review policies and procedures.*
> >
> > ***UT 2.4:*** *Encourage energy resource development in locations within Yakima County that take advantage of the County's energy resources, existing infrastructure, and also are sited to minimize environmental impacts.*
>
> ***GOAL UT 17: Promote the delivery of electrical services, on demand, within the County consistent with utility's public service obligations.***
>
> > ***UT 17.5:*** *Work with electrical utility providers and neighboring jurisdictions to meet regional service needs and to accommodate future facility improvements.*
> >
> > ***UT 17.6:*** *Ensure there are sufficient electric utility facilities that are sufficient to support economic development. Foster cooperation among private enterprise, the County, and the utility provider.*

Analysis: Installation of the Project's PV arrays would generally follow existing contours of the MPE, requiring minimal grading and maintaining the natural slopes on site. Arrays would also be placed in a configuration that would avoid natural drainage channels on the parcels, precluding the need for fill in or removal of potential habitat in these areas. Water use would be minimal as discussed in the ASC. Where Project construction would potentially affect sensitive species, mitigation measures are recommended to reduce or eliminate impacts, as discussed in the Rare Plants and Habitat Report (ASC, Attachment B) and General Wildlife Surveys reports (ASC, Attachment C). Potential visual impacts from light and glare of the Project would not be significant (see ASC, Attachment H Glint and Glare Analysis Solar Glare Report). Thus, the Project would make reasonable efforts to protect the natural environment while introducing a renewable energy source to the MPE, consistent with Goal UT 2.

There is minimal development on properties adjacent to the Study Area. Some single-family residences and planted fields exist in the general vicinity of the site; however, lands proximate to the Study Area are predominantly undeveloped, large parcels of 40 or more acres. There are no existing developments on surrounding lands with which the Project would need to be made compatible in bulk or scale (Policy UT 2.2). As such, it is not anticipated that screening will be required; however, continued consultation with the county through the EFSEC process will confirm the applicability of screening.

The Study Area lacks trees or other significant sources of shade and is highly exposed to sunlight throughout the day, making solar energy a uniquely available natural resource opportunity of the site. The Project would capture the solar access of the property for generation of renewable energy while minimizing its environmental impacts as summarized above, consistent with Policy UT 2.4. The Project is also consistent with the State goals in RCW 80.50.010, as well as local Goal UT 17 and policies UT 17.5 and 17.6, which seek to increase the supply of renewable, affordable energy to residents of the region and state.

Ongoing coordination between CCR, Yakima County, and EFSEC with regard to Project review, and the analysis of this land use study, follow the intent of policies UT 2.3 and UT 17.6.

2.2.4 Economic Development Element

Horizon 2040 includes the following Economic Development (ED) goals and policies that are related to the Project.

GOAL ED 1: Promote economic growth while maintaining environmental quality.

Specific Policies Related to the Project:

ED 1.2: *Encourage economic opportunities that strengthen and diversify the County's economy while maintaining the integrity of the natural environment.*

GOAL ED 4: Preserve and enhance the County's resource-based economy.

Specific Policies Related to the Project:

ED 4.1: *Encourage resource-based industries which are consistent with resource lands goals and policies.*

ED 4.4: *Discourage incompatible development in resource areas.*

Analysis: The Project is consistent with the Economic Development goals and policies listed above and reflected in the goals and policies of other elements of *Horizon 2040*, to foster environmental quality, diversify the regional economy, and protect opportunities for agricultural development of lands. As described in the paragraphs above, the Project is an opportunity to capture the solar energy availability of the property to generate renewable power for the region's residents and businesses, and to diversify the region's predominantly agricultural economic base. The Project has been designed to avoid mass grading of the MPE and extensive fill of natural contours and drainages in consideration of the natural environment. Because the Project would not introduce a resident population to the site, and all Project development would be contained within the boundaries of the MPE, the Project would have minimal risk of conflicts with agricultural activities on regional properties and no conflicts with the Yakima Training Center. The finite term of the Project would ensure that the PV arrays are eventually removed from the property, restoring the potential for agricultural use of the property in the future. By providing productive use of the property while preserving the land for future use, the Project supports the local and regional company.

2.2.5 Other Horizon 2040 Comprehensive Plan Elements

The following goals and policies from the Natural Settings (NSs) and Natural Hazards (NHs) elements of *Horizon 2040* are also related to the Project. Discussions of the Project's potential to affect implementation or application of these goals and policies, as well as to show Project conformance and consistency with goals and policies, are included in the ASC application and associated appendices including Rare Plants and Habitat Report (ASC, Attachment B), General Wildlife Surveys reports (ASC, Attachment C), Wetland Delineation Report (ASC, Attachment D), and Cultural Resources report (ASC, Attachment F).

GOAL NS 3: Make steady improvement in the air quality of the Yakima Valley by reducing dust, odor, auto emissions, smoke, and other contaminants.

Specific Policy Related to the Project:

NS 3.2: *Require control of emissions to the air during land development and construction projects.*

GOAL NS 4: Promote the identification and protection of archaeological and significant historical sites and structures.

Specific Policies Related to the Project:

NS 4.4: *Prior to demolition, moving or alteration of any designated historic, cultural, or archeological landmark, ensure that due consideration is given to its preservation or, at a minimum, documentation of its historic value.*

NS 4.5: *When available, utilize existing archaeological and cultural resource information from the Washington State Department of Archaeology and Historic Preservation and the Yakama Nation.*

GOAL NS 8: Establish critical areas protection measures to protect environmentally sensitive areas, and protect people and property from hazards.

Specific Policies Related to the Project:

NS 8.1: *Use the best available science to develop regulations to protect the functions and values of critical areas.*

NS 8.2: *Ensure proposed subdivisions, other development, and associated infrastructure are designed at a density, level of site coverage, and occupancy to preserve the structure, values, and functions of the natural environment or to safeguard the public from hazards to health and safety.*

NS 8.3: *Use a preference-based system of mitigation sequencing for the County's stream, lake, pond, wetland, floodplain and fish and wildlife priority species and habitat critical areas that reduces impacts using approaches ranging from avoidance to replacement.*

GOAL NS 9: Maintain and manage the quality of the groundwater resources in Yakima County as near as possible to their natural conditions and in compliance with state water quality standards.

Specific Policies Related to the Project:

NS 9.3: *Evaluate the potential impact of development proposals on groundwater quality, and require alternative site designs to reduce contaminant loading where site conditions indicate that the proposed action will measurably degrade groundwater quality.*

NS 9.5: *Encourage the retention of natural open spaces in development proposals overlying areas highly susceptible for contaminating groundwater resources.*

GOAL NS 10a: Enhance the quantity and quality of surface water.

Specific Policy Related to the Project:

NS 10.3: *Protect water quality from the adverse impacts associated with erosion and sedimentation.*

GOAL NS 13: Prevent increased flooding from stormwater runoff.

Specific Policies Related to the Project:

NS 13.1: *Require on-site retention of stormwater.*

NS 13.2: *Preserve natural drainage courses.*

NS 13.3: *Minimize adverse storm water impacts generated by the removal of vegetation and alteration of landforms.*

GOAL NS 14: Improve water quality through improved stormwater management.

Specific Policy Related to the Project:

NS 14.2: *Control stormwater in a manner that has positive or neutral impacts on the quality of both surface and groundwater.*

GOAL NS 15: Provide for the maintenance and protection of habitat areas for fish and wildlife.

Specific Policies Related to the Project:

NS 15.2: *Direct development away from areas containing significant fish and wildlife habitat areas, especially areas which are currently undeveloped or are primarily dominated by low intensity types of land uses such as forestry.*

NS 15.5: *Protect fish and wildlife habitat for all native species in Yakima County, so as to maintain current population over time. Protect the habitat of Washington*

State Listed Species of Concern and Priority Habitats and Species in order to maintain their populations within Yakima County.

GOAL NS 19: (also Natural Hazards Goal NH 2): Protect the public from personal injury, loss of life or property damage from geologic hazards.

Specific Policies Related to the Project:

***NS 19.1** (also Natural Hazards Policy **NH 2.1**)**:** Ensure that land use practices in geologically hazardous areas do not cause or exacerbate natural processes which endanger lives, property, or resources.*

***NS 19.2:** (also Natural Hazards Policy **NH 2.2**)**:** Locate development within the most environmentally suitable and naturally stable portions of the site.*

***NS 19.4:** Prevent the subdividing and development of known or suspected landslide hazard areas, side slopes of stream ravines, or slopes 40 percent or greater for development purposes.*

GOAL NS 20 (also Natural Hazards Goal NH 3): Protect life and property in rural Yakima County from fire hazards.

Specific Policies Related to the Project:

***NS 20.1** (also Natural Hazards Policy **NH 3.1**)**:** Encourage the development of adequate water supply/storage for new development which is not connected to a community water/hydrant system. A storage facility/fire well should be accessible by standard firefighting equipment and adequate for the needs of the structure(s) and people being protected.*

***NS 20.3** (also Natural Hazards Policy **NH 3.4**)**:** Encourage, where feasible, the undergrounding of electrical utilities to reduce their exposure to fire.*

***NS 20.5** (also Natural Hazards Policy **NH 3.6**)**:** Require proposed developments to provide sufficient access for heavy-duty firefighting equipment.*

GOAL NH 1-2: Prevent increased flooding from stormwater runoff.

Specific Policies Related to the Project:

***NH 1-2.1:** Require on-site retention of stormwater.*

***NH 1-2.2:** Preserve natural drainage courses.*

***NH 1-2.3:** Minimize adverse storm water impacts generated by the removal of vegetation and alteration of landforms.*

GOAL NH 4: Limit the impact of drought on property and safety.

Specific Policies Related to the Project:

***NH 4.2:** Ensure sufficient water quantity for new developments.*

***NH 4.3:** Encourage xeriscaping and other landscaping options that limit the need for irrigation.*

***NH 4.4:** Promote design that captures and infiltrates stormwater, meltwater, and irrigation runoff.*

GOAL NH 5: Protect property, life, and health from impacts of multiple and cumulative natural hazards.

<u>*Specific Policies Related to the Project:*</u>

***NH 5.1:** Ensure proposed subdivisions, other development, and associated infrastructure are designed at a density, level of site coverage, and occupancy to preserve the structure, values, and functions of the natural environment or to safeguard the public from hazards to health and safety.*

***NH 5.4:** Locate critical facilities and infrastructure outside of high-risk hazard areas.*

***NH 5.5:** Ensure new developments in high-risk hazard areas include secondary egress.*

2.3 YCC

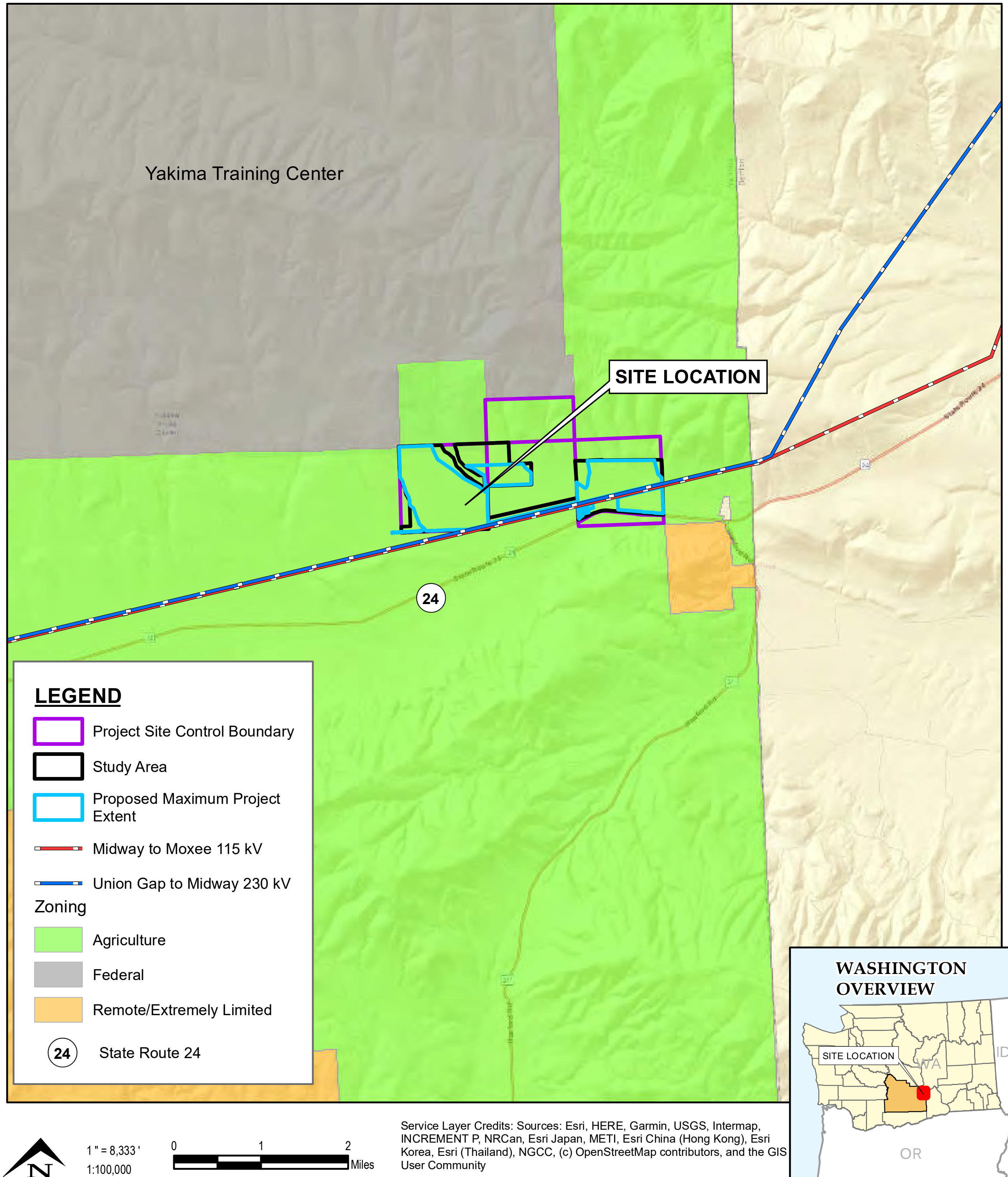
CCR is pursuing site certification through EFSEC; however, EFSEC's review process gives consideration to local community procedures and goals. The following analysis describes whether and how the Project would be consistent with Yakima County's adopted land use regulations that are anticipated to be considered during EFSEC's review.

2.3.1 Zoning and Land Use Development Regulations

2.3.1.1 Zoning

Zoning and land use regulations that are applicable to the Project are prescribed in Title 19, Unified Land Development Code, of YCC. The proposed Project has a *Horizon 2040* land use designation of Agricultural Resource, and it is zoned Agriculture (AG) District (Figure 2-2). As written in YCC 19.11.010:

> *The purpose of the Agriculture (AG) district is to preserve and maintain areas for the continued practice of agriculture by limiting the creation of small lots, permitting only those new uses that are compatible with agricultural activities, protection of agricultural lands of long-term commercial significance, and providing measures to notify and separate especially sensitive land uses from customary and innovative agricultural land management practices. The AG district implements the Comprehensive Plan that calls for the preservation of agricultural lands.*



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TRC - GIS

PROJECT:
CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:
OSTREA STUDY AREA ZONING MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE:	Fig 2-2 Ostrea Zoning Map Land Use.mxd

FIGURE 2-2

Permitted and conditionally permitted uses of land in all zoning districts of unincorporated Yakima County are listed in YCC 19.14.010, Table 19.14.1, Allowable Land Uses. The proposed Project is categorized as a “Power Generating Facility,” a conditionally permitted use of land in the AG District that requires discretionary, quasi-judicial approval from the County’s Hearing Examiner under a Type 3 CUP. As described in YCC 19.14.020, Type 3 Conditional Uses include:

> *Uses which may be authorized subject to the approval of a conditional use permit as set forth in [YCC] Section 19.30.030. Type 3 conditional uses are not generally appropriate throughout the zoning district. Type 3 uses require Hearing Examiner review of applications subject to a Type 3 review under the procedures of Section 19.30.100 and YCC Subsection 16B.03.030(1)(c).*

For the application for a Type 3 CUP, a site plan showing all parcels containing the site must be submitted. Prior to approving a Type 3 CUP, the Hearing Examiner must conduct an open and noticed public hearing to receive written and spoken testimony on the proposed Project. After considering testimony and other information in the record of the Project, the Hearing Examiner may only approve a Type 3 CUP if he or she can make findings that:

- a) *The present and future needs of the community will be adequately served by the proposed development and that the community as a whole will be benefited rather than injured;*
- b) *The proposed use is compatible with neighborhood land uses, the goals, objectives and policies of the Comprehensive Plan, and the legislative intent of the zoning district;*
- c) *The site of the proposed use is adequate in size and shape to accommodate the proposed use;*
- d) *All setbacks, spaces, walls and fences, parking, loading, site screening, landscaping, and other features required by YCC Title 19;*
- e) *The proposed use complies with other development and performance standards of the zoning district and YCC Title 19;*
- f) *The site for the proposed use relates to streets and highways adequate in width and pavement type to carry the quantity and kind of traffic generated by the proposed use;*
- g) *The proposed use will have no substantial adverse effect on abutting property or the permitted use thereof;*
- h) *In the case of residential uses, the housing density of the development is consistent with the existing zoning densities, or the Comprehensive Plan, and that all other aspects of the development are consistent with the public health, safety, and general welfare for the development and for adjacent properties; and*
- i) *The development complies with all criteria in Chapter 19.18 applicable to the proposed use, unless otherwise administratively adjusted.*

Analysis: The proposed Project is consistent with the zoning regulations of YCC Title 19 (Section 2.3). Although not an agricultural use of land on the property zoned AG District, the proposed Project is listed in YCC Title 19 as a conditionally permitted use in the AG District. The proposed use is consistent with the necessary findings that would be required for approval of a Type 3 CUP. As described in paragraphs above, the proposed Project would meet the state-identified needs for affordable, renewable energy sources, and the remote location of the MPE outside the County's urban growth areas would minimize the potential for Yakima County communities to be impacted by the Project (Sections 2.2.2 and 2.2.4). The large amount of parcel acreage accommodates the size of the Project, which allows for compliance with required structural setbacks (Sections 2.3 and 2.3.1.1). Operations of facilities are not expected to require a permanent presence on site, but facilities would be sized to accommodate up to three to five persons from time to time whose presence would not overwhelm the capacity of the adjoining SR-24 right-of-way (ROW) from which the Project has and would continue to have its access (Section 2.4). The Project would not impair continued or future use of adjacent properties for agricultural operations (Sections 2.2.2 and 2.2.3).

Generally, a Hearing Examiner is authorized under YCC 19.30.100(1) to "impose additional or greater requirements [of the YCC] as conditions of approval on any use, development or modification being reviewed to ensure that the proposal meets the standards and criteria for approval." Conditions of approval may also be imposed to mitigate potential environmental impacts of a Project; to ensure compatibility among the Project and existing uses and development on adjacent lands; and to achieve and further the intent, goals, objectives, and policies of the Yakima County Comprehensive Plan. For the proposed Project, the Land Use Hearing will be conducted jointly with EFSEC and any conditions would be issued through EFSEC.

2.3.1.2 Land Use Development Regulations

Regulations governing development on existing lots in the AG District are prescribed in YCC 19.11.010, Table 19.11.010-2, Setbacks, Lot Coverage and Building Height. Development regulations that are applicable to the Project are summarized below:

Maximum Lot Coverage:	Not specified.
Maximum Building Height:	Not specified.
Minimum Vision Clearance Triangle at Driveway:	15 feet along pavement edge of public street, 15 feet along the driveway, third side of triangle is a straight line connecting the 15-foot sides. No sign or landscaping shall be placed within the triangle so as to materially impede vision between the heights of 2.5 and 10 feet above the centerline grade of the streets.
Front Setback:	25 feet from planned edge of ROW or easement.
Interior Side Setback:	10 feet from property line.
Rear Setback:	10 feet from property line.
Additional Setback to Accommodate Required Site Screening:	Not applicable. Not required in AG District or for proposed energy generation facilities.

Yakima County has adopted 2018 International Building Codes, which have been added to the YCC Title 13 regulations. The International Codes require a building permit be obtained prior to construction. Building codes provide minimum standards to safeguard life and limb, health, property, and public welfare by regulating and controlling design, construction, and quality of materials of structures within this jurisdiction. As part of the Building Permit, the County of Yakima requires a site plan review. The site plan review is by multiple Yakima County departments and reviews project compliance with Yakima County Zoning ordinances, Building Codes, Fire Codes, and Health District Requirements applicable to a proposed project. The site plan should include all existing and proposed structures, road and access easements, easements and width, fire apparatus turn-around and turnouts as required, septic systems, well or water source, large physical features, critical areas, and setbacks.

Analysis: Preliminary plans for the Project do not show any solar panel placed immediately adjacent to any property lines of any of the Project parcels. Based on a review of the current site plans, there is sufficient acreage in the Project Site Control Boundary to accommodate both the Project and the minimum setbacks required by YCC. Typically, CCR implements setbacks 20 feet from project fencing to the solar array and minimum 15 feet from property lines to project fencing. Prior to issuance of building permits for the Project, construction drawings will be required to reflect compliance with the minimum setbacks specified in YCC Table 19.11.020-2.

2.3.2 Other Development Regulations Applicable to the Project

The following list of regulations in YCC are also related to the Project. Discussions of the Project’s compliance with the regulations in the sections referenced below are discussed in Rare Plants and Habitat Report (ASC, Attachment B) and General Wildlife Surveys reports (ASC, Attachment C), and associated sections of the ASC application.

- Chapter 9.24, Over-Legal Loads;
- Chapter 12.05, Sewer System;
- Chapter 12.08, Water System;
- Chapter 19.23, Transportation and Circulation;
- Chapter 19.25, Sewer and Water; and
- Title 16C, Critical Areas.

Construction drawings for the Project must also demonstrate compliance with applicable building codes and other regulations in Title 13, Building and Construction, of the YCC, prior to issuance of a building permit for the Project.

2.4 Characterization of Affected Environment

The proposed Project would change the appearance of the MPE, adding arrays of PV panels that would cover the majority of the property. Though visibility of existing vegetation would be reduced with the addition of the solar panels, installation of the arrays would follow existing contours and avoid the majority of existing drainage channels, such that the natural grade of the site would remain mostly unchanged during the life of the Project and following its decommissioning. The east-west access road that parallels the existing transmission line right-of-way will cross four ephemeral channels that run north-south. A Clean Water Action Section 404 permit will be obtained for the Project for the four crossings. More details are included in the ASC, Attachment D Ostrea Wetland Delineation Report. Construction and grading would be limited to the lands within the boundaries of the Project parcels and would not result in changes to the appearance of adjacent properties. Rather, adjacent properties would remain in a vegetated condition and available for use for agricultural operations, if so desired by the owners of those properties.

Facilities would be sized to accommodate up to three to five persons from time to time during Project operations, leading to traffic volumes during the life of the Project that would be minimal and could be accommodated within the existing capacity of SR-24, from which the Project has its access. Noise from Project operations would be limited to occasional employee and maintenance worker vehicle trips to, from, and around the MPE. Noise would be generated by trucks and equipment during construction of the Project; however, due to the large size of the subject and adjoining undeveloped parcels, Project construction noise is not anticipated to exceed any acceptable thresholds in YCC for noise-sensitive uses or residents.

2.5 Potential Project Impacts

There are no anticipated land use conflicts or potential impacts that would result from the implementation of the Project.

2.6 Mitigation Measures

Because no potential land use impacts of the Project have been identified, no mitigation measures are necessary for land use.

2.7 Summary of Effects and Significant Unavoidable Impacts After Mitigation

No significant land use impacts are anticipated to occur as a result of the Project. Yakima County concurrence with this determination is provided in Appendix A.

2.8 References

TRC. 2022. *Phase I Environmental Site Assessment: Ostrea Solar, LLC, Highway 24, Yakima County, WA 97601.* January 7, 2022.

U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). 2021. *Soil Survey Division, Web Soil Survey.* Accessed February 2021 at http://websoilsurvey.nrcs.usda.gov/app/

Washington State Legislature. 2021a. *Washington Administrative Code.* Accessed May 2021 at: https://apps.leg.wa.gov/wac/

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Yakima County. 2017. *Horizon 2040* Comprehensive Plan." Effective August 29, 2017. Accessed May 2021 at: https://www.yakimacounty.us/846/Horizon-2040-Comprehensive-Plan

_____. 2003. *Yakima County-wide Planning Policy: A Policy Framework to Guide the Development of Comprehensive Plans Under the Washington State Growth Management Act.* Revised October 2003. Accessed May 2021 at: https://www.yakimacounty.us/DocumentCenter/View/10859/County-Wide-Planning-Policy-2003?bidId=

_____. 2021. *Yakima County Code.* Accessed May 2021 at: https://www.codepublishing.com/WA/YakimaCounty/

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Appendix A. Letter from Yakima County

Public Services

128 North Second Street • Fourth Floor Courthouse • Yakima, Washington 98901
(509) 574-2300 • 1-800-572-7354 • FAX (509) 574-2301 • *www.co.yakima.wa.us*

LISA H. FREUND – Director

March 7, 2022

TRC
Attn: Steve Graber
Senior Environmental Planner
123 N. College Ave
Suite 206/208
Fort Collins, CO 80524

RE: Certificate of Zoning Compliance – High Top and Ostrea Solar (Cypress Creek Renewables)

Mr. Graber,

Cypress Creek Renewables is proposing to construct a solar facility in Yakima County. The solar facility is defined as a Power Generating Facility under Yakima County Code (YCC) Title 19, the Unified Land Development Code. The facility is proposed to be within the Agriculture Zoning District (AG). In the AG Zoning District, power generating facilities are a Type 3 Use, pursuant to Table 19.14-1 Allowable Land Uses.

Table 19.14-1 Allowable Land Uses

	AG	FW	MIN	R/ELDP	R-10/5	RT	RS	HTC	SR	R-1	R-2	R-3	B-1	B-2	SCC	LCC	GC	M-1	M-2
Power generating facilities	3	3	3	3	3			3									3	3	1

Type 3 Uses are "uses which may be authorized subject to the approval of a conditional use permit as set forth in Section 19.30.030. Type 3 conditional uses are not generally appropriate throughout the zoning district. Type 3 uses require Hearing Examiner review of applications subject to a Type 3 review under the procedures of Section 19.30.100 and YCC Subsection 16B.03.030(1)(c)." (YCC Title 19.14.010(2))

Therefore, the Ostrea Solar project is consistent with Title 19 and would be eligible for review and permitting under Yakima County permit processes.

Please contact me or my staff at (509)574-2300 with any questions.

Sincerely,

Jason Earles,
Zoning and Subdivision Manager

Attachment B. Rare Plants Report

March 2, 2022

Ostrea Solar, LLC Project

Prepared For:

Cypress Creek Renewables, LLC
3402 Pico Blvd
Santa Monica, CA

Prepared By:

TRC
Fort Collins, CO

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Table of Contents

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Appendices

Acronyms and Abbreviations

Notation	Definition
BESS	Battery Energy Storage System
BMP	Best Management Practice
BPA	Bonneville Power Administration
CCR	Cypress Creek Renewables, LLC
EFSEC	State of Washington Energy Facility Site Evaluation Council
ESA	Endangered Species Act
ESCP	Erosion and Sedimentation Control Plan
°F	degrees Fahrenheit
IPaC	Information for Planning and Consultation
kV	Kilovolt
MPE	Maximum Project Extent is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
NRCS	Natural Resource Conservation Service
O&M	Operations and Maintenance
Project	Ostrea Solar, LLC Project
Project Site Control Boundary	Total of the leased areas and easements for the Ostrea Solar, LLC Project
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SR	State Route
Study Area	Survey Area for rare plants
TRC	TRC Environmental Corporation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WNHP	Washington Natural Heritage Program

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). As part of the environmental studies to be included in the Application for Site Certification to the State of Washington Energy Facility Site Evaluation Council (EFSEC), the Washington Department of Fish and Wildlife (WDFW) requested a rare plant survey be conducted. The rare plant survey will provide EFSEC with the necessary information and analysis to determine if the Project may impact sensitive species, as mandated by the Washington State Environmental Policy Act (SEPA).

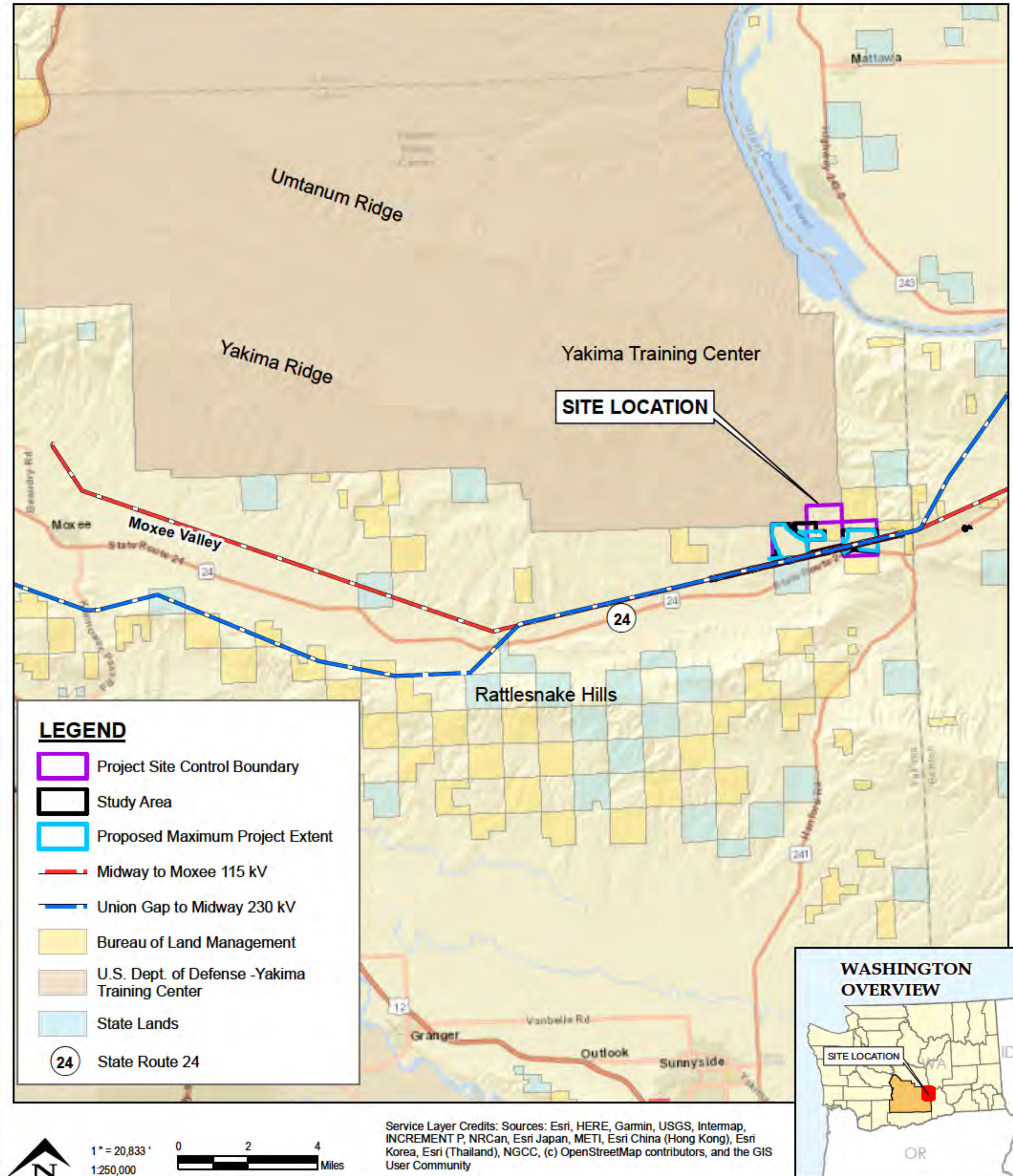
1.1 Background

The Project is situated north of Washington State Route 24 (SR-24), south of the Yakima Training Center, and approximately 22 miles east of the town of Moxee, in Yakima County, Washington (Figure 1-1). The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1-1). Within the Project Site Control Boundary, a smaller Study Area (1,123 acres) was defined for rare plant surveys (Figure 1-1). The Maximum Project Extent (MPE) (811.3 acres) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.

The Project will use solar photovoltaic panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts of alternating current solar capacity at the point of interconnection to the electric power grid. The Project will interconnect through a line tap to Bonneville Power Administration's (BPA's) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project. BPA's Moxee to Midway 115 kV transmission line connects to BPA's Moxee substation, which is approximately 23 miles west and north of the Project and BPA's shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based on the final approved design for the Project.

A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. If required, the BESS will be located to the west of the substation (for alternating current coupled), or as smaller battery cabinets collocated throughout the MPE at the inverter pad locations (for direct current coupled).

An Operations and Maintenance (O&M) trailer and employee parking will be located just west of the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the O&M trailer footprint will be used as a construction laydown yard. Access to the Project will be from SR-24 on the west side of the eastern most parcel in the MPE.



TRC

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TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROJECT OVERVIEW MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE: Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd	

FIGURE 1-1

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd -- Saved By: RBLAKE on 3/13/2022, 20:08:49 PM

2.0 Regulatory Requirements

Pursuant to the Federal Endangered Species Act (ESA), the United States Fish and Wildlife Service (USFWS) is responsible for ensuring compliance with the ESA for activities that may result in take of a species listed as threatened or endangered under the ESA. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct." In general, persons subject to the ESA (including private parties) are prohibited from "taking" endangered or threatened plants in areas under federal jurisdiction or in violation of state law.

Within the State of Washington, the WDFW has the regulatory authority to manage and conserve wildlife resources within state borders. The WDFW maintains a list of Threatened and Endangered species, identified throughout the state as Species of Concern. These include those species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the USFWS or the National Marine Fisheries Service.

3.0 Summary of Consultation

On February 17 and 22, 2021, TRC Environmental Corporation (TRC) conducted initial consultation with Michael Ritter, Fish and Wildlife Area Habitat Biologist for the WDFW, on rare plant survey requirements. Michael Ritter provided guidance on document templates, survey methodologies, plant lists, and reference information. A Study Area for the Project was identified in March 2021 that included portions of the Project Site Control Boundary where the MPE was most likely to be located. Based on the direction from WDFW and the defined Study Area, TRC developed a study plan outlining the proposed rare plant surveys including target species and methodology. The target species for surveys were identified based on the desktop review as described in Section 4.1 and are listed in Table 5-2. The study plan was submitted on March 12, 2021 to Michael Ritter for preliminary feedback. Michael Ritter provided comments on March 15, 2021. Comments including concurrence on the targeted plant species for surveys and the proposed methodology. Mr. Ritter requested a second survey period later in the summer to cover a wider range of the targeted species flowering periods. The study plan was revised to include a second survey period in July 2021. The correspondence is provided in Appendix A.

4.0 Methods

4.1 Desktop Review

Prior to conducting the field survey, TRC biologists performed a desktop review to determine the rare plants, species of concern, and habitats that have been documented in the vicinity of the Study Area. A USFWS Information for Planning and Consultation (IPaC) report was reviewed for federally listed threatened, endangered, candidate and species proposed for listing under the ESA that may occur in the Project vicinity (USFWS 2021, Appendix B). A formal IPaC was requested in March 2022 (Appendix B). State rare plants and species of concern were identified from the Washington Natural Heritage Program (WNHP) list of Washington plant species of conservation concern (WNHP 2019). The list of Washington plant species of conservation concern was updated August 31, 2021. The list updates were reviewed and there are no changes to species identified as having potential to occur in the Study Area. The WNHP defines rare plants as “species that are native to Washington and at risk of extirpation in the state due to low numbers, few occurrences, high habitat specificity, high threats, or significant downward population trends” (WNHP 2020). The Washington plant species of conservation concern includes information on the federal and state listing and the NatureServe heritage rank of global and state conservation status for each species. For each species, the distribution pattern, county, and ecoregion where the species are found are included.

To identify the species with the potential to occur within the Study Area and associated suitable habitat, the following sources were consulted:

- Field Guide to the Rare Plants of Washington (Camp and Gamon 2011).
- Washington Department of Natural Resources (WDNR) Element Occurrence data (WDNR 2021).
- Burke Herbarium Image Collection Species Description (Giblin and Legler 2003).
- The Jepson Herbarium, University of California, Berkeley (Jepson Flora Project 2021).
- Flora of North America (1993).
- NatureServe (2021).
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) SSURGO soil data for Yakima County (USDA NRCS 2021).
- United States Geological Survey (USGS) Topographic Maps (Black Rock Spring and Cairn Hope Peak) (USGS 2020).

4.2 Field Surveys

Field surveys consisted of a systematic pedestrian survey of the Study Area to identify habitat, populations, or occurrences of the target rare plant species. In addition, the field survey verified habitat presence and rated habitat areas for each species as high, medium, or low potential habitat for each species.

Habitat quality was evaluated based on the characteristics unique to individual species and vegetation communities while taking into account level of disturbance, species composition, physical resources, and amount of habitat available. In general, high-quality habitat has a high number of the habitat characteristics associated with an individual species. In areas of high and medium potential habitat, a 100-percent visual exam of the habitat was conducted. A meandering pedestrian survey was conducted in areas of low potential habitat. Dominant plant species were recorded for each area of potential habitat.

Identified populations or occurrences of rare plants were mapped as point, line, or polygon features using portable GPS units designed to gather location data to the sub-meter. Identified botanical features were photographed and data were collected in TRC’s Fulcrum electronic data collection software. Data collection included the examiner name, visit date, species names, number of plants present, plant count type (estimated or actual), percent cover, and whether the plant was alive or dead. The vegetation community where the species was found and its characteristics including habitat quality were noted.

Representative photographs were taken of observed targeted species and areas identified as suitable habitat for the targeted rare plant species. If requested by CCR or WDFW, TRC will provide the data to the WNHP Rare Plant Sighting Form (available here: https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf) for submittal to the WNHP.

The vascular plant species observed in the Study Area were recorded by genus and species. The majority of the species had sufficient characteristics to be identified to species. Specimens not readily identified in the field were collected and identified using the following plant keys and online references:

- Flora of the Pacific Northwest (Hitchcock and Cronquist 2018).
- Field Guide to the Rare Plants of Washington (Camp and Gamon 2011).
- Burke Herbarium Image Collection Vascular Plants, Macrofungi & Lichenized Fungi of Washington (Giblin and Legler 2003).
- Consortium of Pacific Northwest Herbaria (CPNWH 2021).

5.0 Results

The Study Area is found in the Columbia Plateau Ecoregion, a dry area receiving on average eight inches of precipitation a year. The climate in the Study Area and surrounding region consists of cool, dry summers (average high 88 degrees Fahrenheit [°F]), and mild, wet, and cloudy winters (average low of 21 °F) with the wettest months being December and January. The local area is currently experiencing extreme drought. In July 2021, a drought emergency was declared for most of the watersheds in Washington including those in Yakima County.

The landscape in this ecoregion is expansive sagebrush covering plains and valleys with isolated mountain ranges and river systems (Clarke and Bryce 1997). The Study Area is active rangeland with a low number of cattle present in the Study Area. Historically, portions of the Study Area appear to have been plowed for agriculture.

The Study Area is located on a south-facing slope of an anticline. Numerous ravines and gullies are located across the south-facing slope; ravines found on higher and steeper portions of the anticline are reduced to gullies on lower slopes. Much of the alluvium at the toe of the slope may have originated from mass wasting events that long-ago created the ravines high on the slope (Foxworthy 1962). Ephemeral discontinuous channels and erosional features are found throughout the Study Area. Elevations within the Study Area range from 1,340 to 1,960 feet.

5.1 Desktop Review

5.1.1 Soils

Soils are derived from deposition of material resulting from erosion of the nearby McCullough Range. The soils in the Study Area are predominantly mixed alluviums ranging from gravelly sandy loam to stony sandy loam. The soils present in the Study Area, their extent, and their percent of the Study Area are listed in Table 5-1 and shown in Figure 5-1. Soils in the Study Area are predominantly well drained silt loams derived primarily from loess and alluvium parent materials. The dominant soil map unit in the Study Area is Moxee silt loam, 2- to 15 percent slopes (46 percent). Cryptobiotic crusts are present in limited portions of the north-central portions of the Study Area.

5.1.2 USFWS Information for Planning and Consultation (IPaC)

No federally listed plant species were shown as having the potential to occur in the Study Area.

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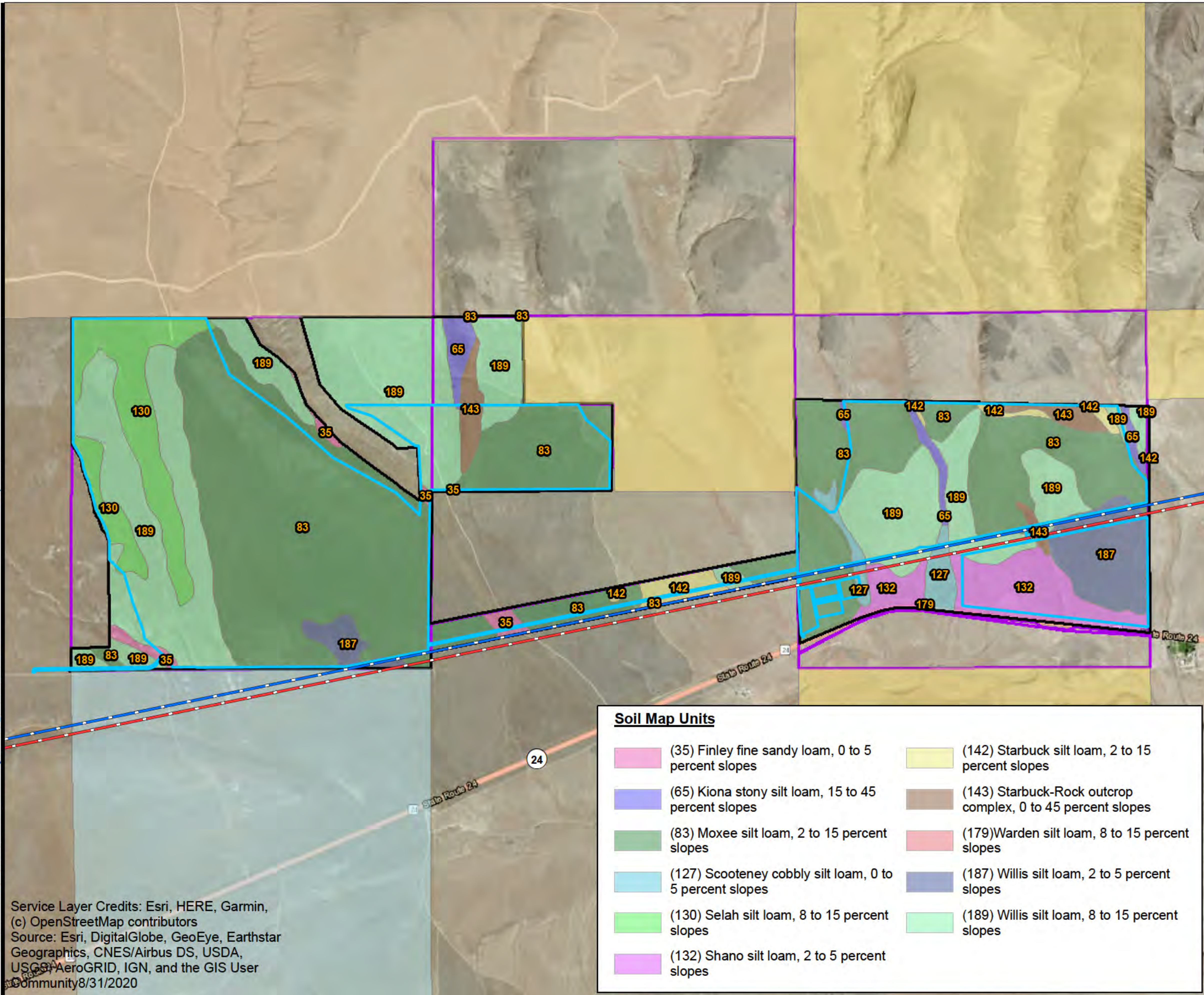

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2022, 21:16:18 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 5-1 Ostrea_Soils Rare Plants.mxd

LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Bureau of Land Management
- U.S. Dept. of Defense -Yakima Training Center
- State Lands
- (24) State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/ MAXAR 2019.
2. SOIL SURVEY STAFF, NATURAL RESOURCES CONSERVATION SERVICE, UNITES STATES DEPARTMENT OF AGRICULTURE. WEBSOIL SURVEY. ACCESSED 02/21/2022.

0 1,000 2,000 Feet

1" = 1,417 '

1:17,000

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

SOIL MAP UNITS IN THE OSTREA STUDY AREA

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	E. BERGQUIST		**FIGURE 5-1**
APPROVED BY:	J. SCHLANGEN		
DATE:	MARCH 2022		

TRC

11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

FILE NO.: Fig 5-1 Ostrea_Soils Rare Plants.mxd

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Table 5-1. Soils in the Study Area

Soil Map Unit Symbol	Soil Map unit Name	Farmland Classification	Acres in Study Area	Percent of Study Area
35	Finley fine sandy loam, 0 to 5 percent slopes	Prime farmland if irrigated	11.4	1
65	Kiona stony silt loam, 15 to 45 percent slopes	Not prime farmland	17.7	2
83	Moxee silt loam, 2 to 15 percent slopes	Not prime farmland	512.8	46
127	Scooteney cobbly silt loam, 0 to 5 percent slopes	Not prime farmland	16.6	1
130	Selah silt loam, 8 to 15 percent slopes	Farmland of statewide importance	73.5	7
132	Shano silt loam, 2 to 5 percent slopes	Farmland of statewide importance	56.1	5
142	Starbuck silt loam, 2 to 15 percent slopes	Not prime farmland	17.1	2
143	Starbuck-Rock outcrop complex, 0 to 45 percent slopes	Not prime farmland	20.7	2
179	Warden silt loam, 8 to 15 percent slopes	Farmland of unique importance	0.3	<0.1
187	Willis silt loam, 2 to 5 percent slopes	Farmland of statewide importance	56.7	5
189	Willis silt loam, 8 to 15 percent slopes	Farmland of unique importance	340.1	30

Source USDA NRCS 2021

5.1.3 Washington Natural Heritage Program

The 2019 list of Washington plant species of conservation concern includes 44 species for Yakima County. WNHP assigns Washington state status as either endangered (in danger of becoming extinct or extirpated from Washington), threatened (likely to become endangered in Washington), sensitive (sensitive, vulnerable, or declining and could become threatened or endangered in Washington), or extirpated (possibly extinct or extirpated in Washington). Of the species found in Yakima County, three of the species are listed as State Endangered, 13 are State Threatened, 24 are State Sensitive, and four of these species are listed as extirpated.

Based on the species range, habitat characteristics, and element occurrence locations and the general habitat, soils, topography, and elevation in the Study Area, 12 state sensitive species were identified as having potential to occur in the Study Area (Table 5-2).

Table 5-2. State Sensitive Species with Potential to Occur in the Study Area

Common Name	Scientific Name	Habitat Characteristics	Flowering period
Columbia milkvetch	*Astragalus columbianus*	Shrub-steppe habitats on sandy or gravelly loams, silts, rocky silt loams, and lithosols. Elevation range is 420 to 2,320 feet.	Mid-March to early May
Pauper milkvetch	*Astragalus misellus* var. *pauper*	On open ridgetops and gentle upper slopes, rarely middle and lower slopes. Elevation range is 500 to 3,280 feet.	April to mid-May
Narrow-stem cryptantha	*Cryptantha gracilis*	Sagebrush steppe habitats on basalt talus, in dry rocky or silty seasonal drainages, and pockets of silt on steep, somewhat unstable substrates. Elevation range is 1,250 to 2,680 feet.	May to June
Desert cryptantha	*Cryptantha scoparia*	Dry areas with full sun and little competing vegetation. South-facing slopes and ridges between small canyons with fine, dry silt and talus. Sites may be a little more alkaline than surrounding areas. Elevation range is 1,200 to 2,100 feet.	April to June
Snake River cryptantha	*Cryptantha spiculifera*	Dry, open, flat, or sloping areas in stable or stony soils, with low vegetative cover. Elevation range is 450 to 3,500 feet.	May to July
Dwarf evening-primrose	*Eremothera pygmaea (Camissonia pygmaea)*	Sagebrush steppe, on unstable soil or gravel in steep talus, dry washes, banks, and roadcuts. Elevation range is 450 to 2,050 feet.	June to August
Suksdorf's monkeyflower	*Erythranthe suksdorfii (Mimulus suksdorfii)*	Open, moist, or dry places, from valleys and foothills to moderate or occasionally high elevations in the mountains. Seasonally moist swales, drainages, or vernal pools with sagebrush steppe vegetation. Microhabitats are often disturbed by small erosive events. Prefer disturbed substrate. Elevation range is 430 to 7,100 feet.	Mid-April continuing as long as habitat remains moist
Hoover's tauschia	*Lomatium lithosolamans* (*Tauschia hooveri*)	Basalt lithosols in shrub-steppe habitats. Flat, well-drained, with prominent rocks and gravel, but very little soil in areas with low veg cover. Elevation range is 1,300 to 1,400 feet.	Early to late March
Hoover's desert-parsley	*Lomatium tuberosum*	Loose basalt talus in sagebrush steppe, typically on east to north-facing slopes. Sometimes in channels of open ridgetops and talus on south to southwest-facing slopes. Elevation range is 460 to 4,000 feet.	Early March to mid-April
False monkeyflower	*Mimetanthe pilosa*	Found in the sandy to gravelly soils along streams, seeps, and springs. Elevation range is 1,000 to 4,500 feet.	May to July
Coyote tobacco	*Nicotiana attenuata*	Dry sandy bottomlands, rocky washes, and other dry open places. Elevation range is 320 to 2,640 feet.	June to September
Caespitose evening-primrose	*Oenothera caespitosa* ssp. *caespitosa*	Open sagebrush desert; on loose talus, steep sandy or gravelly slopes, the flat terrace of the Columbia River, roadcuts, and other exposed sites. Elevation range is 410 to 1,800 feet.	Late April to mid-June

5.2 Field Surveys

TRC biologists Erin Bergquist and Laura Giese conducted the botanical survey of the Study Area from May 10 through 15, 2021 and July 9 through 12, 2021. The first survey period was selected to cover the optimal time for positive identification corresponding to either the flowering or seeding period of the majority of species (see Table 5-2). The second survey was conducted for the species that flower later in the summer: coyote tobacco (*Nicotiana attenuata*): June to September; and dwarf evening-primrose (*Eremothera pygmaea* and *Camissonia pygmaea*) June to August. Two species were past their flowering periods: Hoover's tauschia (*Lomatium lithosolamans* and *Tauschia hooveri*): early to late March; and Hoover's desert parsley (*Lomatium tuberosum*): early March to mid-April. Surveys will be conducted in late March or early April 2022 for these two species. The majority of the non-flowering *Lomatium* observed in the Study Area appeared to be common *Lomatium* species; however, none were in flower. The majority of the western portion of the Study Area appeared to have been plowed historically. Two transmission line routes and the associated access road for the transmission line route are located across the middle of the Study Area running southwest to northeast. Slopes across the Study Area ranged from one to 10 percent. Portions of the shrub-steppe community in the northern portion of the Study Area were burned in the 1987 Lambing fire and the entire Study Area was burned in the 2016 Range 12 fire (Northwest Coordination Center 2021a, b).

The field survey identified a total of 64 species, the majority of which are weedy invasive or early successional species commonly associated with disturbance. The plant list for the Study Area is included in Appendix C. Appendix D contains representative photos of the typical vegetation communities present in the Study Area. Vegetation diversity and cover of native forbs and shrubs was low in the majority of the Study Area. Common species observed were cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), Russian thistle (*Salsola tragus*), tumble mustard (*Sisymbrium altissimum*), diffuse knapweed (*Centaurea diffusa*), flixweed (*Descurainia sophia*), fiddleneck (*Amsinckia intermedia*) and Sandberg bluegrass (*Poa secunda*). Native grass, forb, and shrub species were more common in the northern portion of the Study Area including Indian ricegrass (*Oryzopsis hymenoides*), needle and thread grass (*Hesperostipa comata*), Sandberg bluegrass, green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush (*Artemisia tridentata*), longleaf phlox (*Phlox longifolia*), Carey's balsamroot (*Balsamorrhiza careyana*), and slender hawksbeard (*Crepis atribarba*). There are very few big sagebrush present in the Study Area.

5.3 Rare Plant Species Observed

During the May 2021 surveys, [redacted] of Columbia milkvetch (*Astragalus columbianus*) [redacted]. No individuals or populations of the other target species were encountered during either the May or July 2021 surveys.

The Columbia milkvetch populations and individuals were located near the north-central portion of the Study Area where disturbance from agricultural practices was not readily apparent. However, limited cattle grazing does appear to occur in this area. The plants were found in an elevation range of 1,820 to 1,880 feet. The plants were found in the Willis silt loam, 8- to 15-percent slopes soil map unit.

[redacted]

[redacted]

Codominant associated species included cheatgrass, tumble mustard, Sandberg bluegrass, squirreltail (*Elymus elymoides*), woollypod milkvetch (*Astragalus purshii*), and yellow salsify (*Tragopogon dubius*). A nominal amount of sagebrush was associated with two locations. A diverse mix of species were also present including June grass (*Koeleria macrantha*), fiddleneck, tidy fleabane (*Erigeron concinnus*), crested wheatgrass, biscuitroot (*Lomatium* sp.), longleaf phlox, needle and thread grass, big sagebrush, flixweed, and silvery lupine (*Lupinus argenteus*).

Representative species and habitat photos can be found in Appendix D.

Figure 5-2. Ostrea Rare Plant Survey Results

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6.0 Potential Project Impacts

During the May surveys [redacted] The populations will be located outside the MPE.

7.0 Mitigation Measures

To minimize impacts from the proposed Project, the following best management practices (BMPs) would be implemented. These would include the following measures:

- Flag/fence each population area mapped Columbia milkvetch polygon within a 100-foot buffer of the MPE for construction equipment avoidance.
- Provide education training to construction and operation staff and contractors on how to recognize the Columbia milkvetch and its flowering and seed set times.
- Avoid applying water-based or polymer additive dust palliative such as lignin sulfonate for dust abatement on roads and disturbed areas within 300 feet of the mapped population of the species, as needed.
- Prepare an Erosion and Sedimentation Control Plan (ESCP) to manage construction related ground disturbances. The ESCP will include BMPs such as the appropriate use of silt fencing to avoid or eliminate runoff of contaminants.
- Project has been designed to avoid surface disturbance in mapped populations of the Columbia milkvetch.
- Implement the noxious weed control plan to limit further spread of noxious weeds in MPE.
- Noxious weeds will be controlled in compliance with Revised Code of Washington (RCW) 17.10.140 and the Noxious Weed Management Plan. All herbicide and pesticide applications will be conducted in accordance with manufacturer instructions and all federal, state, and local laws and regulations including RCW 17.21. In compliance with RCW 17.10.140, weed control will only use herbicides that are approved for use in the state of Washington by the United States Environmental Protection Agency and Washington State Department of Agriculture.
- Limit the use of herbicides within 200 feet of the mapped Columbia milkvetch populations and individual Columbia milkvetch. Herbicide spraying will not be conducted when winds are greater than 15 miles an hour.

8.0 Summary of Effects and Significant Unavoidable Impacts After Mitigation

Impacts to the Columbia milkvetch populations will be avoided by placement of facilities and panels outside the Columbia milkvetch-mapped populations.

9.0 References

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U.S. Geological Survey (USGS). 2020. *Topographic relief map for Black Rock Spring Quad.* Accessed February 2021.

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Appendix A. Agency Consultation Log

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Appendix B. IPaC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: March 01, 2022
Project Code: 2022-0014330
Project Name: Ostrea Solar Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Project Code: 2022-0014330
Event Code: None
Project Name: Ostrea Solar Project
Project Type: Power Gen - Solar
Project Description: Solar Project in Yakima County, Washington
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.54478695,-119.94373596211321,14z

Counties: Yakima County, Washington

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4488	Endangered

Birds

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: TRC
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IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Yakima County, Washington

Local office

Washington Fish And Wildlife Office

(360) 753-9440
(360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

http://www.fws.gov/wafwo/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Gray Wolf Canis lupus U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4488	Endangered
Gray Wolf Canis lupus Western Distinct Population Segment No critical habitat has been designated for this species.	Proposed Endangered
North American Wolverine Gulo gulo luscus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout Salvelinus confluentus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE.

"BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Long-billed Curlew Numenius americanus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Breeds Apr 1 to Jul 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

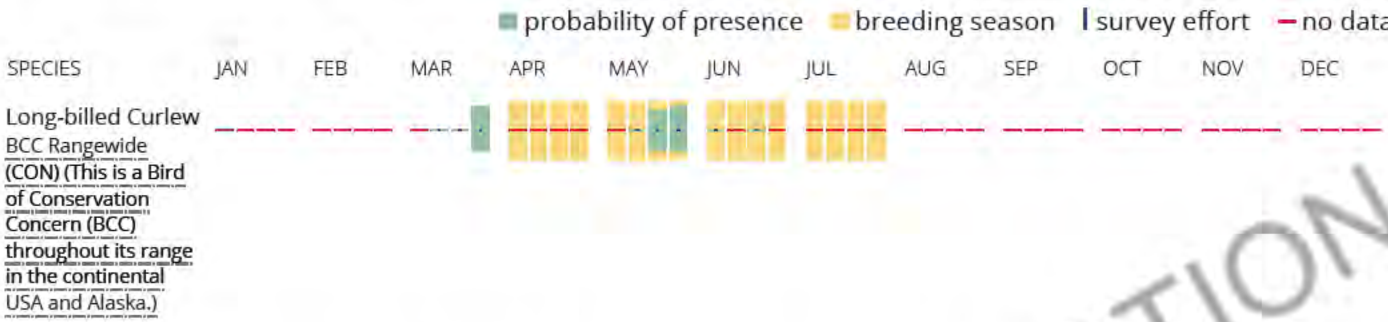
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE
- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C. Plant List

Appendix C. May and July 2021 Surveys Plant List for the Ostrea Project, Yakima County, Washington

Scientific Name	Common Name	Family	Native
Achillea millefolium	Yarrow	Asteraceae	Yes
Agoseris heterophylla	Annual agoseris	Asteraceae	Yes
Agropyron cristatum	Crested wheat	Poaceae	No
Allium douglasii	Douglas' onion	Amaryllidaceae	Yes
Amsinckia intermedia	Common fiddleneck	Boraginaceae	Yes
Antennaria parviflora	Small-leaved pussytoes	Asteraceae	Yes
Artemisia tridentata	Big sagebrush	Asteraceae	Yes
Astragalus columbianus	Columbia milkvetch	Fabaceae	Yes
Astragalus purshii	Wooly-pod milk-vetch	Fabaceae	Yes
Astragalus speircarpus	Medick milkvetch	Fabaceae	Yes
Balsamorrhiza careyana	Carey's balsamroot	Asteraceae	Yes
Bromus tectorum	Cheatgrass	Poaceae	No
Castilleja sp.	Painbrush	Orobanchaceae	Yes
Centaurea diffusa	Diffuse knapweed	Asteraceae	No
Chaenactis douglasii	Douglas' dustymaiden	Asteraceae	Yes
Chenopodium album	Lambsquarters	Chenopodiaceae	Yes
Chondrilla juncea	Rush skeletonweed	Asteraceae	No
Chorispora tenella	Blue mustard	Brassicaceae	No
Chrysothamnus viscidiflorus	Yellow rabbitbrush	Asteraceae	Yes
Clematis sp.	Clematis	Ranunculaceae	Yes
Convolvulus arvensis	Bindweed	Convolvulaceae	Yes
Conyza canadensis	Horseweed	Asteraceae	Yes
Crepis intermedia	Limestone hawksbeard	Asteraceae	Yes
Delphinium nuttallianum	Upland larkspur	Ranunculaceae	Yes
Descurainia pinnata	Tansy mustard	Brassicaceae	Yes
Descurainia sophia	Flixweed	Brassicaceae	Yes
Elymus elymoides	Squirreltail	Poaceae	Yes
Erigeron concinnus	Navajo fleabane	Asteraceae	No
Erigeron linearis	Desert yellow daisy	Asteraceae	Yes
Eriogonium ovalifolium	Cushion buckwheat	Polygonaceae	Yes
Erodium cicutarium	Redstem stork's bill	Geraniaceae	No
Foeniculum vulgare	Sweet fennel	Apiaceae	No
Hesperostipa comata	Needle and thread grass	Poaceae	Yes
Hirschfeldi incana	Shortpod mustard	Brassicaceae	No
Kochia scoparia	Kochia	Amaranthaceae	No
Koeleria macrantha	Junegrass	Poaceae	Yes
Krascheninnikovia lanata	Winterfat	Chenopodiaceae	Yes
Lappula occidentalis	Western stickseed	Boraginaceae	Yes
Lepidium perfoliatum	Clasping pepperweed	Brassicaceae	No

Scientific Name	Common Name	Family	Native
Lomatium farinosum	Northern biscuitroot	Apiaceae	Yes
Lomatium grayi	Pungent desert parsley	Apiaceae	Yes
Lupinus argenteus	Silvery lupine	Fabaceae	Yes
Medicago sativa	Alfalfa	Fabaceae	No
Mentzelia albicaulis	Whitestem blazingstar	Loasaceae	Yes
Nestotus stenophyllus	Narrowleaf goldenweed	Asteraceae	Yes
Nothocalais troximoides	Sagebrush false dandelion	Asteraceae	Yes
Oryzopsis hymenoides	Indian ricegrass	Poaceae	Yes
Pascopyrum smithii	Western wheatgrass	Poaceae	Yes
Phacelia linearis	Threadleaf phacelia	Boraginaceae	Yes
Phlox hoodii	Spiny phlox	Polemoniaceae	Yes
Phlox hoodii var muscoides	Musk phlox	Polemoniaceae	Yes
Phlox longifolia	Longleaf phlox	Polemoniaceae	Yes
Phlox speciosa	Showy phlox	Polemoniaceae	Yes
Poa bulbosa	Bulbous blue grass	Poaceae	No
Poa secunda	One sided blue grass	Poaceae	Yes
Salsola tragus	Russian thistle	Amaranthaceae	No
Sisymbrium altissimum	Tumble mustard	Brassicaceae	No
Sonchus arvensis	Field sowthistle	Asteraceae	No
Sphaeralcea munroana	Orange globemallow	Malvaceae	Yes
Taraxacum officinale	Common dandelion	Asteraceae	No
Townsendia florifer	Showy townsendia	Asteraceae	Yes
Tragopogon dubius	Salsify	Asteraceae	No
Triteleia grandiflora	Large-flower tritelia	Asparagaceae	Yes
Zigadenus venenosus	Deathcamas	Liliaceae	Yes

Appendix D. Representative Photos

Confidential - Not for Public Distribution

Attachment C. General Wildlife Surveys Report

April 1, 2022

Ostrea Solar, LLC Project

Prepared for:

Cypress Creek Renewables, LLC
3402 Pico Blvd.
Santa Monica, CA 90405

Prepared by:

TRC
Fort Collins, CO

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Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

Notation	Definition
BCC	Birds of Conservation Concern
BESS	Battery Energy Storage System
BPA	Bonneville Power Administration
CCR	Cypress Creek Renewables, LLC
EFSEC	State of Washington Energy Facility Site Evaluation Council
ESA	Endangered Species Act
°F	degrees Fahrenheit
FR	Federal Register
GIS	Geographic Information System
IPaC	Information for Planning and Consultation
kV	Kilovolt
MBTA	Migratory Bird Treaty Act
MPE	The area that contains the Project Footprint and additional construction areas.
O&M	Operations and Maintenance
PHS	Priority Habitat Species
Project	High Top Solar, LLC Project
Project Site Control Boundary	Total of the leased areas and easements for the Project
SGCN	Species of Greatest Conservation Need
SR	State Route
Study Area	Survey area for wildlife analysis
SWAP	State Wildlife Action Plan
TRC	TRC Environmental Corporation
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). TRC Environmental Corporation (TRC) was contracted by CCR to conduct a review of wildlife policies and regulations that are applicable to the Project, and site assessment field studies in support of siting and permitting the Project. The wildlife analysis provides the findings and regulatory context for energy facility siting and wildlife entitlement in general in Yakima County.

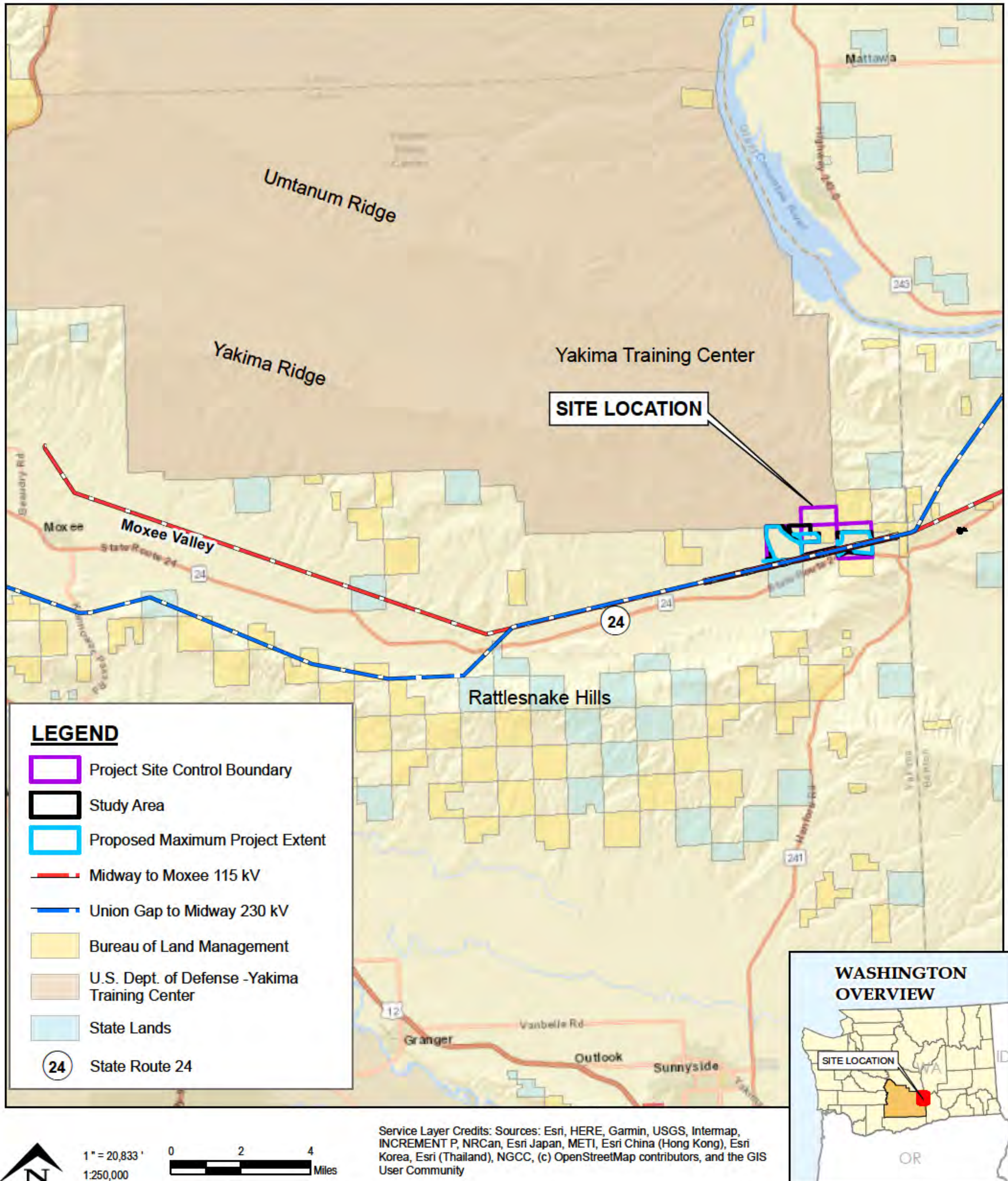
As part of the environmental studies to be included in the Application for Site Certification to the State of Washington Energy Facility Site Evaluation Council (EFSEC), the Washington Department of Fish and Wildlife (WDFW) requested that the Study Area be surveyed for sensitive species wildlife including federally listed, state-listed and candidate species, state Priority Habitat Species (PHS), and Species of Greatest Conservation Need (SGCN) as identified in the Washington State Wildlife Action Plan (SWAP). The WDFW also recommended conducting a study for nesting raptors within 0.5 mile of the Study Area.

1.1 Background

The Project is situated north of Washington State Route 24 (SR-24), south of the Yakima Training Center, and approximately 22 miles east of the town of Moxee, in Yakima County, Washington (Figure 1-1) The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1-1). Within the Project Site Control Boundary, a smaller Study Area (1,123 acres) was defined for the wildlife resource surveys (Figure 1-1). The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.

The Project will use solar photovoltaic panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts of alternating current solar capacity at the point of interconnection to the electric power grid. The Project will interconnect through a line tap to Bonneville Power Administration’s (BPA’s) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project. BPA’s Moxee to Midway 115 kV transmission line connects to BPA’s Moxee substation, which is approximately 23 miles west and north of the Project and BPA’s shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based on the final approved design for each Project. A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. If required, the BESS will be located to the west of the substation (for alternating current coupled), or as smaller battery cabinets collocated throughout the MPE at the inverter pad locations (for direct current coupled).

An Operations and Maintenance (O&M) trailer and employee parking will be located just west of the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the O&M trailer footprint will be used as a construction laydown yard. Access to the Project will be from SR-24 on the west side of the eastern most parcel in the MPE.



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

TRC

11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROJECT OVERVIEW MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE: Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd	

FIGURE 1-1

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd – Saved By: RBLAKE on 3/13/2022, 20:08:49 PM

2.0 Permitting and Regulatory Requirements

2.1 Federal and State Special Status Species

Pursuant to the Federal Endangered Species Act (ESA), the United States Fish and Wildlife Service (USFWS) is responsible for ensuring compliance with the ESA for activities that may result in take of a species listed as threatened or endangered under the ESA. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct." Under federal regulations, take is further defined to include habitat modification or degradation that results, or is reasonably expected to result, in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. In general, persons subject to the ESA (including private parties) are prohibited from "taking" endangered or threatened fish and wildlife species on private property, and from "taking" endangered or threatened plants in areas under federal jurisdiction or in violation of state law.

Within the State of Washington, the WDFW has the regulatory authority to manage and conserve wildlife resources within state borders. The WDFW maintains a list of species that are identified throughout the state as State Endangered, State Threatened, State Sensitive, or State Candidate under Washington Administrative Code (WAC) 220-610-110, as well as species listed or proposed for listing by the USFWS or the National Marine Fisheries Service.

2.2 Migratory Birds and Eagles

Migratory bird species are protected under the Migratory Bird Treaty Act (MBTA). The MBTA implements the U.S.' commitment to four (4) bilateral treaties, or conventions, for the protection of a shared migratory bird resource, protecting more than 800 species of birds. Most native bird species (birds naturally occurring in the United States) belong to a protected family and are therefore protected by the MBTA. Many migratory birds nest in the U.S. and Canada during summer months and migrate south to the southern U.S., tropical regions of Mexico, Central or South America, and the Caribbean for the non-breeding season. Others exhibit shorter migrations and remain in the U.S. to breed and overwinter. These species are protected pursuant to the MBTA under U.S. Code 703-711. The MBTA prohibits the take, kill, possession, and transportation of migratory birds, their eggs, and parts except when specifically permitted. In addition, bald and golden eagles are protected pursuant to the Bald and Golden Eagle Protection Act under 16 U.S. Code 668-668(d), which prohibits the take and disturbance of individual eagles, their nests, eggs, or parts. On January 8, 2021, USFWS issued a final rule codifying the 2017 Department of Interior Solicitor's Office Opinion M-37050 to provide a uniform approach that incidental take of birds resulting from an activity is not prohibited when the underlying purpose of that activity is not to take birds (86 Federal Register [FR] 1134). However, as of December 3, 2021, the USFWS has reverted to the 2017 interpretation of the MBTA, which prohibits intentional "take."

3.0 Approach/Methods

3.1 Summary of Consultation

TRC, on the behalf of CCR, conducted initial consultation with WDFW before field surveys were begun to determine potential concerns regarding habitat, habitat connectivity, and wildlife, and to request agency input and review of study plans. Following a virtual meeting with Yakima

County, Washington State Department of Transportation (WSDOT), and WDFW on December 8, 2020, comments were received from Michael Ritter, Wildlife Area Habitat Biologist for the WDFW, including pre-Project assessment approach and guidance on wildlife survey methodology (Appendix A).

A follow-up call with Michael Ritter and Scott Downes (WDFW Wildlife Area Habitat Biologist) occurred on January 5, 2021, during which survey methodology and timing were discussed in more detail. An additional discussion, which focused on finalizing survey parameters was held on February 17, 2021. Once the Study Area was defined and selected for the Project, TRC developed a study plan outlining the proposed wildlife surveys including target species and methodology. The study plan was submitted on March 12, 2021, to Michael Ritter for preliminary feedback. Comments were received from Michael Ritter on March 15, 2021.

Several follow up calls were made to Michael Ritter between June 2021 and January 2022. TRC called to inquire about recommended management and mitigation practices, to discuss habitat and species recorded in the Study Area, and to discuss protocols for specific species surveys (Appendix A).

3.2 Desktop Review

Prior to initiating field surveys, TRC conducted a desktop review to identify sensitive species with the potential to occur in the vicinity of the Study Area and identify general habitat areas. These included federally listed, state-listed and candidate species, state PHS, state SGCN, and raptors with the potential to nest within 0.5 mile of the Study Area.

3.2.1 Federally Listed Species

During the development of the Study Plan, the USFWS Information for Planning and Consultation (IPaC) Trust Resources Report identified five species with the potential to occur in the vicinity of the Study Area (USFWS 2020; Appendix B). Final critical habitat has been designated for the gray wolf, marbled murrelet, and bull trout, and critical habitat has been proposed for the yellow-billed cuckoo. The Study Area is outside the designated and proposed critical habitats for these species.

Table 3-1 includes a summary of the species, their federal status, habitat requirements, and likelihood to occur within the Study Area based on TRC's desktop review when the Study Plan was developed. As noted above, the IPaC list and the analysis was provided in the Study Plan to WDFW for their review and concurrence. A more recent IPaC review (March 2022) of the Study Area no longer includes the gray wolf, North American wolverine, and marbled murrelet, however, the monarch butterfly (USFWS candidate) is now included (Appendix B). Surveys were not specifically conducted for the monarch butterfly; however, general habitat surveys were conducted as part of the rare plant and habitat surveys. All observed species in the Study Area were recorded as part of these surveys.

Table 3-1. Federally Listed Species with the Potential to Occur within the Study Area.

Species	Status[1]	Habitat	Potential to Occur within the Study Area
Gray wolf (*Canis lupus*)	Endangered	In the Northwest, most often found in forested areas within relatively flat topography, rolling hills, or open spaces, and tend to prefer areas far from human disturbance.	Low: may disperse through the area. No wolf packs are known to occur near the Study Area.
North American wolverine (*Gulo luscus*)	Proposed Threatened	May occur in a variety of habitats, but primarily found in boreal forests and tundra ecosystems in alpine and subalpine forest habitats. Active territories may be very large.	Very low: Study Area lacks suitable forested and high-elevation habitats.
Marbled murrelet (*Brachyramphus marmoratus*)	Threatened	In Washington, nest in mature and old-growth forests and occasionally in younger forests with residual old-growth trees. Forage in marine waters.	Very low: Study Area lacks suitable nesting or forage habitat.
Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened	Typically occur in dense stands of willows or cottonwoods associated with riparian floodplains.	Low: no suitable nesting habitat within the Study Area.
Bull Trout (*Salvelinus confluentus*)	Threatened	Occur in very cold waters, with stable stream channels, gravel substrates, diverse cover, and unblocked migration routes.	None: no perennial waters identified within the Study Area.
Monarch Butterfly (*Danaus plexippus*)	Candidate	Monarch butterflies are associated with the obligate host plant, milkweed (*Asclepias* spp.), considered widespread throughout the west and frequently found in fields and pastures and along roadsides.	Low: no milkweed species were identified in the Study Area and there are no nearby perennial waters typically associated with terrestrial monarch butterfly habitats or migration corridors.

[1] Status as of 2020 IPaC report for the gray wolf, North American wolverine, and marbled murrelet. Status as of 2022 IPaC (USFWS 2022) for the yellow-billed cuckoo, bull trout, and monarch butterfly (Appendix B).

3.2.2 Washington Sensitive Species

3.2.2.1 State-listed and Candidate Species

Based on a review of WDFW databases, State-listed threatened and endangered species, and species listed as candidates for State-listing having the potential to occur in the vicinity of the Study Area are listed in Table 3-2 (WDFW 2013; 2020a, b; 2021a). The federally listed gray wolf, marbled murrelet, and yellow-billed cuckoo are also State-listed as endangered. These species are discussed above. Table 3-1 includes a summary of the species, their federal status, habitat requirements, and likelihood to occur within the Study Area based on TRC's desktop review when the Study Plan was developed. As noted above, the IPaC list and the analysis was provided in the Study Plan to WDFW for their review and concurrence. A more recent IPaC review (March 2022) of the Study Area.

According to the WDFW PHS Report, several State-listed and candidate species have been previously recorded in the vicinity of the Study Area and analyzed in detail below.

Greater Sage-grouse

Greater sage-grouse are sagebrush obligate species that require large, intact areas of shrub-steppe habitat dominated by sagebrush with a diverse herbaceous understory, and springs or wet areas nearby that support green vegetation in late summer.

Several occurrences, including areas identified as breeding areas for greater sage-grouse are recorded approximately four miles to the northwest of the Study Area. In addition, species occurrences have been documented approximately 2.5 miles north of the Study Area (T13N, R23E), at the nearest point (Appendix C). The exact locations of these occurrences are not provided due to this species' sensitive status. Although these occurrences are nearby, greater sage-grouse is unlikely to use the Study Area itself as the Study Area lacks large stands of suitable unconverted shrub-steppe habitat.

Ferruginous Hawk

Ferruginous hawks can be found in open, arid grasslands or shrub-steppe habitats with an abundance of prey species for foraging. Nesting habitat for ferruginous hawks in Washington include rock outcrops on the slopes of steep hillsides, cliffs, canyons, or in isolated trees. They are also known to build upon the remains of existing hawk or raven nests.

The WDFW PHS report identifies several Townships in the area surrounding the Study Area (T11N, R22E; T11N, R23E; T12N, R24E; and T12N, R23E) as ferruginous hawks or their habitat occurrences, the closest of which is located approximately 0.5 mile to the north of the Study Area. Because of this species' sensitive status, the exact locations of these occurrences are not provided (Appendix C). In addition, the eBird website notes several occurrences of ferruginous hawks within several miles of the Study Area, the closest of which was seen about 0.3 mile south from SR-24, associated with the Black Rock Valley hotspot (eBird 2021b). eBird is a collaborative enterprise with hundreds of partner organizations, thousands of regional experts, and hundreds of thousands of users—both professional and non-professional birders. Sightings reported by users to eBird are managed by the Cornell Lab of Ornithology.

Burrowing Owl

Burrowing owls occur in open grassland and shrub-steppe habitats and nest in abandoned mammal burrows previously excavated by species such as ground squirrels, badgers, and marmots. They generally exhibit high site fidelity, returning to the same or nearby burrows year after year (Rich 1984; Feeney 1992). Burrowing owls do appear to be attracted to agricultural areas, likely due to an abundance of prey species, however, the rates of natal recruitment (the return of an individual to its place of birth to breed) and adults returning to agriculture areas are lower, suggesting that agricultural areas may constitute a population sink (WDFW 2021b).

Table 3-2. State-listed, Candidate, and Priority Habitat Species with the Potential to Occur in the Study Area

Species[1, 2]	Status[2]	Habitat	Potential to Occur within the Study Area
American badger (*Taxidea taxus*)	SGCN	Occurs in grasslands, shrub-steppe, desert, dry forests, parklands, and agricultural areas, and require soils that allow the excavation of den sites and support burrowing prey species (such as ground squirrels).	Moderate to high: the Study Area contains suitable habitat for badgers, and the number of burrows observed during earlier surveys may indicate an adequate amount of prey species that could support badgers.
Black-tailed jackrabbit (*Lepus californicus*)	Candidate, SGCN, PHS	Occurs in areas of sagebrush and rabbitbrush, as well as areas of mixed grassland and shrub. Tend to prefer areas with greater concentrations of shrubs than grasses.	Moderate to high: the Study Area contains abundant grassland and areas dominated by shrub species.
Burrowing owl (*Athene cunicularia*)	Candidate, SGCN, PHS	Occurs in steppe and shrub-steppe habitat and uses abandoned mammal burrows for nesting. Habitats include open grasslands, prairie, plains, savannahs, and vacant lots near human-occupied areas.	Moderate: the Study Area contains suitable grassland and open habitat and mammal burrows have been recorded in the Study Area. The closest recorded breeding area is ~0.3 mile east of the Study Area.
Ferruginous hawk (*Buteo regalis*)	Threatened, SGCN, PHS	Prefers open habitats with short vegetation that provides abundant prey. Nests on small rock outcrops on steep hills, canyons, or in isolated trees.	Low for nesting, moderate for foraging: the Study Area may provide adequate open terrain for foraging, but does not contain rock outcrops, cliffs, or trees suitable for nesting. The species and habitat have been recorded north of the Study Area.

Species[1, 2]	Status[2]	Habitat	Potential to Occur within the Study Area
Golden eagle (*Aguila chrysaetos*)	Candidate, SGCN, PHS	Found primarily in dry, open forests of eastern Washington, as well as shrub-steppe, canyonlands, and high-elevation areas. Nests are typically situated on cliff ledges, rock outcrops, large trees, and human-made structures.	Low: may forage in shrub-steppe habitats. The Study Area lacks suitable rock outcrops or cliffs to support nesting eagles.
Greater-sage grouse (*Centrocercus urophasianus*)	Threatened, SGCN, PHS	Requires large areas of shrub-steppe habitat dominated by sagebrush. Wintering grouse may use degraded habitat lacking the grasses and forbs necessary for nesting and brooding.	Low: the Study Area lacks suitable, undisturbed habitat; however, the species has been recorded in the vicinity.
Loggerhead shrike (*Lanius ludovicianus*)	Candidate, SGCN, PHS	Breeds and forages in open areas, including shrub-steppe and grassland habitats with scattered tall shrubs or fence posts. Generally, nests in dense, thorny trees or shrubs.	Moderate: the Study Area contains shrub-steppe and grassland habitats that could support this species. This species has been recorded several miles northeast of the Study Area.
Prairie falcon (*Falco mexicanus*)	PHS	Inhabits the arid environments of eastern Washington, and nests on cliffs in steppe and shrub-steppe habitats.	Moderate: the nearest recorded occurrence is approximately 0.3 mile northeast of the Study Area. The Study Area appears to contain suitable foraging habitat but does not appear to contain suitable nesting habitat for this species.
Rocky Mountain elk (*Cervus canadensis nelsoni*)	PHS	This subspecies is primarily found in the mountain ranges and shrub-steppe of eastern Washington, with small herds being established throughout the Pacific Northwest.	High: the WDFW PHS report shows the entire region surrounding the Study Area as wintering habitat for this species. Individuals and sign such as antlers and scat have been observed within the Study Area.
Sage thrasher (*Oreoscoptes montanus*)	Candidate, SGCN	Generally depends on large stands of sagebrush for breeding but has been known to use smaller fragments among agricultural fields.	Moderate: the Study Area contains fragmented sagebrush habitat.

Species[1, 2]	Status[2]	Habitat	Potential to Occur within the Study Area
Sagebrush sparrow (*Artemisiospiza nevadensis*)	Candidate, SGCN	In eastern Washington, nests in shrub-steppe habitat, and prefers areas with large expanses of unconverted shrub-steppe habitat.	Moderate: suitable shrub-steppe habitat is present to the north of the Study Area. This species has been recorded in the vicinity of the Study Area (WDFW 2020 a, b).
Townsend's ground squirrel (*Urocitellus townsendii townsendii*)	PHS	Occurs in shrub-steppe, native grasslands, pastures, orchards, vineyards, as well as in disturbed areas such as highway margins, vacant lots, or canal banks with ample soil depths to provide space for burrow construction. In Washington, they are endemic to the Columbia Basin, west of the Columbia River.	Moderate to high: the closest recorded occurrence is approximately 2.6 miles west of the Study Area, where they have been documented in regular concentrations. The Study Area contains suitable shrub-steppe habitat for this species and evidence of fossorial species' burrows.
White-tailed jackrabbit (*Lepus townsendii*)	Candidate, SGCN	Occurs in hilly areas or on plateaus, and prefers areas dominated by bunchgrasses with limited shrub cover.	Moderate to high: Study Area contains suitable hilly grassland habitat, dominated by bunchgrass.

[1] State listed species yellow-billed cuckoo is also federally listed and covered in Table 4-1.
[2] Four additional State candidate species (sagebrush lizard, striped whipsnake, Townsend's big-eared bat, and Western bumble bee) were identified as not having associated habitat within the Study Area in early-stage studies conducted in support of the Project. Therefore, they are not included in the habitat analysis for State-listed species conducted in this report. WDFW concurred with the assessment for these four species in the review of the Study Plan.
[3] Federal status is based on 2020 IPaC report for the gray wolf, North American wolverine, and marbled murrelet, and 2022 IPaC (USFWS 2022) for the yellow-billed cuckoo, bull trout, and monarch butterfly (Appendix B).

The WDFW PHS report identifies a breeding location for burrowing owls approximately one to 1.6 miles to the east of the Study Area and one recorded breeding area approximately 0.1 mile south of the Study Area. WDFW notes multiple burrows at this location (Appendix C). Several sightings of burrowing owls have also been recorded on the eBird website about 0.2 mile southwest from SR-24, associated with the Black Rock Valley hotspot (eBird 2021a).

Sagebrush Sparrow

The sagebrush sparrow is a sagebrush obligate species and is sensitive to patch size, preferring areas with large expanses of unconverted shrub-steppe, typically areas greater than 2,500 acres. Nests are built in or under big sagebrush.

Sagebrush sparrow has also been recorded in close proximity to the Study Area, the nearest of which was approximately two miles to the north of the Study Area, within the Yakima Training Center property (Appendix C). This area appears to contain large areas of unconverted shrub-steppe habitat, based on a review of aerial imagery (Google Earth Pro 2021). In contrast, the Study Area contains only fragmented stands of shrub-steppe habitat. While this species may occur in the general area, it is unlikely to inhabit or nest within the Study Area.

Other State-listed and candidate species that have been recorded in the vicinity of the Study Area and may have the potential to use the Study Area include loggerhead shrike and black-tailed jackrabbit. WDFW maps the central and northeastern portions of the Study Area as part of a shrub-steppe wildlife corridor extending from Yakima Training Center to Hanford Reservation, about eight miles to the northeast (Appendix C). Much of this corridor contains large stands of unconverted shrub-steppe habitat. However, the shrub-steppe habitat in the Study Area appears to be degraded and may be less likely to be used by these sensitive species.

3.2.2.2 Other Sensitive Species

In addition to the state-listed and candidate species described above, several other species were identified that may be sensitive to impacts from habitat loss, based on the WDFW PHS Report (Appendix C), habitat connectivity maps (WHCWG 2010 and 2011), and consultation with WDFW (Appendix A). In addition, the Yakima County Geographic Information Systems website maps the entire area as Upland Wildlife Habitat (Yakima County 2020).

PHS identified by the WDFW database include burrowing owl and golden eagle (as identified in State-listed and Candidate species above), prairie falcon (*Falco mexicanus*), Rocky Mountain elk (*Cervus canadensis nelsoni*), and Townsend's ground squirrel (*Urocitellus townsendii townsendii*). In addition to the PHS species identified, WDFW has also recommended the American badger (*Taxidea taxus*), a SGCN under the Washington SWAP (WDFW 2015), be included in the analysis (Appendix A) as the species is highly vulnerable to loss of terrestrial habitat (WHCWG 2010 and 2011). According to the WDFW PHS Report, those species previously recorded in the vicinity of the Study Area are analyzed in detail below.

Prairie falcon

Prairie falcons typically inhabit dry climates, such as arid grasslands or shrub-steppe habitats. They are known to use a wide variety of rock and cliff substrates for nesting, ranging from 400-ft basalt cliffs to escarpments that are raised only 20 feet from a sloping canyon wall. They forage on a variety of prey common to steppe and shrub-steppe habitats. The invasive grasslands and shrub-steppe areas within the Study Area could be expected to provide suitable forage habitat for prairie falcons and the numerous mammal burrows observed in previous surveys suggests the potential for an adequate prey base to support this species. Based on the desktop review, suitable rock outcrops or cliffs that could support nesting falcons do not appear to be present within the Study Area. As such, the species would not be expected to nest within the MPE. Suitable nest substrates may be present in the surrounding area.

The WDFW PHS report identifies an historic prairie falcon nest location approximately 0.3 mile northeast of the Study Area. This nest was recorded in 1988, so it may no longer be present (Appendix C). Prairie falcon sightings have also been recorded more recently (2014) from SR-24, the closest of which was approximately 0.3 mile south of the Study Area (eBird 2021c).

Rocky Mountain elk

This subspecies is primarily found in the mountain ranges and shrub-steppe of eastern Washington, with small herds being established throughout the Pacific Northwest. The Project is within Game Management Unit 372 and overlaps with the Yakima elk herd and Rattlesnake Hills sub-herd ranges. The Rattlesnake Hills sub-herd is mainly located on the Arid Lands Ecology Reserve, west of the Project, but has been observed moving onto the Yakima Training Center due to historic fires and the need for winter forage.

The WDFW PHS report shows the entire region surrounding the Study Area as wintering habitat for this species (Figure 3-1; Appendix C). Although much of the Study Area has been converted from shrub-steppe habitat for cattle grazing use, elk could be likely to use the Study Area and surrounding area to forage. Carcass Removal Data provided by WSDOT for SR-24 within one mile of the Project indicated the presence of elk in the vicinity of the MPE (WSDOT 2021) (Figure 3-2).

Townsend's ground squirrel

Townsend's ground squirrels are known to occur in shrub-steppe, native grasslands, pastures, orchards, vineyards, as well as in disturbed areas such as highway margins, vacant lots, or canal banks. In Washington, they are endemic to the Columbia Basin, west of the Columbia River. Occupied habitat must have ample soil depths to provide space for burrow construction (WDFW 2013).

According to the WDFW PHS report, the closest recorded occurrence is approximately 2.6 miles west of the Study Area, where they have been documented in regular concentrations. The Study Area contains suitable shrub-steppe habitat for this species and, given the number of burrows observed during previous surveys, this species is likely to use the Study Area.

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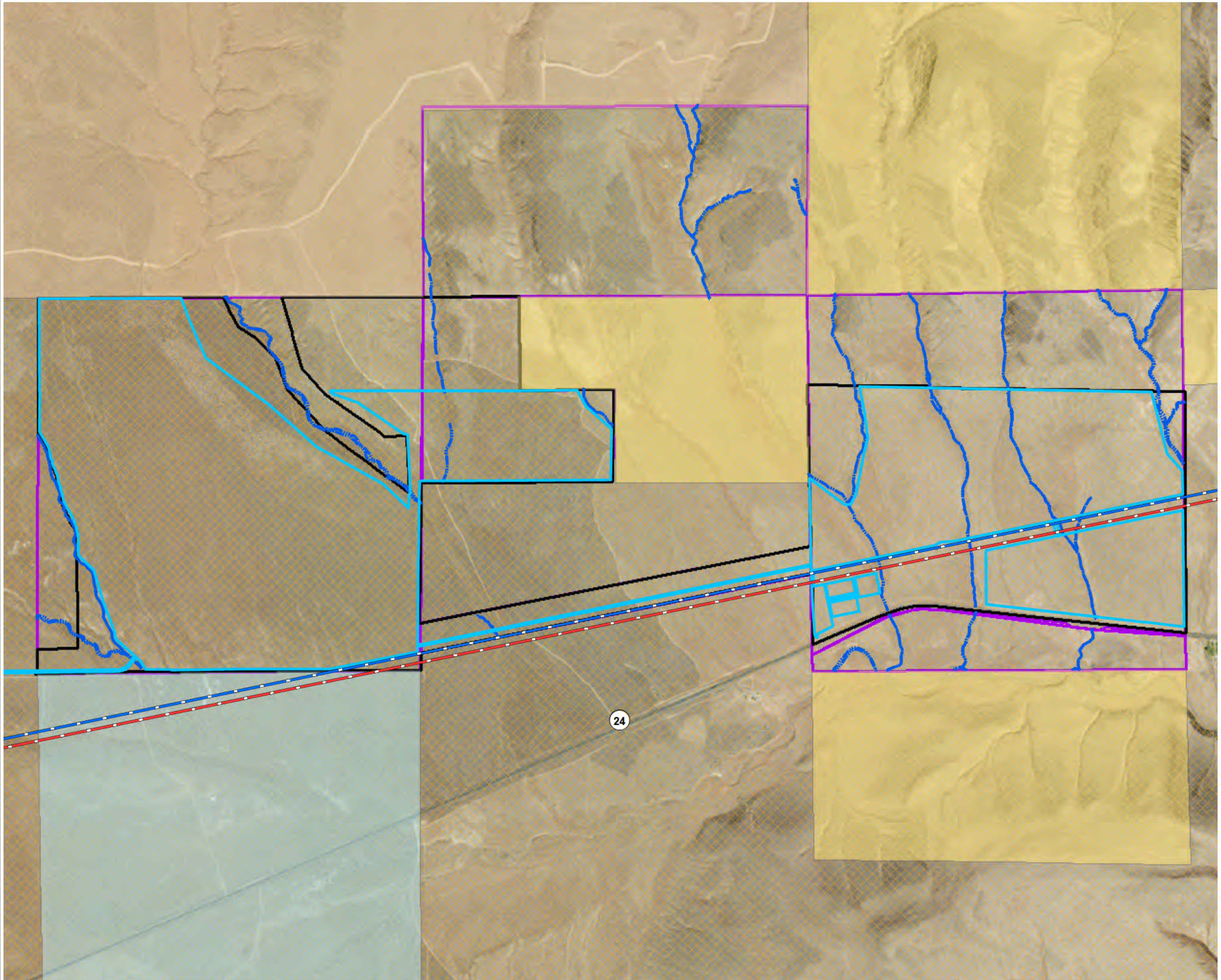

LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- Elk Wintering Area
- Ephemeral Channel
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Bureau of Land Management
- U.S. Dept. of Defense-Yakima Training Center
- State Lands
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/MAXAR 2019.

0 1,000 2,000 Feet

1" = 1,333 '

1:16,000

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA ELK WINTERING AREA

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ	**FIGURE 3-1**	
APPROVED BY:	E. BERGQUIST		
DATE:	MARCH 2022		

TRC
11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

FILE NO.: Fig 3-1 Ostrea Elk Wintering Habitat.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2022, 21:31:35 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 3-1 Ostrea Elk Wintering Habitat.mxd

Figure 3-2. Wildlife Observations

Confidential – Not for Public Distribution

3.2.3 Migratory Birds

According to the USFWS Birds of Conservation Concern (BCC) lists, 34 bird species (Table 3-3) have the potential to occur as migratory species in Bird Conservation Region 9, Great Basin, which intersects the MPE (USFWS 2021).

Table 3-3. Birds of Conservation Concern for Bird Conservation Region 9

Common Name	Scientific Name
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*
Black Swift	*Cypseloides niger*
Calliope Hummingbird	*Selasphorus calliope*
Rufous Hummingbird	*Selasphorus rufus*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Yellow Rail	*Coturnicops noveboracensis*
American Avocet	*Recurvirostra americana*
Snowy Plover (Interior/Gulf Coast)	*Charadrius nivosus*
Marbled Godwit	*Limosa fedoa*
Red Knot (Pacific)	*Calidris canutus roselaari*
Pectoral Sandpiper	*Calidris melanotos*
Lesser Yellowlegs	*Tringa flavipes*
Willet	*Tringa semipalmata*
Franklin's Gull	*Leucophaeus pipixcan*
California Gull	*Larus californicus*
Black Tern	*Chlidonias niger surinamensis*
Forster's Tern	*Sterna forsteri*
American White Pelican	*Pelecanus erythrorhynchos*
Northern Harrier	*Circus hudsonius*
Flammulated Owl	*Psiloscops flammeolus*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
Lewis's Woodpecker	*Melanerpes lewis*
Olive-sided Flycatcher	*Contopus cooperi*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Bendire's Thrasher	*Toxostoma bendirei*
Sage Thrasher	*Oreoscoptes montanus*
Evening Grosbeak	*Coccothraustes vespertinus*
Black Rosy-Finch	*Leucosticte atrata*
Cassin's Finch	*Haemorhous cassinii*
Cassia Crossbill	*Loxia sinesciuris*
Bobolink	*Dolichonyx oryzivorus*
Virginia's Warbler	*Leiothlypis virginiae*

Source: USFWS 2021

During review of the Study Plan, WDFW requested that long-billed curlew be included as part of the Study Plan (Appendix A). In addition, the long-billed curlew was identified by the USFWS 2020 IPaC report as potentially occurring within the Study Area (USFWS 2020; Appendix B). They breed primarily in the Columbia Basin, using a variety of native and non-native grasslands, pasture lands, and croplands for nesting. The primary breeding season for this species typically ranges from early April to late June (Fellows and Jones 2009). Thus, suitable breeding habitat appears to be present within the Study Area. Recent updates to the USFWS BCC lists (USFWS 2021) no longer include the long-billed curlew as a BCC species within the Bird Conservation Region 9, Great Basin (Table 3-3).

3.2.3.1 Nesting Raptors

Prior to conducting field surveys, TRC obtained the locations of known raptor nests within 0.5 miles of the Study Area from publicly available sources including the WDFW PHS report (Appendix C) and eBird website (eBird 2021a, b, c). As discussed above in Section 4.3.2.1, State-listed and Candidate Species, the WDFW PHS report identifies a breeding location for burrowing owls approximately 0.1 mile south of the Study Area, an occurrence of ferruginous hawks or their habitat approximately 0.5 mile to the north, and a historic prairie falcon nest location approximately 0.3 mile northeast of the Study Area.

3.2.4 Wildlife Habitat Mapping

TRC used aerial imagery, publicly available landcover data, Wildlife Habitat Connectivity Statewide Analysis, Columbia Plateau Ecoregion Analysis, Arid Lands Initiative Conservation Priorities, and WDFW priority habitat information to create a draft map of the general habitat types in the Study Area. General habitat types in the Study Area were identified and named to be consistent with those used by the WDFW and described in the WDFW Wind Power Guidelines (WDFW 2009).

The WDFW Wind Power Guidelines list grassland, shrub, and forested habitat types in eastern and western Washington as well as "common habitats" to eastern and western Washington. The document includes general descriptions for each habitat type. Each of the habitat types are assigned a habitat classification (Class I, II, III, and IV). Mitigation requirements in the Wind Power Guidelines are described by Habitat Classification (WDFW 2009). However, the Wind Power Guidelines and mitigation requirements do not take into account the quality of habitat present. Habitat quality can be impacted by fragmentation, historic and current disturbances, wildlife fire, climate conditions, noxious weed presence, and other stressors.

Wildlife connectivity analysis will be conducted in the Spring of 2022 and included as an addendum to the Wildlife Report.

3.3 Field Surveys

A team of two TRC field biologists conducted two field surveys, one from April 13 to April 16, 2021, and another from May 14 to May 16, 2021. Surveys were spaced one month apart to account for variation in seasonal activity. No surveys were conducted when wind speeds exceeded 25 kilometers per hour (15.5 miles per hour) (Beaufort scale of approximately four or less) to increase species detectability.

During the April and May 2021 field surveys, TRC biologists Nathalie Denis and Alan Plumeau walked parallel transects spaced approximately 60 meters apart for a survey coverage of 30 meters on either side of each biologist. Transects were oriented east to west, to parallel the topographic features. All survey transects were tracked using Global Positioning Systems to ensure adequate survey coverage. If a sensitive species, signs of recent sensitive species activity, or potential or active burrows were observed, biologists recorded the location, number of individuals, behaviors observed, and other relevant details. During the surveys, biologists walked at a similar pace to ensure no gaps in coverage, listened for wildlife calls, and scanned the ground for burrows and other signs of wildlife activity. Field biologists communicated findings via cell phones to avoid duplication of data. When wildlife species were observed or heard, or if potential or occupied burrows were observed, the surveyor would alert the other biologist and then listen and visually scan the area for additional signs of activity. The wildlife species observed during surveys were recorded (Appendix D).

3.3.1 Fossorial Species

Sensitive species with the potential to occur in the Study Area that inhabit underground burrows or tunnels include the American badger (SGCN), burrowing owl (State candidate for listing), and Townsend's ground squirrel (PHS; Table 3-2). During the surveys, biologists recorded observations of all potential and occupied burrows. Potential for use by these species was determined by the size and condition of the burrow entrance. Occupancy of burrows was determined by an observation of an individual near a burrow, or of signs of recent activity in or near the burrow entrance. When an occupied burrow was recorded, biologists searched the surrounding area for other occupied burrows by walking concentric circles around the burrow in predefined distances determined by species.

Badgers may occur in grasslands, shrub-steppe, desert, dry forests, parklands, and agricultural areas, and require soils that allow the excavation of den sites and support fossorial prey species (such as ground squirrels). Burrows excavated by badgers may be used by burrowing owls or other mammal species. The current distribution of this species in the state includes portions of eastern Washington from the eastern Cascade foothills to the Idaho border. Potential badger burrows were defined as those with an entrance measuring greater than seven inches in diameter with greater than 50 percent of the opening clear, but no signs of recent activity within or adjacent to the burrow entrance (Finger et al. 2007). Occupied badger burrows were those meeting the size criteria and with signs of recent activity, such as scat or tracks near the burrow entrance, or if an individual was seen nearby.

Potential burrowing owl burrows were those with clear entrances and openings at least four inches in diameter. An active or "occupied burrow" was defined for burrowing owl as having at least one observation, or alternatively, molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance (California Burrowing Owl Consortium 1993). A burrow was determined to be an active nest site if juveniles were observed, if one or more owls were observed outside at a burrow twice, at least one month apart, or if an adult was observed near a burrow that had signs of recent activity.

Potential Townsend's ground squirrel burrows were those freshly dug with a clear entrance (no vegetation or dense cobwebs), structurally sound but with no other Townsend's ground squirrel signs (scat, visual, audio) observed, and a diameter of at least 2.25 inches, This diameter is based on the size of Washington ground squirrel burrows (Goodman 2003), which are similar to those of Townsend's ground squirrels, but are not known to occur in Yakima County (WDFW 2021c). Small (greater than 2.25 inches) to large open burrows were considered potential Townsend's ground squirrel burrows. A Townsend's ground squirrel colony is defined as "active" when Townsend's ground squirrel activity is confirmed through visual detection of a squirrel, audio confirmations (hearing alarm or social calls), and/or fresh scat near burrows. Goodman (2003) describes the size of a Washington ground squirrel burrow to be approximately 2¼-2¾ inches, which is applicable to the Townsend's ground squirrel burrow. However, the species is also known to occupy badger burrows and pocket gopher tunnels as well. Hence, any burrow ≥2¼ inches in diameter was considered active if ground squirrel droppings or signs were present in the burrow or around the entrance (Finger et al. 2007).

3.3.2 Raptor Nest Survey

TRC conducted a pedestrian survey of the Study Area and a 0.5-mile buffer for nesting raptors during the breeding season (April 16, 2021) to assess nesting activity and to determine if nest buffers may need to be implemented during construction. Biologists searched for nests by walking the Study Area and using binoculars to search for nests in areas containing suitable habitat. Biologists also searched from a vehicle on access roads and SR-24 using a spotting scope and binoculars. Because access is prohibited within the Yakima Training Center, located immediately to the north of the Study Area, the portions of the 0.5-mile buffer where access was not possible were surveyed from accessible vantage points using a spotting scope and binoculars.

Field biologists noted the locations of all raptors observed to determine if a territory may be occupied. If a nest was observed, its condition (e.g., poor, fair, good, excellent), substrate (e.g., tree, manmade structure, ridgetop, rock outcrop), and location would be recorded, and each nest photographed. Territories were considered occupied if biologists observed individuals in the vicinity of a nest site or known breeding area, fresh lining material in a nest, a recent and well-used perch site near a nest, or fresh excrement near a nest. Alternatively, in areas where nests may not be visible (e.g., Yakima Training Center), multiple observations of a raptor species could indicate occupancy of a territory and the potential presence of a nest nearby. A nest was considered active if biologists observed any of the following: adults defending a territory, courtship displays, nest-building, incubating or brooding behavior, or if the presence of eggs or young on the nest could be detected.

If a nest was observed, biologists used the following procedures to minimize the potential adverse effects to nesting raptors (Call 1978; Grier and Fyfe 1987):

- Nests were approached with caution and relevant information was determined from a distance with binoculars and/or a spotting scope.
- If necessary, to approach a nest, this was done tangentially and in an obvious manner to avoid disturbance to raptors to the extent possible.
- Nests were not approached during adverse weather conditions (extreme temperatures, high winds, or precipitation events).
- Visits were kept as brief as possible and the number of visits to the vicinity of each nest were kept to a minimum.

Surveys for nesting burrowing owls were conducted as described in Section 4.4.1, Fossorial Species, above.

3.3.3 Wildlife Habitat Mapping

Based on the initial wildlife map created during the desktop review, TRC field-verified habitats identified during the rare plant and wildlife surveys in the 2021 field season. Habitat types were identified based on dominant vegetation present, topographic characteristics, presence of noxious weeds, and past and current disturbance impacts. Habitat quality was determined for each habitat type in terms of disturbance including fragmentation, noxious weeds, grazing, drought, and other stressors. Available historic wildfires data in the area were used to assist in evaluation of the wildlife habitat types in the Study Area. Sagebrush shrub-steppe habitat was evaluated in the field for structural components including shrub size, shrub space, percent alive and dead, biological crust, and sagebrush shrub steppe obligate species presence. From the field verified results, habitat types boundaries were updated digitally, acres of each habitat type calculated, and a habitat map developed for the Project Area.

4.0 Survey Results

The Study Area is found in the Columbia Plateau Ecoregion. The landscape in this ecoregion consists of expansive sagebrush covering plains and valleys, with isolated mountain ranges and river systems (Clarke and Bryce 1997). The Study Area is located on a south-facing slope of an anticline. Numerous ravines and gullies are located across the south facing slope; ravines found on higher and steeper portions of the anticline are reduced to gullies on lower slopes. Much of the alluvium at the toe of the slope may have originated from mass wasting events that long-ago created the ravines high on the slope (Foxworthy 1962). Elevations within the Study Area range from 1,340 to 1,960 feet.

The climate in the Study Area and surrounding region consists of cool dry summers (average high 88 degrees Fahrenheit [°F]) and mild, wet, and cloudy winters (average low of 21 °F) with the wettest months being December and January. The local area is currently experiencing extreme drought. In July 2021, a drought emergency was declared for most of the watersheds in Washington including those in Yakima County.

Soils are derived from deposition of material resulting from erosion of the nearby McCullough Range. The soils in the Study Area are predominantly mixed alluviums ranging from gravelly sandy loam to stony sandy loam. Ephemeral discontinuous channels and erosional features are found throughout the Study Area.

The Study Area is currently active rangeland. Historic land use based on aerial photographs shows portions of the Study Area appearing to be used for agricultural purposes. Ephemeral discontinuous channels and erosional features are found throughout the Study Area.

4.1 Federally Listed Species

No federally listed species were observed during the surveys.

4.2 Washington State Sensitive Species

4.2.1 State-listed and Candidate Species

During the field surveys, elk scat and tracks were observed within the Study Area and individuals were observed adjacent to the Study Area (Figure 3-2). WDFW (2020b) considers the Study Area and surrounding region year-round and wintering habitat for elk, with approximately 130 individuals associated with the Department of Energy’s Arid Lands Ecology Reserve (Appendix C).

No other state-listed, candidate, PHS species, or SGCN were observed during the field surveys. Scat that resembled jackrabbit excrement was observed but could not be confirmed because no individuals or other signs were seen during the surveys.

4.2.1.1 *Sensitive Raptor Species*

Burrowing Owl

No burrowing owls were observed during the field surveys. Many medium (greater than four inches) to large (six to 12 inches) burrows were observed throughout the Study Area, with many of them appearing inactive (i.e., burrows had collapsed, or openings were blocked by debris, dense cobwebs, or grass). [redacted] These burrows had feathers, excrement, and/or cast pellets at the burrow entrance. However, the burrow openings were partially cluttered with debris, and one of them was partly collapsed. As such, it is assumed that these burrows were likely abandoned earlier in the spring.

Ferruginous Hawk

No individual ferruginous hawks were observed during the surveys. Based on field surveys, the Study Area appears to contain suitable foraging habitat and a prey base that includes small mammals such as ground squirrels, rabbits, hares, and gophers for this species but would not be expected to provide suitable habitat for nesting. Suitable nesting habitat for this species appears to be limited within the Study Area, as it does not appear to contain suitable rock outcrops, canyons, cliffs, or trees that could be used for nests. However, suitable nest substrate may be present in the surrounding area.

Prairie falcon

No individual prairie falcons were observed during the surveys. Based on field surveys, the Study Area appears to contain suitable foraging habitat and a prey base that includes small mammals such as ground squirrels, birds, and insects for this species but would not be expected to provide suitable habitat for nesting. However, suitable rock outcrops or cliffs that could support nesting falcons do not appear to be present within the Study Area. As such, the species would not be expected to nest onsite. Suitable nest substrates may be present in the surrounding area.

4.2.1.2 Fossorial Species

Biologists observed at least one very old burrow and/or recently active burrow within nearly every transect, including many inactive burrows of suitable size for badgers, burrowing owls, and Townsend's ground squirrels. [redacted] The same potential burrows for badgers, burrowing owls, and Townsend's ground squirrels that were identified and recorded during the April surveys were re-checked for changes or recent signs of activity in May. None of the previously recorded potential species changed to an occupied or active status (Figure 4-1). One very large burrow (greater than 12 inches) was observed with canine scat near the entrance, which could be indicative of a potential coyote den [redacted]

However, no badgers, burrowing owls, or Townsend's ground squirrels were observed during the field surveys.

4.2.1.3 Raptor Nests

The entire Study Area and 0.5-mile buffer was surveyed for nesting raptors during the April 16, 2021, field visit. No raptor nests were recorded within the Study Area or within 0.5 mile of the Study Area (Figure 4-1). Therefore, a second raptor nest survey was not conducted during the May field survey. Red-tailed hawks were observed flying above the Study Area but were not seen in regular concentration in any particular portion of the Study Area. No cliffs or other suitable nesting substrates for the sensitive raptor species described above are located within 0.5 mile of the Study Area.

One active common raven nest was recorded [redacted] lthough the common raven is not a raptor species, this nest could be used by a raptor if it is left in place after fledging.

4.2.2 Migratory Birds

Based on field surveys of the Study Area, suitable foraging and nesting habitat for migratory birds protected under the MBTA, including the long-billed curlew, exists within the MPE.

During the April 2021 surveys, TRC biologists recorded observations of brown-headed cowbird (*Molothrus ater*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), killdeer (*Charadrius vociferus*), northern harrier, red-tailed hawk (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsoni*), white-crowned sparrow (*Zonotrichia leucophrys*) and western meadowlark (*Sturnella neglecta*). None of these migratory bird species are federally listed under the ESA or considered state-listed or candidate species, or PHS according to the WDFW.

During the May 2021 surveys, biologists also recorded observations of brown-headed cowbird, common raven, horned lark, killdeer, northern harrier, red-tailed hawk, swallow species (bank and/or northern rough-wing swallows), and western meadowlark. Other avian species identified during the May surveys included American pipit (*Anthus rubescens*), barn swallow (*Hirundo rustica*), Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird (*Agelaius phoeniceus*), sharp-shinned hawk (*Accipter striatus*), and vaux swift (*Chaetura vauxi*). None of these species are federally listed or state-listed as threatened, endangered, or candidate species. None of these migratory bird species are federally listed under the ESA or considered state-listed or candidate species, or PHS according to the WDFW.

4.2.3 Other Wildlife

Other wildlife or wildlife sign observed within the Study Area during the field surveys included probable Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) scat, two coyotes (*Canis latrans*) observed [redacted], and one snake species, the western yellow-bellied racer (*Coluber constrictor mormon*), observed [redacted].

The full list of wildlife species observed during the field surveys is included in Appendix D.

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Figure 4-1 Wildlife Survey Results

Confidential – Not for Public Distribution

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4.3 Habitats in the Study Area

Four habitats were identified in the Study Area: cheatgrass dominated pasture and mixed environs, crested wheatgrass dominated pasture and mixed environs, shrub-steppe, and disturbed/reclaimed. Wetland delineation surveys identified several ephemeral channels in the Study Area (See Application for Site Certification, Attachment D). The acreage of each habitat type and the delineated ephemeral channels in the Study Area are listed in Table 4-1. Figure 4-2 shows the three habitat types and ephemeral channels identified within the Study Area. The dominant habitat in the Study Area is the shrub-steppe (36 percent). Each habitat type is described below. Representative photographs of each habitat type are included in Appendix E.

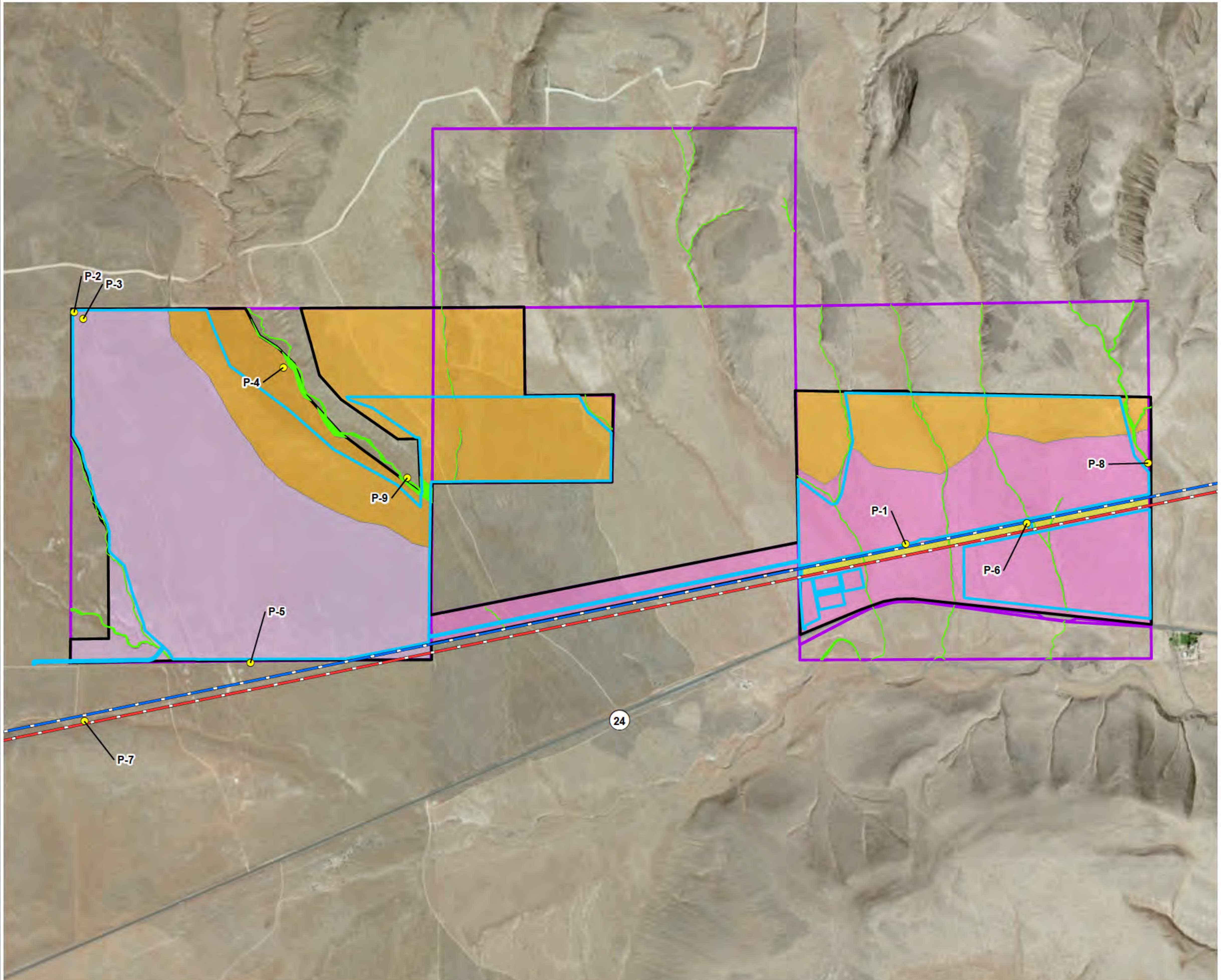
Table 4-1. Habitat Types Identified in the Study Area

Habitat Types	Acres in the Study Area	Percent of the Study Area
Cheatgrass dominated pasture and mixed environs	391.5	34
Shrub-steppe	398.2	36
Disturbed/Reclaimed	12.7	1
Crested wheatgrass dominated pasture and mixed environs	318.3	29
Ephemeral Channels	2.3	<1
Total	1,123	100

Shrub-steppe

The shrub-steppe habitat type was the dominant habitat type in the Study Area (36 percent). This habitat type was located found on the hillsides and along the wider ephemeral channels in the northern portion of the Study Area. The boundaries for this habitat type were based on the boundary of the plowed areas mapped as pasture and mixed environs and the presence of native forbs and grasses. In portions of the shrub-steppe community in the three isolated northern parcels, cryptobiotic crusts were present which were used in delineating habitat boundaries.

The shrub-steppe habitat had a higher cover of native grass, forb, and shrub species than the rest of the Study Area. Dominant native species observed included Indian ricegrass (*Oryzopsis hymenoides*), needle and thread (*Hesperostipa comata*), Sandberg bluegrass (*Poa secunda*), green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush (*Artemisia tridentata*), phlox longifolia (*Phlox longifolia*), Carey’s balsamroot (*Balsamorrhiza careyana*), and slender hawksbeard (*Crepis atribarba*).



LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- Photograph Location
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Cheatgrass Dominated Pasture and Mixed Environs
- Crested Wheatgrass Dominated Pasture and Mixed Environs
- Disturbed/Reclaimed
- Ephemeral Channel
- Shrub-steppe
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/ MAXAR 2019.

0 1,000 2,000 Feet

1" = 1,417 '
1:17,000

PROJECT: CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE: **HABITAT TYPES PRESENT IN THE OSTREA STUDY AREA**

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ		
APPROVED BY:	E. BERGQUIST	**FIGURE 4-2**	
DATE:	MARCH 2022		

TRC
11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

FILE NO.: Fig 4-2 Ostrea Habitats Wildlife.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2022, 21:37:54 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 4-2 Ostrea Habitats Wildlife.mxd

Disturbances in the shrub-steppe habitat type include cattle grazing, wildfire, and the establishment of invasive and noxious weed species. Cattle were observed in the Study Area during field surveys. The percent cover of non-native invasive species was high. Many of the non-native species are "increaser" species, species that increase in cover in reaction to grazing pressure. Dominant non-native species included cheatgrass, blue mustard, and bindweed (*Convolvulus arvensis*). Portions of the shrub-steppe community in the northern portion of the Study Area were burned in the 1987 Lambing fire and the entire Study Area was burned in the 2016 Range 12 fire (Northwest Coordination Center 2021a, b). There were few patches or single individuals of big sagebrush species observed in the shrub-steppe habitat. Much of the big sagebrush observed were dead or a quarter to half of the shrub was dead. Portions of the shrub-steppe community in the northern portion of the Study Area were burned in the 1987 Lambing fire and the entire Study Area was burned in the 2016 Range 12 fire (Northwest Coordination Center 2021a, b).

Based on the Wind Power Guidelines, shrub-steppe habitats are designated as Class II. The shrub-steppe habitat quality in the Study Area is moderate (398 acres), based on the connectivity with the Yakima Training Center, the surrounding disturbance areas including the former agricultural field, cattle grazing and various two-track roads, the high cover of invasive and increaser species, and the presence of cryptobiotic crusts.

Cheatgrass dominated Pasture and Mixed Environs

The cheatgrass dominated pasture and mixed environs is the second dominant habitat type (34 percent) in the Study Area. This habitat type was clearly defined by the previous indicators of cropland in the field and aerial imagery. The ground surface is uneven and has the appearance of fallow fields that have been plowed. The soil is loose and appears to have little to no soil structure. These areas are predominantly flat with slopes of one to five percent.

This area was determined to meet the WDFW Wind Power Guidelines pasture and mixed environs description due to the habitat location in flat or generally rolling terrain and its use as an unimproved pasture with predominately non-native grass and forb species present and little or no active management occurring. The dominant vegetation is weedy invasive forb and grass species including cheatgrass (*Bromus tectorum*), flixweed (*Descurainia sophia*), tumblemustard (*Sisymbrium altissimum*), and Russian thistle (*Salsola tragus*). Based the on Wind Power Guidelines, cheatgrass dominated pasture and mixed environs are designated as Class IV.

Crested wheatgrass dominated Pasture and Mixed Environs

The crested wheatgrass dominated pasture and mixed environs is the third dominant habitat type in the Study Area. The boundaries for this habitat type were based on topography and the dominance of crested wheatgrass (*Agropyron cristatum)*. This habitat type was found on the lower, flatter portions of the Project Area. This habitat type does not appear to have been plowed. Cattle grazing occurs in this area, and the transmission line and two track access roads cross through this habitat type.

Shallow vegetated swales and several ephemeral channels run northwest to southeast across this community. This area was determined to meet the WDFW Wind Power Guidelines pasture and mixed environs description due to the habitat location in flat or generally rolling terrain and its use as an unimproved pasture with predominately non-native grass and forb species present and little or no active management occurring. The dominant vegetation is crested wheatgrass, which is fairly evenly distributed across the landscape. Other common species include cheatgrass, rubber rabbitbrush (*Ericameria nauseosa*), flixweed, and Sandberg bluegrass. Based on the Wind Power Guidelines, crested wheatgrass dominated pasture and mixed environs are designated as Class IV.

Disturbed/Reclaimed

The disturbed/reclaimed vegetation community is located along the transmission line route and its associated access road. This area is dominated by crested wheatgrass, cheatgrass, flixweed, and bulbous blue grass (*Poa bulbosa*). Based on the even spacing of the crested wheatgrass in this area, it is assumed that that some of the vegetation in this area was part of the seed mix used to reclaim the transmission line right-of-way after its installation.

Ephemeral Channels

Wetland and waterbody delineation surveys were conducted in December 2018, July 2020, and May 2021 in the Project Site Control Boundary. Based on the field surveys, 18 ephemeral channels were delineated within the Project Site Control Boundary (Figure 4-2). Eleven of these channels are found in the Study Area. The channels vary in width and lack recent signs of scouring or erosion. The substrate in the ephemeral channels is gravelly loam interspersed with cobbles. Upland vegetation was observed along the channels and in some areas was found in the channels. The ephemeral channels vary in width from 0.5 foot wide at their headwaters to between three and five feet wide at the southern (downstream) end of the Study Area.

5.0 Potential Project Impacts

5.1 Summary of Survey Results

- No federal- or State-listed species were observed within or near the Study Area.
- No raptor nests were recorded within the Study Area or a 0.5-mile buffer.
- Many migratory bird species were observed during the 2021 surveys.
- Evidence of recent activity of several state-sensitive species were observed within the Study Area during the May 2021 survey. These included:
    - Signs of recent activity by Rocky Mountain elk, a state PHS, recorded throughout the Study Area, most of which occurred in the northern portions.
    - Evidence of recent activity by burrowing owl, a state candidate species, [redacted] during the April surveys. However, no changes in these burrows were noted between April and May surveys, indicating the burrows had not been used by burrowing owls between surveys.
- Many old and/or inactive burrows were noted during surveys. Numerous potential burrows that could be used by badgers, burrowing owls, or Townsend's ground squirrels, were recorded.
- A common raven's nest was identified [redacted] a raptor could use it in subsequent years.

5.2 Impacts to Wildlife Species

Based on the results of the field surveys, direct impacts to wildlife species described above as a result of the Project are expected to be minimal. No occupied burrows were identified during surveys, however, due to the number of burrows observed, it was determined that sensitive fossorial species may use the area for nesting or denning. Suitable nesting and foraging habitat for migratory birds exists within the Study Area. Nesting habitat for raptors and other sensitive avian species within the Study Area is limited. According to the California Burrowing Owl Consortium (1993), impacts to the burrowing owl and its habitat occur when there is:

1. Disturbance or harassment within 50 meters of occupied burrows.
2. Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs and debris piles that provide shelter to burrowing owls.
3. Destruction and/or degradation of foraging habitat adjacent to occupied burrows.

Vegetation removal and fencing within the MPE would temporarily and permanently displace nesting, denning, foraging, and migrating wildlife with the potential to occur in the MPE. If construction activities were to occur during the primary nesting season for migratory birds (April 1 through August 31) and breeding season for fossorial species, impacts could include direct loss of individuals, nests, eggs, and young. Impacts to big game species include loss of foraging habitat and the interruption of migration routes through the MPE.

5.3 Impacts to Priority Habitats

Much of the Study Area has been converted from native shrub-steppe habitat to invaded grassland, with evidence of agricultural use and plowing occurring historically and current grazing use. Approximately, 398 acres of moderate quality shrub-steppe habitat is located in the Study Area. Approximately 231 acres of shrub-steppe habitat will be located in the MPE. The shrub-steppe habitat is considered a Washington Priority Habitat.

6.0 Mitigation Measures

Consultation with the WDFW is ongoing regarding the development of mitigation measures to avoid impacts to wildlife species.

The following avoidance and mitigation measures have been developed to ensure that significant impacts to wildlife resources are avoided during Project implementation:

- **WL-1**: Avoidance measures include 1) siting facilities predominantly on the previously plowed and disturbed areas of the MPE, wherever possible, 2) siting the substation adjacent to the interconnecting transmission line for both Projects, 3) leaving the majority of the ephemeral channels unfenced which will provide corridors for wildlife movement and wildlife connectivity function, and 4) minimizing disturbance in the ephemeral channels in the MPE crossed by permanent and temporary access roads.
- **WL-2**: Mitigation measures to avoid impacts to nesting migratory birds, including burrowing owls, and fossorial species if required by an agency, will be developed in consultation with the WDFW and EFSEC. Details regarding the implementation of mitigation measures for impacts to the active nests and burrows if any will be identified prior to construction within the MPE.
- **WL-3**: Minimization measures include:
  - Siting facilities predominantly on the previously plowed and disturbed areas of the MPE, wherever possible.

- Implement the Vegetation Management Plan, which will include noxious weed control measures to limit further spread of noxious weeds in the MPE.

- **WL-4**: A Habitat Restoration and Mitigation Plan will be developed in consultation with WDFW and EFSEC. The Plan will detail the implementation of mitigation measures for impacts to the shrub-steppe habitat.
- **WL-5**: Best Management Practices include:
  - When necessary, downward-directed lighting will be used to minimize horizontal or skyward illumination. Unnecessary lighting like steady-burning, high intensity lights will be turned off at night to limit attraction of migratory birds and bats.
  - Where applicable, above-ground collector or transmission lines are designed and constructed to minimize avian electrocution, per the guidelines outlined in Avian Power Line Interaction Committee standards (APLIC 2012).
  - In accordance with WAC 173-60-050, construction activities will only occur between the hours of seven am and ten pm.
  - Environmental awareness training will be provided to construction and operation staff and contractors on applicable wildlife resource protection measures, including: (1) federal and state laws (e.g., those that prohibit animal collection or removal); and (2) awareness of sensitive habitats and bird species, potential bird nesting areas, and general wildlife issues.
  - Traffic speeds on unpaved roads will be limited to 25 miles per hour to minimize generation of fugitive dust and wildlife collisions.
  - Following decommissioning, reclamation shall help to reduce the likelihood of ecological resource impacts in disturbed areas.

7.0 Summary of Effects and Significant Unavoidable Impacts After Mitigation

No potentially significant unavoidable impacts are anticipated after consultation with WDFW is complete and the appropriate mitigation has been determined.

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Appendix A. Agency Consultation
Confidential - Not for Public Distribution

Appendix B. USFWS IPaC Report

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: March 01, 2022
Project Code: 2022-0014330
Project Name: Ostrea Solar Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Project Code: 2022-0014330
Event Code: None
Project Name: Ostrea Solar Project
Project Type: Power Gen - Solar
Project Description: Solar Project in Yakima County, Washington
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.54478695,-119.94373596211321,14z

Counties: Yakima County, Washington

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4488	Endangered

Birds

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: TRC
Name: Abigail Arfman
Address: 123 N College Ave Ste 206
City: Fort Collins
State: CO
Zip: 80524
Email aarfman@trccompanies.com
Phone: 9705490043

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Yakima County, Washington

Local office

Washington Fish And Wildlife Office

📞 (360) 753-9440
📠 (360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

http://www.fws.gov/wafwo/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Gray Wolf Canis lupus U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4488	Endangered
Gray Wolf Canis lupus Western Distinct Population Segment No critical habitat has been designated for this species.	Proposed Endangered
North American Wolverine Gulo gulo luscus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout Salvelinus confluentus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE.

"BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Long-billed Curlew Numenius americanus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Breeds Apr 1 to Jul 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (I)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

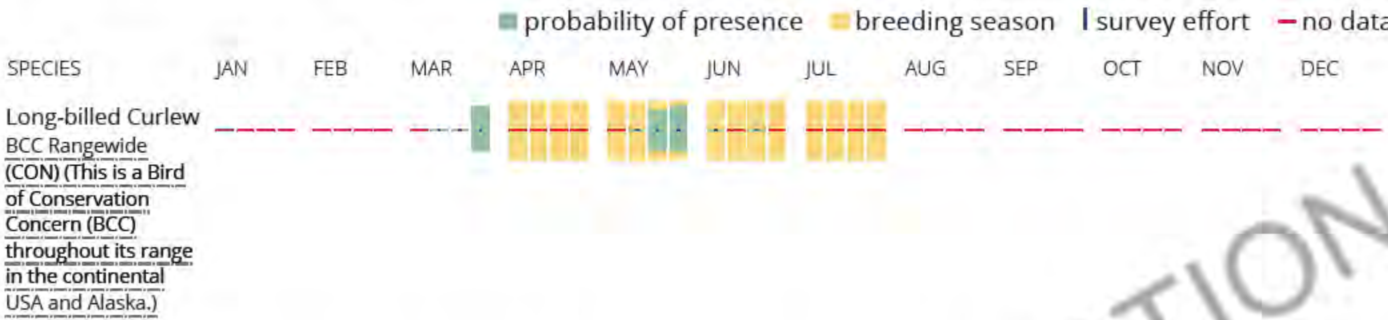
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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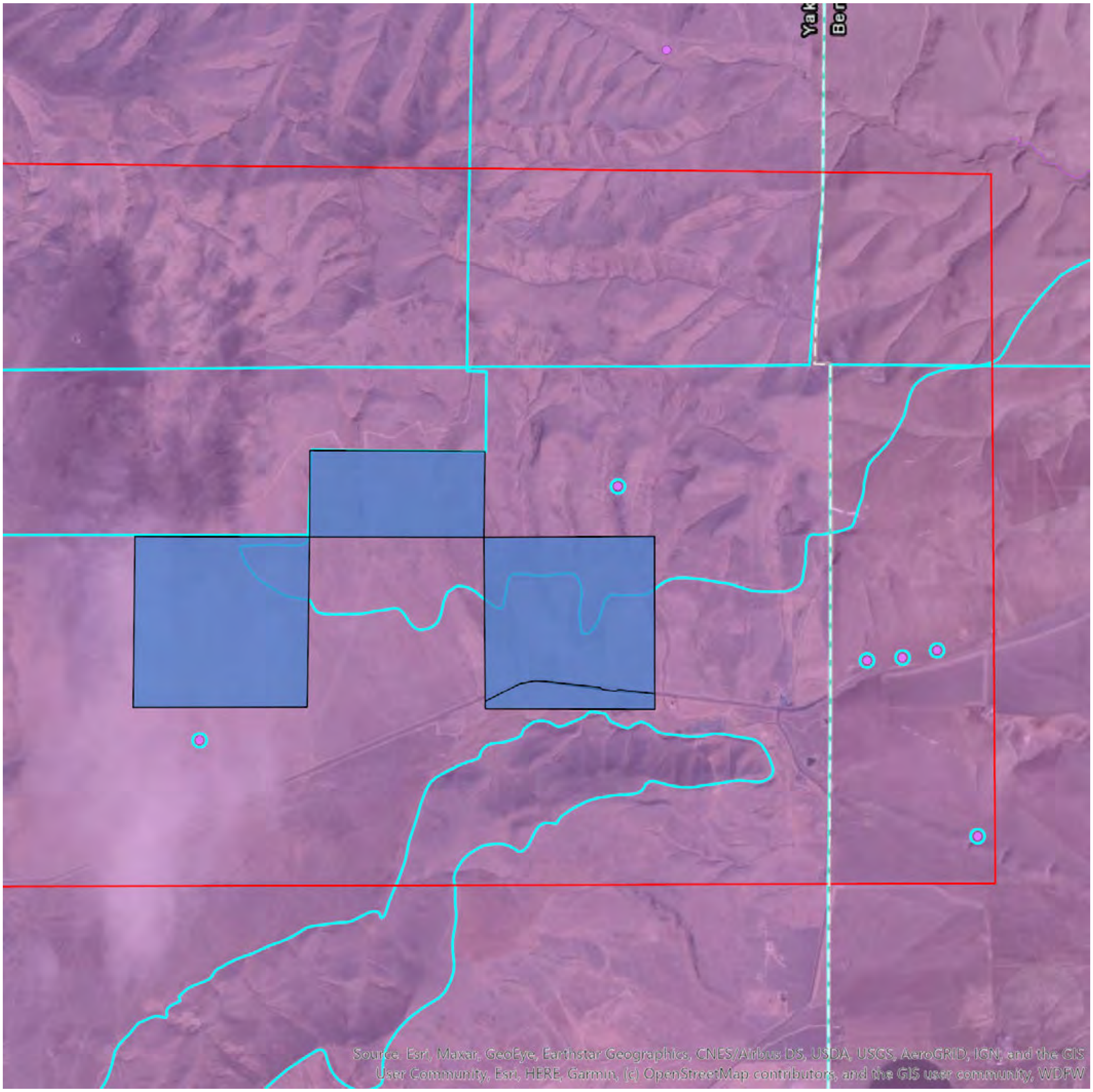
Appendix C. PHS Ostrea Report

Priority Habitats and Species on the Web



Report Date: 05/12/2021

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Generalized Location
Burrowing owl	N/A	Candidate	No
Prairie falcon	N/A	N/A	No
Shrub-steppe	N/A	N/A	No
Elk	N/A	N/A	No
Townsend's Ground Squirrel - nancyae	N/A	N/A	No
Ferruginous hawk	N/A	Threatened	Yes
Greater Sage-grouse	Fed Spp Concern	Threatened	Yes

PHS Species/Habitats Details:

Burrowing owl	
Scientific Name	*Athene cunicularia*
Priority Area	Breeding Area
Site Name	BLACK ROCK
Accuracy	GPS
Notes	MULTIPLE BURROWS
Source Record	143844
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	FIDORRA, J/WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Burrowing owl	
Scientific Name	*Athene cunicularia*
Priority Area	Breeding Area
Accuracy	1/4 mile (Quarter Section)
Notes	BURROWING OWL BURROW. ADULTS SEEN AROUND BURROW. LOCATION SHOWN ON MAP IS VERY APPROXIMATE, PER BARTELS, 2000 PG. 1612
Source Record	55029
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	BARTELS, P/WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Burrowing owl	
Scientific Name	*Athene cunicularia*
Priority Area	Breeding Area
Accuracy	1/4 mile (Quarter Section)
Notes	BURROWING OWL NEST: 2 ADULTS STANDING ON MOUND 1/2 MILE OF SILVER DOLLAR CAFE, NORTH OF HWY. NOTE: THE MAPPED LOCATION IS WRONG. SILVER DOLLAR CAFE IS AT INTERSECTION HWY 24 & HWY 241. NO IDEA IF THIS IS N, S, E, W OF CAFE.
Source Record	55198
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	BARTELS, P/WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Burrowing owl	
Scientific Name	*Athene cunicularia*
Priority Area	Breeding Area
Site Name	BARREL SPRINGS
Accuracy	GPS
Notes	MULTIPLE BURROWS
Source Record	143843
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	FIDORRA, J/WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Prairie falcon	
Scientific Name	*Falco mexicanus*
Priority Area	Breeding Area
Site Name	HORSETHIEF POINT
Accuracy	1/4 mile (Quarter Section)
Notes	PRAIRIE FALCON NSTING ON CLIFFS.
Source Record	59743
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	UNKNOWN/UNKNOWN
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Burrowing owl	
Scientific Name	*Athene cunicularia*
Priority Area	Breeding Area
Accuracy	1/4 mile (Quarter Section)
Notes	BURROWING OWL NEST: 1 ADULT AT BURROW NORTH OF HWY 24 IN PASTURE WITH CATTLE. LOCATION MAY BE VERY GENERAL.
Source Record	55201
Source Dataset	WS_OccurPoint
Source Date	WS_OccurPoint
Source Name	BARTELS, P/WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	Candidate
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Points

Shrub-steppe	
Priority Area	Terrestrial Habitat
Site Name	RATTLESNAKE HILLS
Accuracy	1/4 mile (Quarter Section)
Notes	SHRUB-STEPPE
Source Record	901434
Source Dataset	PHSREGION
Source Name	FITZNER, LISA WDW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Elk	
Scientific Name	*Cervus elaphus*
Priority Area	Regular Concentration
Site Name	RATTLESNAKE
Accuracy	1/4 mile (Quarter Section)
Notes	ELK WINTERING AREA, 130 ANIMALS ARID LANDS ECOLOGY RESERVE
Source Record	901605
Source Dataset	PHSREGION
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00614
Geometry Type	Polygons

Shrub-steppe	
Priority Area	Terrestrial Habitat
Site Name	HANFORD-TRAINING CENTER CONNECTION
Accuracy	1/4 mile (Quarter Section)
Notes	CORRIDOR BETWEEN THE HANFORD RESERVATION & YAKIMA TRAINING CENTER USED BY ELK,DEER,SAGE GROUSE,LOGGERHEAD SHRIKE, & JACK RABBIT.NATIVE SHRUB STEPPE IN GOOD TO EXCELLENT CONDITION MIXED W/CRP LANDS.STEEP ROCKY SLOPES SUPPORT NESTING FALCONS.
Source Record	901671
Source Dataset	PHSREGION
Source Name	FITZNER, LISA
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrub-steppe	
Priority Area	Terrestrial Habitat
Site Name	YAKIMA TRAINING CENTER AND VICINITY
Accuracy	1/4 mile (Quarter Section)
Notes	LARGE AREA OF SHRUB STEPPE HABITAT. SOME HIGH QUALITY INTERMIXED WITH AREAS OF FAIR AND POOR QUALITY THAT HAS BEEN IMPACTED BY LAND USE PRACTICES ON THE TRAINING CENTER.
Source Record	920175
Source Dataset	PHSREGION
Source Name	TESKE, MARK WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Townsend's Ground Squirrel - nancyae	
Scientific Name	*Urocitellus townsendii nancyae*
Priority Area	Regular Concentration
Accuracy	Map 1:12,000 <= 33 feet
Notes	DELINEATION IS NOT PRECISE
Source Record	5607
Source Dataset	WS_OccurPolygon
Source Date	WS_OccurPolygon
Source Name	BARNARD, K/UNKNOWN
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	Y
Display Resolution	AS MAPPED
Geometry Type	Polygons

Ferruginous hawk	
Scientific Name	*Buteo regalis*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	Threatened
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

Greater Sage-grouse	
Scientific Name	*Centrocercus urophasianus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	Fed Spp Concern
State Status	Threatened
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

Ferruginous hawk	
Scientific Name	*Buteo regalis*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	Threatened
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

Greater Sage-grouse	
Scientific Name	*Centrocercus urophasianus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	Fed Spp Concern
State Status	Threatened
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

Appendix D. List of Species Observed at the Ostrea Solar, LLC Project

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Wildlife Species Observed During the April 13 to April 16, 2021; and May 14 to May16, 2021 Survey at the Ostrea Solar Project, Yakima County, Washington.

Type/Species	Scientific Name	Status
Birds		
American Pipit	*Anthus rubescens*	MB
Brewers Blackbird	*Euphagus cyanocephalus*	MB
Brown-headed Cowbird	*Molothrus ater*	MB
Common Raven	*Corvus corax*	MB
Horned Lark	*Eremophila alpestris*	MB
Killdeer	*Charadrius vociferous*	MB
Northern Harrier	*Circus hudsonius*	MB/BCC
Red-tailed Hawk	*Buteo jamaicensis*	MB
Red-winged Blackbird	*Agelaius phoeniceus*	MB
Swallow species	*Hirundinidae sp.*	MB
Western Meadowlark	*Sturnella neglecta*	MB
White-crowned Sparrow	*Zonotrichia leucophrys*	MB
Mammals		
American Badger	*Taxidea taxus*	State SGCN
Coyote	*Canis latrans*	
Rocky Mountain Elk	*Cervus elaphus nelson*	PHS
Reptile		
Western Yellow-bellied Racer	*Coluber constrictor mormon*	

[1]MB = Migratory Bird; BCC = Birds of Conservation Concern; SGCN = Species of Greatest Conservation Need; PHS = Priority Habitat Species

Appendix E. Representative Photos
Confidential - Not for Public Distribution

Wetland and Waterbody Delineation Report

April 4, 2022

Ostrea Solar, LLC Project (NWS-2021-778)

Prepared for:

Cypress Creek Renewables, LLC
3402 Pico Blvd
Santa Monica, CA 90405

Prepared by:

TRC
Fort Collins, CO

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Tables

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Acronyms and Abbreviations

Notation	Definition
APN	Assessor's Parcel Number
BESS	Battery Energy Storage System
BPA	Bonneville Power Administration
CAO	Critical Areas Ordinance
CCR	Cypress Creek Renewables, LLC
CWA	Clean Water Act
Ecology	State of Washington Department of Ecology
EFSEC	State of Washington Energy Facility Site Evaluation Council
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
kV	kilovolt
MPE	Maximum Project Extent is defined as the area that contains the Project footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
O&M	Operations and Maintenance
PEM	Palustrine Emergent Wetland
Project	Ostrea Solar, LLC, Project
RCW	Revised Code of Washington
SBAS	Satellite-based Augmentation System
SDAM	Streamflow Duration Assessment Form
SR	State Route
TBD	To be determined
TRC	TRC Environmental Corporation
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WETS	Wetlands (Tables)
WOTUS	Waters of the U.S.
YCC	Yakima County Code

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted by Cypress Creek Renewables, LLC (CCR) to conduct a wetland and waterbody delineation for the proposed Ostrea Solar, LLC Project (Project) located in Yakima County, Washington.

The objective of the wetland and waterbody delineation survey was to identify the spatial extent and arrangement of wetlands, streams, and other aquatic resources within the Project. Aquatic resources that are considered Waters of the U.S. (WOTUS) are subject to regulation under Section 404 of the Clean Water Act (CWA). The wetland and waterbody delineation surveys were completed by Jay Lorenz (Senior Scientist) and Nathalie Denis (Senior Biologist) on July 1, 2020, and by Erin Bergquist (Wetland Delineator/Botanist) and Laura Giese (Wetland Delineator/Botanist) May 10 to 15, 2021.

1.1 Project Location and Description

The Project is located approximately 22 miles east of the town of Moxee in Yakima County, Washington (Figure 1). The Project is located north of Washington State Route 24 (SR-24) and south of the Yakima Training Center in Sections 3, 9, and 11, Township 12 North, Range 23 East (Figure 2). The Survey Area for the wetland and waterbody delineation surveys encompasses 1,746 acres of private land that is currently used for grazing. The Survey Area for the wetland and waterbody delineation surveys includes the following Assessor's Parcel Numbers (APN): 231203-31001, 231211-11001, 231209-11001, 231210-24001, 231210-23001, 231210-22002, 231210-31001, and 231210-41002 (Figure 2). Maximum Project Extent (MPE) is defined as the area that contains the Project footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design. The life of the Project is anticipated to be 40 years.

The Project will use solar photovoltaic panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts of alternating current solar capacity at the point of interconnection to the electric power grid. The Project will interconnect through a line tap to Bonneville Power Administration's (BPA's) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project. BPA's Moxee to Midway 115 kV transmission line connects to BPA's Moxee substation, which is approximately 23 miles west and north of the Project and BPA's shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based on the final approved design for the Project.

A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. The BESS will be located to the west of the substation.

An Operations and Maintenance (O&M) trailer and employee parking will be located just west of the Project substation. During construction, the employee parking area and the O&M trailer footprint will be used as a construction laydown yard. Access to the Project will be from SR-24 on the west side of the eastern-most parcel in the Maximum Project Extent (MPE).

1.2 Landscape Setting

The Project is located in the Columbia Plateau Ecoregion. The landscape in this ecoregion includes expansive sagebrush covering plains and valleys with isolated mountain ranges and river systems (USEPA 2010). The Project is located in the valley between Yakima Ridge and the Rattlesnake Hills (Figure 1). An unnamed ephemeral channel parallels SR-24 flowing southeast. Surface water flow in the area is from the Yakima Ridge located north of the Project to the unnamed ephemeral channel that parallels SR-24. This unnamed ephemeral channel is a fourth order tributary to the Columbia River via Dry Creek, Cold Creek, and the Yakima River.

The Survey Area is located on a south-facing slope of an anticline. Numerous ravines and gullies are located across the south-facing slope of the Survey Area. The ravines found on higher and steeper portions of the anticline are reduced to channels and upland draws on lower slopes. Much of the alluvium at the toe of the slope may have originated from mass wasting events that historically created the ravines high on the slope (Foxworthy 1962). The soils within the Project Boundary are predominantly mixed alluviums ranging from gravelly sandy loam to stony sandy loam. Elevations within the Project Boundary range from 1,348 to 2,100 feet.

The climate in the surrounding region consists of cool, dry summers, and mild, wet, and cloudy winters with the wettest months being December and January. Average temperature ranges from 36.4 degrees Fahrenheit (°F) in January to 84.6 °F in July (WRCC 2016). Average precipitation ranges from 0.25 inches in July to 1.01 inches in December (WRCC 2016). Annual average precipitation is 7.87 inches (WRCC 2016).

2.0 REGULATORY BACKGROUND

Wetlands and other WOTUS are protected under Section 404 of the CWA. Any activity that involves discharge of dredged or fill material into WOTUS is subject to regulation by the U.S. Army Corps of Engineers (USACE). WOTUS are defined to encompass navigable waterways; interstate waters; all other waters where their use, degradation, or destruction could affect interstate or foreign commerce; tributaries of any of these waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their tributaries. As of August 30, 2021, the 2015 Navigable Waters Protection Rule has been remanded. Per the USACE direction in an email from David Moore, USACE Biologist/Soil Scientist, on September 7, 2021, the 2008 Rapanos WOTUS guidance is being used to evaluate jurisdiction of wetlands and waterbodies.

Section 404 or Section 10 permits issued by the USACE under the authority of the CWA as well as all wetlands and waters identified as “waters of the state”, are subject to the Section 401 permitting program administered by the State of Washington Department of Ecology (Ecology). A separate application is required if there is no corresponding Section 404 permit. If the disturbance is more than 0.3 acre, a pre-application meeting with Ecology is required for the Section 401 permit as part of the Section 404 permitting process.

Ecology has developed the Eastern Washington State Wetland Rating System to categorize wetlands “based on specific attributes such as rarity, sensitivity to disturbance, and the functions they provide.” The rating system is used to provide a basis for developing standards for protecting and managing the wetlands including buffer distances, permitted uses in the wetland, and the amount of mitigation needed to compensate for impacts to the wetland. Wetlands are grouped into four categories based on their rarity, functions, importance in maintaining biodiversity, sensitivity to nearby disturbance, and how easy they are to replace (Table 2-1).

The Eastern Washington State Wetland Rating System classifies wetlands based on their hydrologic and geomorphic conditions (e.g., Lake Fringe Wetlands, Slope Wetlands, Riverine Wetlands, Depressional Wetlands) and their Cowardin Classification (forested class, scrub-shrub class, emergent class, or aquatic bed class).

Table 2-1. State of Washington Wetland Categories

Wetland Category	Description	Examples
Category I	Unique or rare wetland type, are more sensitive to disturbance than most wetlands, are relatively undisturbed and contain ecological attributes that are impossible or too difficult to replace within a human lifetime and provide a high level of functions. Generally, these wetlands are not common and make up a small percentage of the wetlands within Yakima County.	• Alkali wetlands; • Wetlands of high conservation value; • Bogs and calcareous fens, mature and old-growth forested wetlands with native slow growing trees, forested wetlands with stands of aspen; and • A functions rating score of 22 points or more in the Eastern Washington Wetland Rating System.
Category II	Wetlands that are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection.	• Forested wetlands in the floodplains of rivers; • Mature and old-growth forested wetlands with fast growing native trees, which include alders, cottonwoods, willows, quaking Aspen, or water birch; • Vernal pools; and • A functions rating score between 19 to 21 points in the Eastern Washington Wetland Rating System.
Category III	Wetlands that are with a moderate level of functions and can often be adequately replaced with a well-planned mitigation project.	• Vernal pools; and • A functions rating score between 16 to 18 points in the Eastern Washington Wetland Rating System.
Category IV	Wetlands that have the lowest level of functions are often heavily disturbed. These are wetlands that should be able to be replaced, and, in some cases, be improved.	

Source: Eastern Washington State Wetland Rating System

The State of Washington 1990 State Growth Management Act defines critical areas as “(a) wetlands; (b) areas with a critical recharging effect on aquifers used for potable water; (c) fish and wildlife habitat conservation areas; (d) frequently flooded areas; and (e) geologically hazardous areas. ‘Fish and wildlife habitat conservation areas’…does not include such artificial features or constructs as irrigation delivery systems, irrigation infrastructure, irrigation canals, or drainage ditches that lie within the boundaries of and are maintained by a port district or an irrigation district or company” (Revised Code of Washington (RCW) 36.70A.030). Per the Growth Management Act, each county designates critical areas and adopts development regulations conserving and protecting the designated critical areas.

Yakima County's Critical Areas Ordinance (CAO) defines hydrologically related Critical Area Features as (1) any floodway and floodplain identified as a special flood hazard area; (2) perennial and intermittent streams, excluding ephemeral streams, including the stream main channel and all secondary channels within the Ordinary High Water Mark (OHWM); (3) naturally occurring ponds under 20 acres and their submerged aquatic beds; and man-made lakes and ponds created within a stream channel; (4) wetlands; (5) flood-prone areas not included in a designated floodway and floodplain, but indicated as flood-prone (i.e., specific flood frequency, stream channel migration), by information observable in the field such as soils or geological evidence, or by materials such as flood studies, topographic surveys, photographic evidence, or other data; and (6) set distance of vegetative buffer from wetland and waterbodies as defined in the Yakima County CAO (CAO 16C.06.03). Vegetative buffer distances are set by the type of wetland or waterbody as shown in Table 2-2.

Table 2-2. Yakima County Critical Area Ordinance Vegetative Buffer Distances

Wetland/Stream Type	Buffer Width
Type 1 Shoreline streams, lakes, and ponds [Note Type 1 waterbodies are regulated by the Shoreline Master Program (YCC Title 16D)]	100’
Type 2 Streams, lakes, and ponds	100’
Type 3 Streams (Perennial), lakes, and ponds	50’
Type 4 Streams (Intermittent), lakes, and ponds	25’
Type 5 Streams (Ephemeral)	No buffer standards. Activities such as clearing, grading, dumping, filling, or activities that restrict or block flow, redirect flow to a point other than the original exit point from the property or result in the potential to deliver sediment to a drainage way/channel, are regulated under clearing and grading regulations. These drainages may also be protected under geologically hazardous area, floodplain, stormwater, building and construction, or other development regulations.
Type 1 Wetlands[a]	200’
Type 2 Wetlands[a]	100’
Type 3 Wetlands[a]	75’
Type 4 Wetlands[a]	50’

Source: Yakima County CAO (CAO 16C.06.16).
[a] Wetland type corresponds to State of Washington Wetland Rating categories.
YCC=Yakima County Code

Wetlands are ranked by their functions, values, uniqueness, and ability to be replaced or replicated. The Eastern Washington Wetland Rating System described above is used to provide a point based ranking system to assist in determining each wetlands categorization.

As part of the State of Washington Energy Facility Site Evaluation Council (EFSEC) permitting process, Yakima County will analyze if a critical area is likely to be present and whether a development proposal would impact the critical area. The decision on impacts may result in a decision of 1) no critical areas present; 2) critical areas present, but no impact; 3) critical areas may be affected by the proposal but would not require a more detailed critical area report; or 4) a more detailed critical area report is required.

3.0 METHODS

3.1 Desktop Review

Prior to conducting the wetland delineation, TRC reviewed maps and data from the following sources:

- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) digital wetland mapping (USFWS 2020);
- U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) digital waterway mapping (USGS 2020);
- U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) digital soil survey mapping (USDA NRCS 2020);
- USGS digital 7.5’ quadrangle maps (USGS 1978, 1979); and
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels for Yakima County (FEMA 2020).

In addition, TRC reviewed precipitation data from approximately 90 days prior to the field investigation using data obtained from a nearby weather station (Yakima Airport). Antecedent precipitation data were compared with the 30-year average precipitation data from the same location to determine if hydrologic conditions at the time of the 2020 and 2021 surveys were normal, wetter, or drier than normal (NOAA 2020). Historic aerial imagery of the Survey Area, ranging from 1996–2020, was also reviewed for areas exhibiting visible wetness signatures (Google Earth Pro 1996, 2003, 2004, 2005, 2006, 2009, 2011, 2013, 2015, and 2017).

3.2 Field Survey Methods

Surveys were conducted on APNs 231203-31001, 231211-11001, and 231209-11001 by Jay Lorenz (Senior Scientist) and Nathalie Denis (Survey Technician/Senior Biologist) on July 1, 2020. The survey area was expanded to include APNs 231210-24001, 231210-23001, 231210-22002, 231210-31001, and 231210-41002 in 2021. Surveys were conducted in the additional APNs by Erin Bergquist (Wetland Delineator/Botanist) and Laura Giese (Wetland Delineator/Botanist). In addition, Erin Bergquist and Laura Giese completed Streamflow Duration Assessment Forms for each delineated waterbody per the USACE guidance. Statements of qualifications for of each wetland delineator are provided below in Section 3.3.

3.2.1 Wetlands

The wetland delineation was conducted in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0* (USACE 2008), *United States Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1* (USACE 1987), and subsequent guidance documents (USACE 1991a, b; 1992).

On-site wetland determinations were made using the three criteria (vegetation, soil, and hydrology) and technical approach defined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid Region Version 2.0* (USACE 2008). According to the procedures described therein, areas that under normal circumstances reflect a predominance of hydrophytic vegetation, hydric soils, and wetland hydrology (e.g., inundated, or saturated soils) are considered wetlands. Wetland features were assigned a unique feature identification number with a “W” prefix. A Wetland Determination Data Form was completed for each wetland and its associated upland data point. Upland data points were assigned a unique feature ID number with a “U” prefix.

The geospatial boundary of each wetland was captured using tablets paired with an external Global Navigation Satellite System receiver with submeter accuracy (Juniper Geode Satellite-based Augmentation System (SBAS) <30 centimeters with real-time correction).

3.2.2 Waterbodies

Based on USACE guidance, and A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States (Lichvar and McColley 2008), delineated waterbodies were identified by the presence of bed and bank or other OHWM indicators. Common identifiable indicators of an OHWM include open water or evidence of a clear, natural line visible on the bank; shelving; changes in soil characteristics; disturbance to or lack of terrestrial vegetation; presence of litter and debris; and watermarks indicative of inundation during high water conditions. The OHWM typically represents the potential limits of USACE jurisdiction. All waterbody features were assigned a unique feature ID number with an “S” prefix. Per the USACE guidance in an email from David Moore, USACE Biologist/Soil Scientist, on September 7, 2021, a Streamflow Duration Assessment Form (SDAM) was completed for each delineated waterbody feature. Methodology for completing the SDAM forms followed the Streamflow Duration Assessment Method for the Pacific Northwest Manual (Nadeau 2015).

For NWI/NHD stream features where OHWM indicators were absent, photo points were recorded and a representative photo was taken. These areas were classified as uplands.

The geospatial boundary of each waterbody was captured using tablets paired with an external Global Navigation Satellite System receiver with submeter accuracy (Juniper Geode SBAS <30 centimeters with real-time correction).

The USACE criteria to identify jurisdictional determinations for waterbodies includes the continuous presence of OHWM indicators and downstream connectivity to jurisdictional waterbodies. Downstream connectivity for delineated waterbodies in the field was determined based on the continuous presence of an OHWM and connection to downstream waterbodies. Downstream connectivity was identified in the field to the boundary of the Survey Area. Outside the Survey Area where land access was not available, aerial imagery was used to supplement field observations in determining downstream connectivity. For delineated features that did not have continuous bed bank or continuous evidence of an OHWM were determined not to have downstream connectivity.

For features with periodic OHWM indicators but no downstream connectivity, the geospatial boundary of the waterbody was mapped where the OHWM indicators were present.

3.3 Statement of Qualifications

Erin Bergquist is a wetland delineator with 18 years of experience in Section 404 permitting, wetland delineations, biological field surveys, and database management. Erin has worked with the USACE Regulatory Offices throughout the Midwest and Western U.S. to acquire the necessary Section 404 permits including individual permits and Section 10 permits. She has conducted vegetation and wetland delineation field surveys throughout the Midwest and Western U.S.

Laura Giese, PWS, CF, CSE, is a Senior Field Biologist at TRC with more than 26 years of professional experience working in natural resources throughout the East and Midwest. Dr. Giese's experience includes wetland delineation and functional analyses, threatened and endangered species habitat assessments and surveys, vegetation surveys, stream assessment and restoration, wetland mitigation monitoring, forest management, and biomonitoring. She has authored numerous wetland, botanical, and forestry technical reports, and natural resources impact analyses. Delineation and biological habitat assessment work has been conducted in WI, IL, MI, OH, MD, PA, NC, DC, MD, WV, FL, GA, and OK.

Jay Lorenz, PhD has in excess of 40 years of experience in consulting, extension service education, teaching, and research. He provides senior level biology/ecology leadership, strategic advising, and review to projects in multiple market segments: pipeline, renewable energy, communication towers, transportation, transmission, water, and mine closure. He has conducted hundreds of wetland delineations in Oregon and Washington and was a co-principal for conducting local wetland inventories for the Salem-Keizer, Oregon urban growth boundary (45,000 acres) and Warm Springs Indian Reservation (640,000 acres). He is a long-time member of the Society of Wetland Scientists.

4.0 RESULTS

Desktop and field survey results are presented in the following discussion. SDAM forms are included in Appendix A. Wetland delineation forms are included in Appendix B. Representative photographs are included in Appendix C.

4.1 Precipitation Data and Analysis

The National Oceanic and Atmospheric Administration (NOAA) Agricultural Applied Climate Information System was used to obtain historical and antecedent rainfall data for the NRCS Climate Analyst for Wetlands (WETS) Tables and NOAA Regional Climate Centers. Historical rainfall records from the Yakima Airport NRCS WETS weather station were used to determine the normality of rainfall using Direct Antecedent Rainfall Evaluation Method (NOAA 2020). Precipitation data from the Yakima Airport weather station was used to determine the measured rainfall for the three months prior and during the delineations. Table 4-1 below presents a rainfall summary for eastern Yakima County.

Based on a review of antecedent precipitation and comparison with the previous average precipitation data for 2014 to 2020, conditions were determined to be average at the time of the 2018 and 2020 survey and to be drier during the 2021 survey (NOAA 2020). Drier than normal conditions could affect the features exhibiting wetland indicators (i.e., hydrophytic vegetation or hydric soils) that were identified within the Survey Area.

Table 4-1. Rainfall Summary for Yakima County, Washington

Prior Month		WETS Rainfall Percentile (in)		Evaluation Month: Varies			
		30th	70th	Measured Rainfall	Condition[a]	Month Weight[b]	Score[c]
Three months prior to July 2020 Survey Date							
1st	June	0.22	0.62	0.24	2	3	6
2nd	May	0.25	0.51	0.88	3	2	6
3rd	Apr	0.19	0.53	0.07	1	1	1
					Sum	**13**	
					Description[d]	**Normal**	
Three months prior to May 2021 Survey Date							
1st	Nov	0.19	0.62	0.04	1	3	3
2nd	Oct	0.31	0.85	0.08	1	2	2
3rd	Sept	0.49	0.96	0.94	2	1	2
					Sum	**7**	
					Description[d]	**Dryer than normal**	

[a] Condition values are 1 for < 30th percentile, 2 for between 30th and 70th percentiles, and 3 for > 70th percentile.
[b] Month Weight is 3 for the most recent month, 2 for the prior month, and so on.
[c] Score is the product of the Condition and Month Weight values.
[d] Drier than normal (sum = 6-9), normal (sum = 10-14), wetter than normal (sum = 15-18).
Source: NOAA 2020.

4.2 Hydric Soils

Soils within the Survey Area were identified using the soil survey from the NRCS (USDA NRCS 2020). The National Technical Committee for Hydric Soils defines hydric soils as “a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.” The major and minor components of a soil map unit are classified as to how likely they are to be hydric and are rated on a range from hydric to nonhydric.

There are 23 soil map units within the Survey Area (Table 4-2). Of these, one soil map unit (83, Moxee silt loam, 2- to 15-percent slopes) is classified as containing a hydric soils component (Figure 3). In total, approximately, 649 acres (37 percent) of the Survey Area are classified as containing a hydric soils component.

Table 4-2. Soils Map Units with the Survey Area

Map Unit Symbol	Map Unit Name	Hydric Soil	Acres	Percent of MPE
3	Bakeoven very cobbly silt loam, 0 to 30-percent slopes	No	83	5
33	Esquatzel silt loam, 2 to 5-percent slopes	No	3	<1
35	Finley fine sandy loam, 0 to 5-percent slopes	No	36	2
36	Finley cobbly fine sandy loam, 0 to 5-percent slopes	No	6	<1
58	Hezel loamy fine sand, 2 to 15-percent slopes	No	3	<1
65	Kiona stony silt loam, 15 to 45-percent slopes	No	102	6
68	Lickskillet very stony silt loam, 5 to 45-percent slopes	No	10	1
81	Mikkalo silt loam, 15 to 30-percent slopes	No	15	1
83	Moxee silt loam, 2 to 15-percent slopes	Yes	649	37
127	Scooteney cobbly silt loam, 0 to 5-percent slopes	No	19	1
129	Selah silt loam, 5 to 8 percent slopes	No	31	2
130	Selah silt loam, 8 to 15 percent slopes	No	82	5
132	Shano silt loam, 2 to 5-percent slopes	No	84	5
142	Starbuck silt loam, 2 to 15-percent slopes	No	42	2
143	Starbuck-Rock outcrop complex, 0 to 45-percent slopes	No	70	4
179	Warden silt loam, 8 to 15-percent slopes	No	10	1
180	Warden silt loam, 15 to 30-percent slopes	No	12	1
187	Willis silt loam, 2 to 5-percent slopes	No	57	3
189	Willis silt loam, 8 to 15-percent slopes	No	430	25
208	Kiona stony silt loam, 15 to 45-percent slopes	No	2	<1
209	Lickskillet very stony silt loam, 5 to 45-percent slopes	No	1	<1
214	Willis silt loam, 8 to 15-percent slopes	No	<1	<1
215	Bakeoven very cobbly silt loam, 0 to 30-percent slopes	No	<1	<1
		Total	**1,746**	**100**

NRCS 2021

4.3 Vegetation and Land Use

The Survey Area is currently active rangeland with cattle observed on-site during the two survey events. Historic land use based on aerial photographs shows areas in the Project appearing to be used for agricultural purposes. Vegetation diversity and cover of native forbs and shrubs was low in the majority of the Survey Area. Common species observed were upland species cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), Russian thistle (*Salsola tragus*), tumble mustard (*Sisymbrium altissimum*), diffuse knapweed (*Centaurea diffusa*), flixweed (*Descurainia sophia*), fiddleneck (*Amsinckia intermedia*) and Sandberg bluegrass (*Poa secunda*). Native grass, forb, and shrub species were more common in the northern portion of the Survey Area including Indian ricegrass (*Oryzopsis hymenoides*), needle and thread grass (*Hesperostipa comata*), Sandberg bluegrass, green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush (*Artemisia tridentata*), longleaf phlox (*Phlox longifolia*), Carey's balsamroot (*Balsamorrhiza careyana*), and slender hawksbeard (*Crepis atribarba*). Very few big sagebrush are present in the Survey Area.

4.4 Site Alterations

The Survey Area is crossed by various two-track dirt roads, SR-24, trails created by cattle, and an existing high voltage transmission line right-of-way (Figure 2). Portions of the area have been farmed historically. Grazing occurs in the Survey Area for part of the year. No other site alterations were observed.

4.5 Floodplains

Based on review of FEMA FIRM Panels 53077C1175D (effective November 18, 2009), the majority of the Survey Area is within Zone X, Areas of Minimal Flood Hazard. A small portion of the southeast of the Project Boundary is mapped as Zone A, 100-year floodplain along the unnamed tributary of Dry Creek south of SR-24 (Figure 3).

The Yakima County CAO defines 100-year floodplains as critical areas. A flood hazard permit would be required for any proposed development in 100-year floodplains, and the Flood Hazard Protection General and Specific Standards in the Yakima County CAO (16C.05.28) are required for construction and operation activities in the 100-year floodplain.

4.6 Wetlands

No NWI-identified wetlands were identified in the Survey Area. Field surveys identified one seep wetland (W-01) in the northcentral portion of the Survey Area (Figure 4). W-01 is characterized as a freshwater palustrine emergent wetland (PEM) dominated by reed canarygrass (*Phalaris arundinacea*), bird's-foot trefoil (*Lotus corniculatus*), and Canada thistle (*Cirsium arvense*). The percent cover of bare ground is 85 percent. The wetland is located in an ephemeral channel (S-10). S-10 continues downstream and connects to S-7. Table 4-2 includes acreages, downstream connectivity, and state and county jurisdiction related to the wetland. Representative photos are in Appendix C and photo locations are depicted on Figure 4 (P-1 and P-2)

The hydrogeomorphic classification is slope wetland and its score in the Eastern Washington Wetland Rating System is 6 (out of a total possible score of 27). Based on its characteristics and the score in the Eastern Washington Rating System, the wetland is classified as a Type 4 under the Yakima County CAO wetland classification and would require a 50-foot buffer.

Table 4-3. Delineated Wetland and Waterbodies and Recommended Respective Jurisdiction

Feature ID	Type	Acres	Downstream Connection	State and County Jurisdiction (Yakima County CAO)	Statutory Setbacks
W-001	PEM	0.02	Yes	Type 4 Wetland	50’

4.7 Waterbodies

Based on the USFWS NWI, 19 intermittent features are identified within the Survey Area (Figure 3; USFWS 2020). The USGS NHD identified the same 19 features as intermittent flowlines (USGS 2020). Based on field observations of the 19 features identified by NWI/NHD, 18 were identified as ephemeral channels within the Survey Area (Figure 4, Table 4-3). The remaining NWI/NHD-identified feature did not have OHWM indicators.

One roadside metal culvert was identified at the intersection of SR-24 and S-7 (Figure 4). Additional culverts under SR-24 are located outside the Survey Area. Based on the 2008 Rapanos Guidance, of the 18 ephemeral channels with OHWM indicators, 14 had downstream connectivity to downstream jurisdictional waterbodies. Photo points and representative photos (P-3 to P-21) for these areas are shown on Figure 4 and in Appendix C, respectively.

Lack of recent signs of scouring or erosion, and the lack of restrictive layers suggested that surface flow is rare in the Survey Area and most likely occurring following large precipitation events. The substrate in the delineated ephemeral channels was gravelly loam interspersed with cobbles. Upland vegetation was observed along the channels and in some areas was found in the channels. The ephemeral channels vary in width from 0.5 foot wide at their headwaters to 3 to 5 feet wide at the southern (downstream) end of the Survey Area. OHWM indicators include changes in vegetation, drainage patterns, and scour lines.

Large patches of dried “tumbleweed” species (include tumble mustard, kochia, knapweed, and Russian thistle) were found along and in deep piles in many of the channels limiting flow in those areas. The piles of tumbleweed varied in thickness from 0.5 feet to several feet deep in places and in width from one foot to over 10 feet wide. The tumbleweed was matted, and vegetation was not observed growing underneath. The culverts were also filled with tumbleweed. Tumbleweeds in the delineated ephemeral channels are shown in Photos P-7, P-8, P-9, P-10, P-11, and P-21.

The delineated ephemeral channels identified as having downstream connectivity in Table 4-4 (S-1, S-2, S-3, and S-4) flow south from the Survey Area, through culverts under SR-24, and into an ephemeral channel located south of the Survey Area that parallels SR-24. This unnamed channel is a fourth order tributary to the Columbia River via Dry Creek, Cold Creek, and the Yakima River.

The delineated ephemeral channels are rated Type 5 streams (Section 2.0, Table 2-2) by the Yakima County CAO. As noted in Table 2-2, Type 5 streams do not have a defined vegetation buffer but are regulated by other Yakima County development regulations for activities in the

Table 4-4. Delineated Wetland and Waterbodies

Feature ID	Classification	Average Width OHWM (Feet)	Crossing Length Temp/Perm (Linear Feet)[a, b]	Downstream Connection [a]	Notes
S-1	Ephemeral	0.5	0/0	Yes	Channel starts north of the Survey Area and flows generally southwest. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was three percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-3.
S-2	Ephemeral	2	0/0	Yes	Channel starts north of the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was four percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-4.
S-3	Ephemeral	1	0/0	Yes	Channel starts east of the Survey Area and flows generally southwest. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was four percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-5.
S-4	Ephemeral	1	0/0	Yes	Channel starts in the Survey Area and flows generally southwest. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was six percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-6.

Table 4-4. Delineated Wetland and Waterbodies

Feature ID	Classification	Average Width OHWM (Feet)	Crossing Length Temp/Perm (Linear Feet)[a, b]	Downstream Connection [a]	Notes
S-5	Ephemeral	1 to 2	TBD/4	Yes	Channel starts north of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was four percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-7.
S-6	Ephemeral	0.5 to 2	TBD/2	Yes	Channel starts north of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was three percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-8.
S-7	Ephemeral	0.5 to 1	TBD/1	Yes	Channel starts northeast of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was three percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Points P-9, P-10, and P-21.
S-8	Ephemeral	1 to 2	0/0	Yes	Channel starts in the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was nine percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-11.

Table 4-4. Delineated Wetland and Waterbodies

Feature ID	Classification	Average Width OHWM (Feet)	Crossing Length Temp/Perm (Linear Feet)[a, b]	Downstream Connection [a]	Notes
S-9	Ephemeral	1 to 3	0/0	Yes	Channel starts north of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was two percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-12.
S-10	Ephemeral	0.5	0/0	Yes	Channel starts north of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was seven percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-13.
S-11	Ephemeral	0.5	0/0	Yes	Channel starts in the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was seven percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines.
S-12	Ephemeral	0.5	0/0	Yes	Channel starts north of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was six percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-14.

Table 4-4. Delineated Wetland and Waterbodies

Feature ID	Classification	Average Width OHWM (Feet)	Crossing Length Temp/Perm (Linear Feet)[a, b]	Downstream Connection [a]	Notes
S-13	Ephemeral	0.5	0/0	No	Channel starts north of the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was six percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-15.
S-14	Ephemeral	0.5 to 1	0/0	No	Channel starts west of the Survey Area and flows generally south. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was six percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-16.
S-15	Ephemeral	2	TBD/2	Yes	Channel starts north of the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was two percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-17.
S-16	Ephemeral	2	TBD/2 (Estimated for potential road crossing)	Yes	Channel starts north of the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was two percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-18.

Table 4-4. Delineated Wetland and Waterbodies

Feature ID	Classification	Average Width OHWM (Feet)	Crossing Length Temp/Perm (Linear Feet)[a, b]	Downstream Connection [a]	Notes
S-17	Ephemeral	0.5 to 1	0/0	No	Channel starts east of the Survey Area and flows generally southeast. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was two percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-19.
S-18	Ephemeral	1 to 2	TBD/2	No	Channel starts east of the Survey Area and flows generally east. No riparian or submerged aquatic vegetation was observed. There were no observed macroinvertebrates. The slope was one percent. OHWM field indicators included changes in vegetation, drainage patterns, and scour lines. Photo Point P-20.

[a] The USACE has the final authority on the jurisdictional status and connectivity of a wetland or waterbody.
[b] The number of potential construction crossings will be determined by the Engineering and Procurement Contractor. The total linear feet will be provided in the Nationwide Permit application to the USACE and to EFSEC. TBD = To Be Determined

channel including clearing and grading regulations, geologically hazardous areas, floodplain, stormwater, building and construction, or other development regulations.

Five channels (S-5, S-6, S-7, S-15, and S-18) will be temporarily crossed by construction traffic. BMPs will be implemented at construction crossings, including but not limited to timber mats, or other similar types of temporary products, to limit impacts to the channel crossings. The BMPs will be removed when the construction is complete. The ephemeral channels will be restored to their current topography once construction is complete.

The east-west access road (Figure 5) that crosses the Project parallel to the existing transmission line will cross five of the ephemeral channels (S-5, S-6, S-7, S-15, and S-18). One of the internal access roads to the panels will cross S-5. A potential road crossing could be required at S-16 as the Project is micro-sited. The access road will be gravel. A culvert will be placed at each of the five channel crossings during construction and will be maintained for the life of the Project. Typical construction drawings of the culvert placement and associated erosion control devices are provided in Appendix D. The proposed gravel road is 20 feet wide and construction impacts are anticipated to be contained within the road right-of-way. The linear foot of each crossing is provided in Table 4-3.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Delineations and data collection for wetlands and waterbodies were conducted July 1, 2020, and May 10 to 15, 2021 in the proposed Ostrea Solar Project Survey Area. Based on field observations, one wetland and 18 ephemeral channels and their associated tributaries were identified within the Survey Area. Based on the 2008 Rapanos Guidance, 14 of the ephemeral features have a downstream connection and would be considered jurisdictional by the USACE. One culvert was identified at the intersection of Washington SR-24 and Channel S-7 in the Survey Area and additional culverts under SR-24 are located outside the Survey Area.

A total of five channels (S-5, S-6, S-7, S-15, and S-18) will be temporarily crossed by construction traffic. BMPs will be implemented at construction crossings, including but not limited to timber mats, or other similar types of temporary products, to limit impacts to the channel crossings. The BMPs will be removed when the construction is complete, and the channels restored to pre-construction topography as required. A total of five ephemeral channels (S-5, S-6, S-7, S-15, and S-18) will be permanently impacted by the development of the access road across the Project (<0.1 acres). S-4 will be permanently impacted by the development of an internal access road to access the panels.

However, the ultimate authority to determine federal wetland and waterway boundaries and jurisdiction rests with the USACE. Decisions made by USACE may result in modifications to the conclusions stated in this report. The delineated ephemeral channels are rated Type 5 streams. Type 5 streams do not have a defined vegetation buffer but are regulated by other Yakima County development regulations for activities in the channel including clearing and grading regulations, geologically hazardous areas, floodplain, stormwater, building and construction, or other development regulations.

As part of the EFSEC permitting process, Ecology will conduct a site visit to confirm the results of the wetland delineation and Waters of the State.

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Figures

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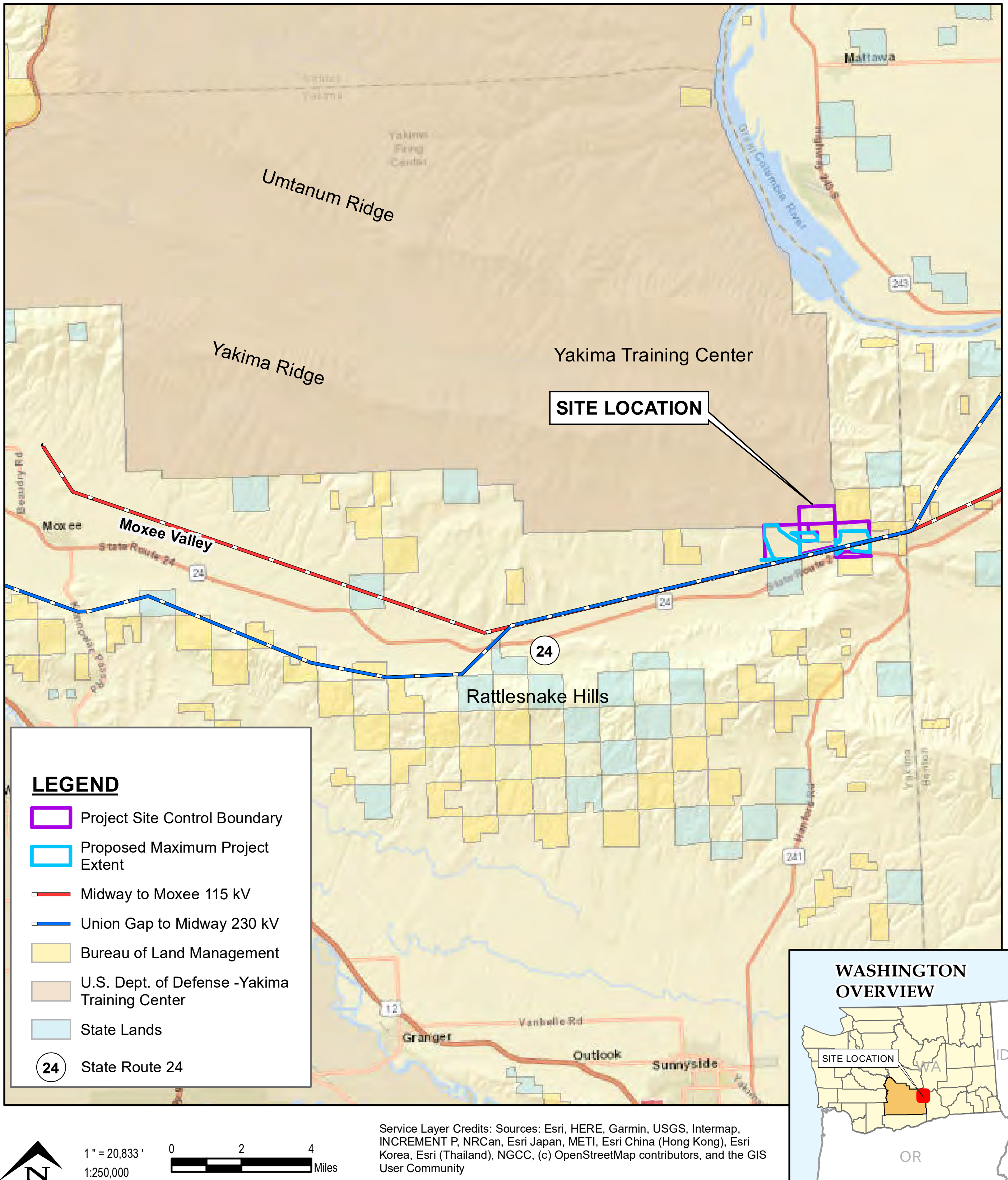


N

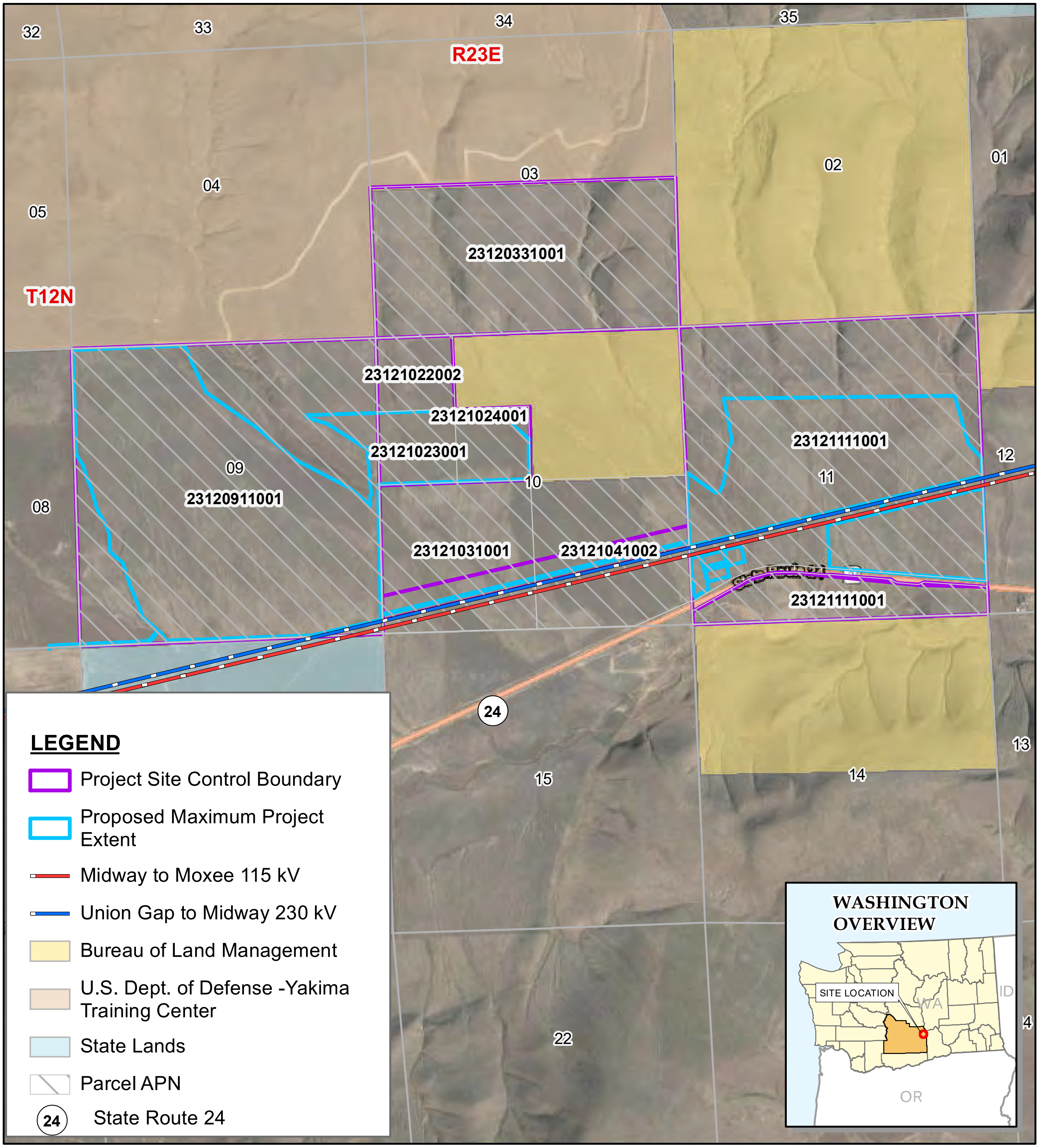
1 " = 20,833 '
1:250,000

0 2 4 Miles

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

TRC 123 N. College Ave., Suite 206 Fort Collins, CO 80524 970.549.0043 www.trccompanies.com TRC - GIS	PROJECT: **CYPRESS CREEK RENEWABLES, LLC OSTREA SOLAR, LLC YAKIMA COUNTY, WASHINGTON**	DRAWN BY: R. BLAKE CHECKED BY: P. LORENZ APPROVED BY: E. BERGQUIST DATE: MARCH 2022 PROJ. NO.: 427473 FILE: Fig 1 Ostrea Solar Project Study Area Wetland.mxd
	TITLE: **PROJECT OVERVIEW MAP**	**FIGURE 1**

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1 Ostrea Solar Project Study Area Wetland.mxd -- Saved By: RBLAKE on 3/25/2022, 09:45:30 AM



BASE MAP FROM: GOOGLE, MAXAR TECHNOLOGIES.

N

1 " = 2,500 '
1:30,000

0 2,000 4,000 FEET

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TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

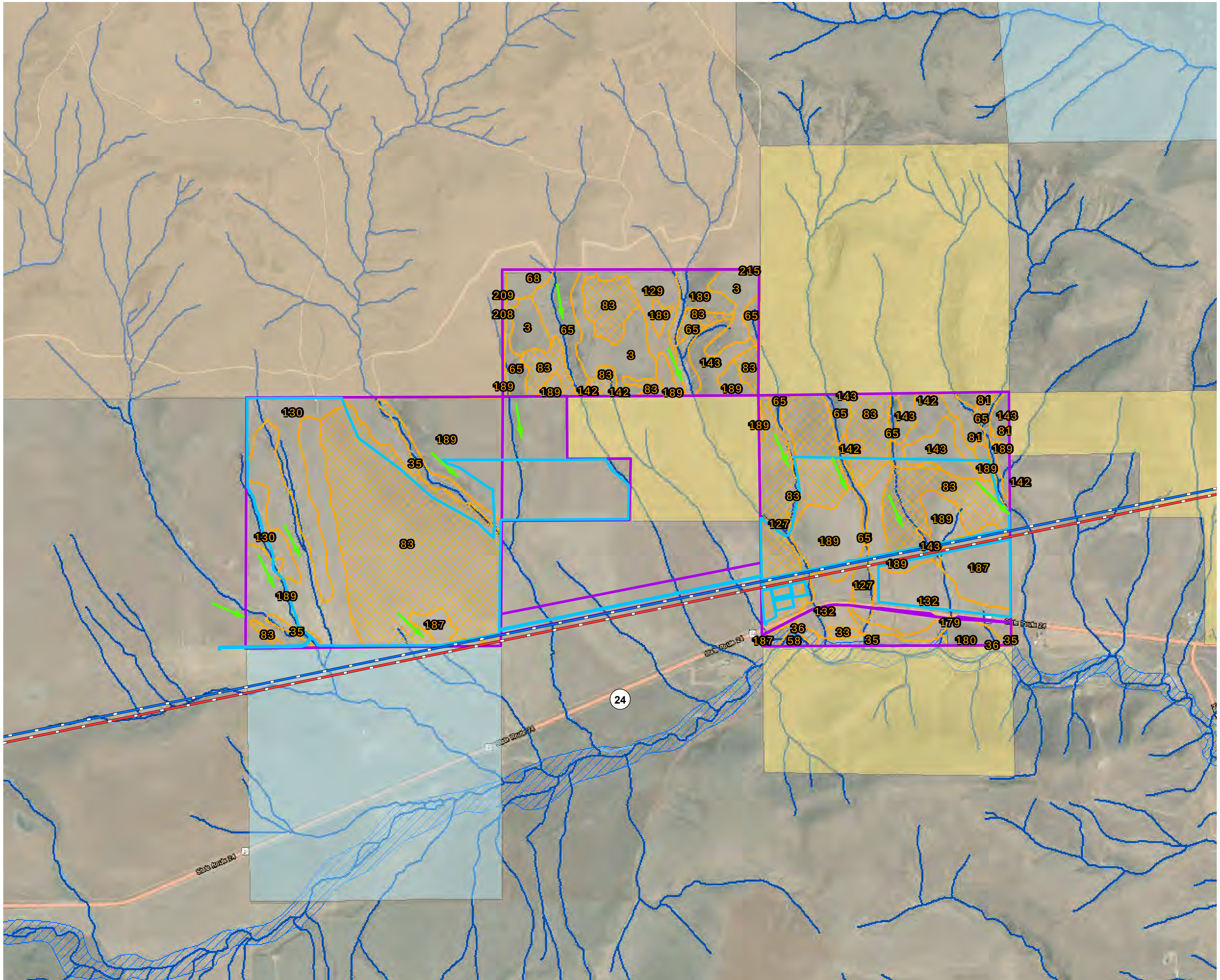
TITLE:

SURVEY AREA

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	427473
FILE:	Fig 2_Ostrea_Survey Area Aerial Wetland.mxd

FIGURE 2

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 2_Ostrea_Survey Area Aerial Wetland.mxd -- Saved By: RBLAKE on 3/16/2022, 10:59:21 AM



LEGEND

- Project Site Control Boundary
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- NHD Flowline
- NWI
- FEMA 100-Year Flood Zone
- USDA-NRCS Web Soil Survey Soils
- Hydric Soils
- Bureau of Land Management
- U.S. Dept. of Defense -Yakima Training Center
- State Lands
- 3 Soil Map Unit Number
- Direction of Flow
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/MAXAR 2019.
2. NWI DATA ACQUIRED FROM USFW WETLANDS MAPPER.
3. NHD FLOW LINE ACQUIRED FORM USGS.GOV.
4. SOILS DATA ACQUIRED FROM USDA/NRCS SSURGO SOILS DATABASE.
5. NWI RIPARIAN AND NHD FLOWLINE LAYERS COVER THE SAME FOOTPRINT IN THE STUDY AREA.
6. NO NHD WATERBODY IN MAP EXTENT.
7. FLOODPLAIN DATA FROM FEMA

0 1,000 2,000 Feet

1 " = 2,000 '

1:24,000

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

HYDRIC SOILS, NWI/NHD DATA, AND FEMA FLOODPLAIN

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ	FIGURE 3	
APPROVED BY:	E. BERGQUIST		
DATE:	MARCH 2022		

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FILE NO.: Fig 3_Ostrea_hydric soils, NWI-NHD, and FEMA wetland.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/25/2022, 09:49:42 AM by RBLAKE -- LAYOUT: ANSI B(11"x17")
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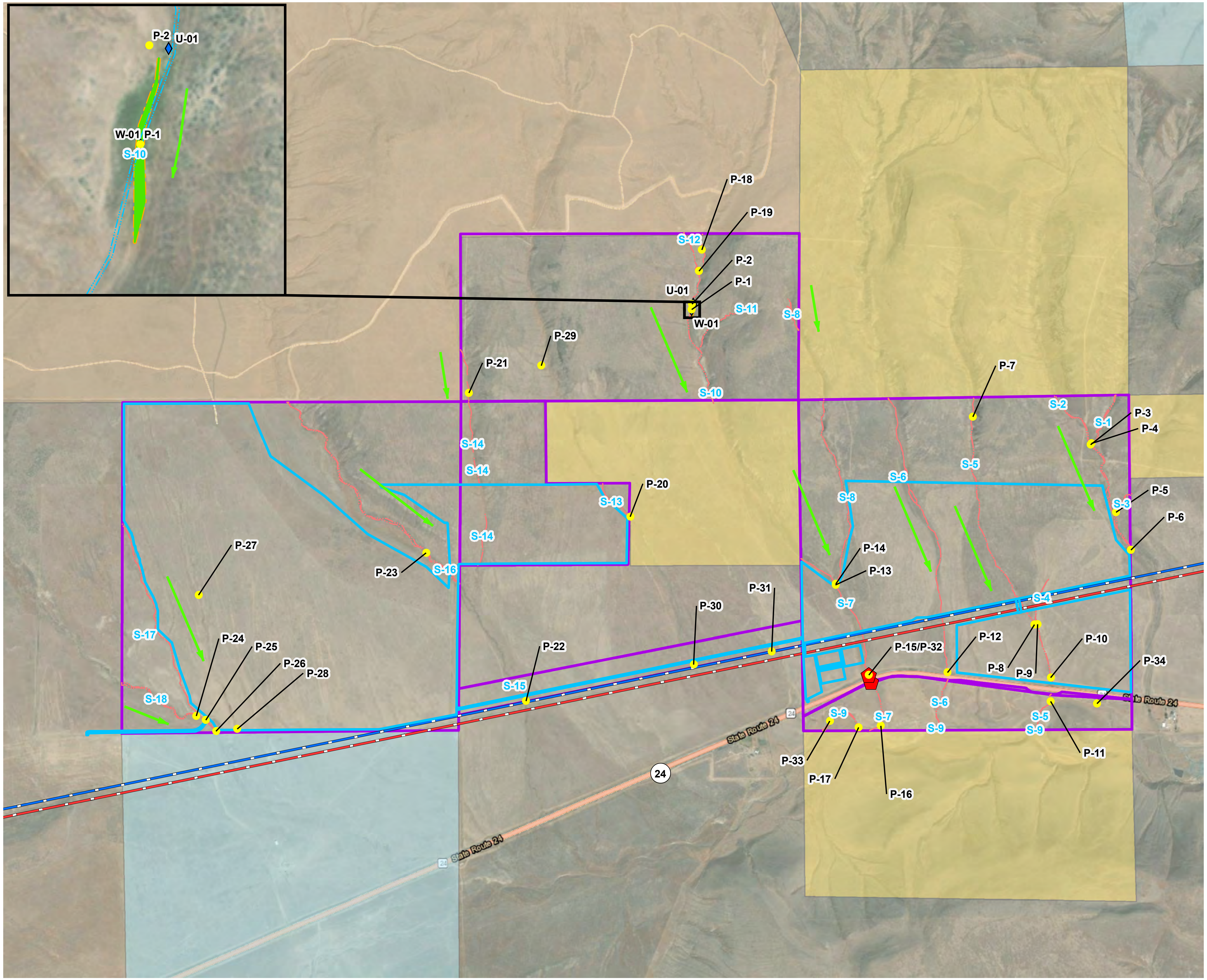

LEGEND

- Project Site Control Boundary
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Soil Pit
- Photograph Location
- Culvert
- Delineated Wetland
- Surveyed Stream
- Wetland 50ft Buffer
- Bureau of Land Management
- U.S. Dept. of Defense -Yakima Training Center
- State Lands
- Direction of Flow
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/MAXAR 2019.
2. RESOURCES WERE DELINEATED BY TRC FIELD PERSONNEL NATHALIE DENIS AND JAY LORENZ ON JUNE 30TH TO JULY 2; ERIN BERGQUIST AND LAURA GIESE MAY 10TH TO 15TH, 2021
3. 50 FOOT WETLAND BUFFER IS BARELY VISIBLE AT CURRENT MAP SCALE.
4. P – PHOTOGRAPH POINT
5. S – STREAM
6. W – WETLAND
7. U - UPLAND

0 1,500 3,000 Feet

1 " = 1,500 '

1:18,000

N

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

SURVEY RESULTS

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ		
APPROVED BY:	E. BERGQUIST	**FIGURE 4**	
DATE:	APRIL 2022		

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FILE NO.: Fig 4_Ostrea_Survey Results Wetland.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 4/4/2022, 14:55:54 PM by BTRACY -- LAYOUT: ANSI B(11"x17")
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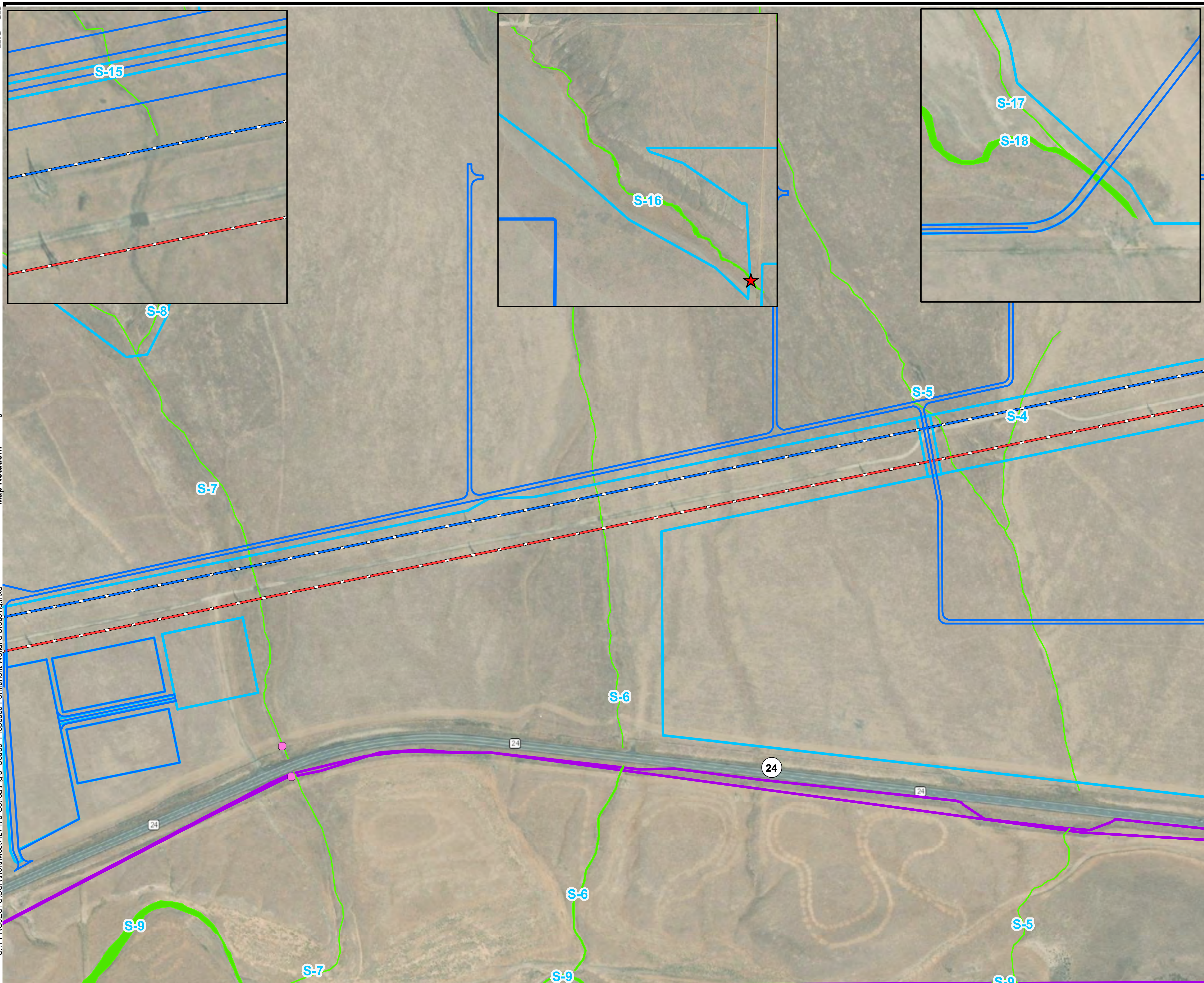

LEGEND

- Project Site Control Boundary
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Access Road
- Culvert
- Surveyed Stream
- State Route 24
- Potential Road Crossing

NOTES

1. BASE MAP IMAGERY FROM ESRI/MAXAR 2019.
2. RESOURCES WERE DELINEATED BY TRC FIELD PERSONNEL NATHALIE DENIS AND JAY LORENZ ON JUNE 30TH TO JULY 2; ERIN BERGQUIST AND LAURA GIESE MAY 10TH TO 15TH, 2021
3. S – STREAM

0 175 350 Feet

1 " = 350 '

1:4,200

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROPOSED PERMANENT WETLAND CROSSINGS

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ		**FIGURE 5**
APPROVED BY:	E. BERGQUIST		
DATE:	APRIL 2022		

TRC

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FILE NO.: Fig 5_Ostrea_Proposed Permanent Wetland Crossing.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 4/4/2022, 11:56:20 AM by BTRACY -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 5_Ostrea_Proposed Permanent Wetland Crossing.mxd

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Appendix A. SDAM Forms

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Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/10/2021
Waterway Name S-1	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'46.86" N
Reach Boundaries See Figure 4	Long. 119°53'52.12" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0____

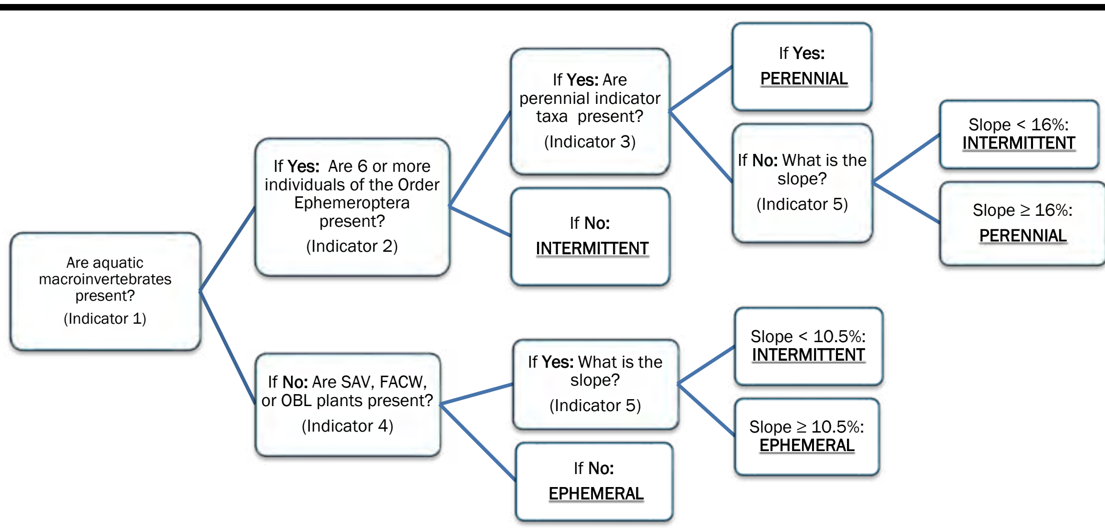
Observations

Observed Wetland Plants (and indicator status):	**Observed Macroinvertebrates:**			
	Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None	None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__7%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-1. Attachment C Photo Log, P-3. Reach is from confluence upslope 100 feet.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/10/2021
Waterway Name S-2 downstream at project boundary	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'30.25" N Long. 119°53'43.62" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 1	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

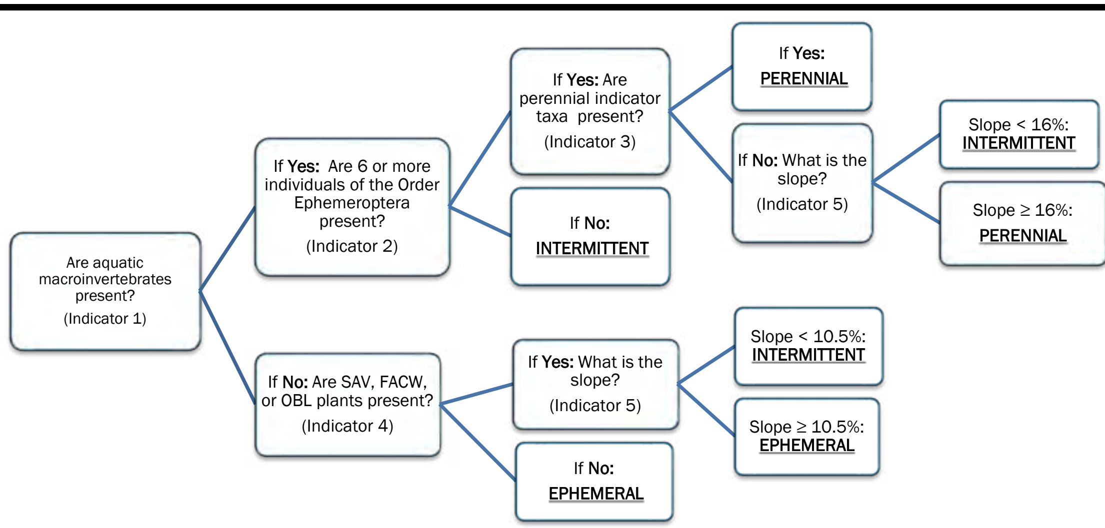
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__4%	

Conclusions



Single Indicators:

☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-2 downstream at project boundary (P-6), Attachment C Photo Log, P-6. Reach is from confluence upslope 100 ft

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/10/2021
Waterway Name S-2 at junction with S-1	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'47.03" N Long. 119°53'52.22" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 1	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

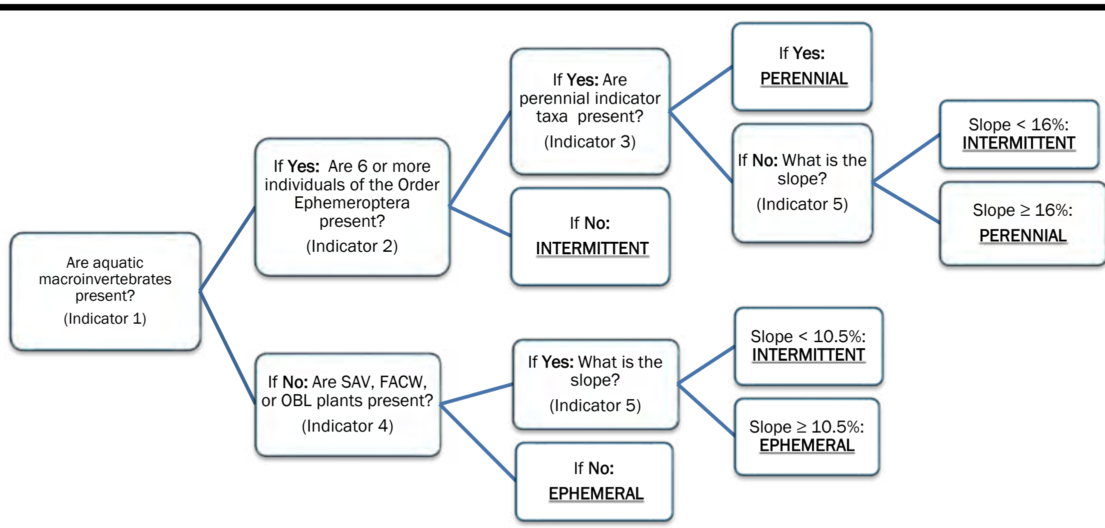
Observations

Observed Wetland Plants (and indicator status):	**Observed Macroinvertebrates:**
None	Taxon / Indicator Status / Ephemeroptera? / # of Individuals None

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__3%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-2 at junction with S-1(P-4), Attachment C Photo Log, P-4. Reach is from confluence upslope 100 ft

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/10/2021
Waterway Name S-3	Coordinates at downstream end (ddd.mm.ss) Lat. 46º32'36.13" N Long. 119º53'46.9" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

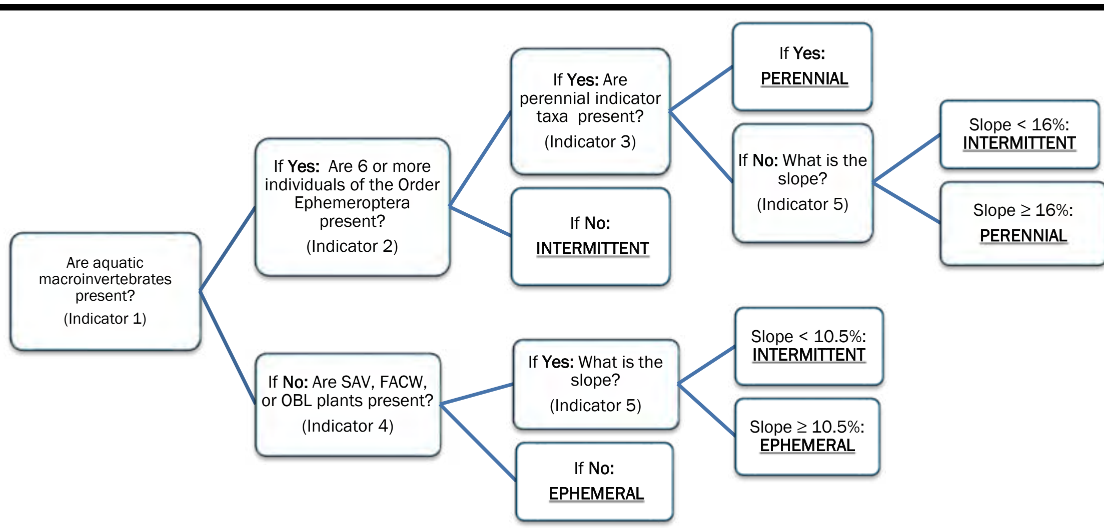
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__3%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-3. Attachment C Photo Log, P-5. Reach is from confluence upslope 100 feet.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/12/2021
Waterway Name S-4	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'21.3" N Long. 119°54'4.76" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.33	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

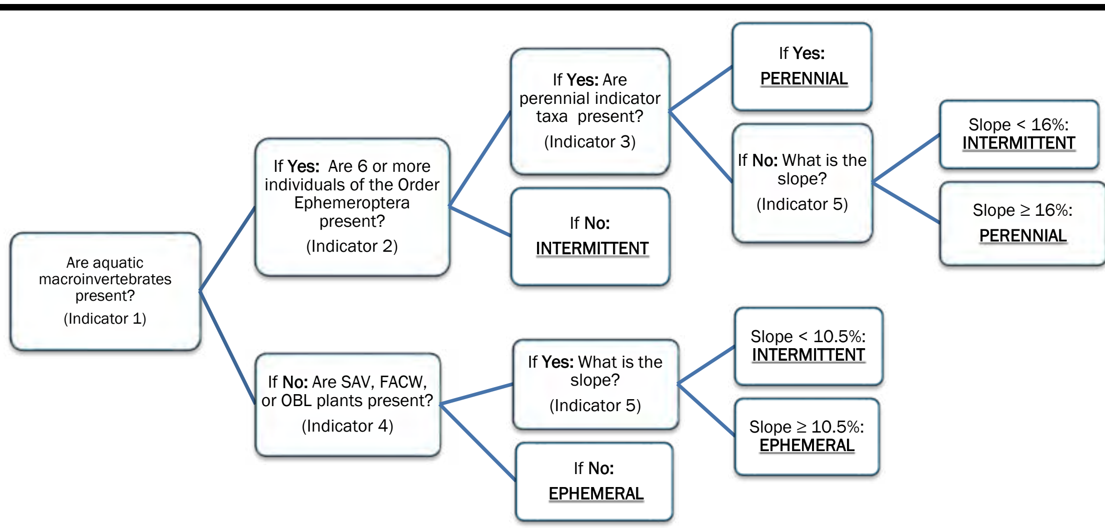
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	___4%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance Majority of channel is full of Russian thistle and other dried vegetation

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-4, Attachment C Photo Log, P-8. Reach is from the confluence upslope 100 feet

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/12/2021
Waterway Name S-5 at junction with S-4	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'20.61" N
Reach Boundaries See Figure 4	Long. 119°54'5.21" W
Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5
☐ Disturbed Site / Difficult Situation (Describe in "Notes")	

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

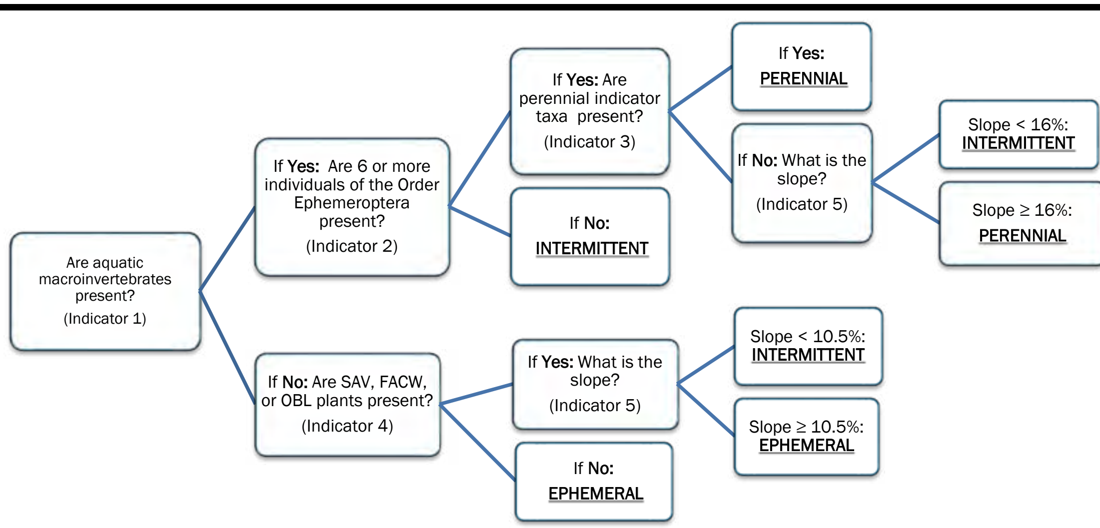
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	___6%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

  ☐ Below Average

  ☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4 S-5 at junction at S-4 (P-9), Attachment C Photo Log, P-9. Reach is from the confluence to the Project Area Boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/14/2021
Waterway Name S-5 north of Washington SR-24	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'10.47" N Long. 119°54'1.88" W
Reach Boundaries See Figure 4	
Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.3
[X] Disturbed Site / Difficult Situation (Describe in "Notes")	

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

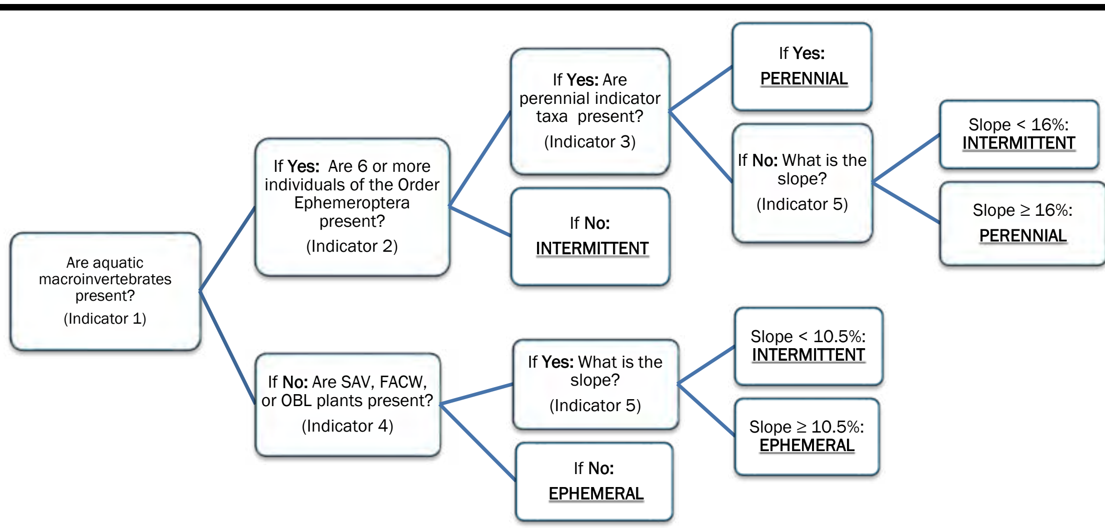
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	[ ] Yes	[X] No
2. Are 6 or more individuals of the Order Ephemeroptera present?	[ ] Yes	[X] No
3. Are perennial indicator taxa present? (refer to Table 1)	[ ] Yes	[X] No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	[ ] Yes	[X] No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2_ %	

Conclusions



Single Indicators:

[ ] Fish

[ ] Amphibians

Finding: [X] Ephemeral [ ] Intermittent [ ] Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance

Channel flattens out at the fence where Russian thistle and other vegetation are piled up at the fence. No culvert was present at the road.

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-5 north of Washington SR-24, Attachment C Photo Log, P-10. Reach is from the road to project boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/12/2021
Waterway Name S-5, south of Washington SR-24	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'6.76" N Long. 119°54'1.94" W
Reach Boundaries See Figure 4	
Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.3
☐ Disturbed Site / Difficult Situation (Describe in "Notes")	

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0____

Observations

Observed Wetland Plants (and indicator status):

None

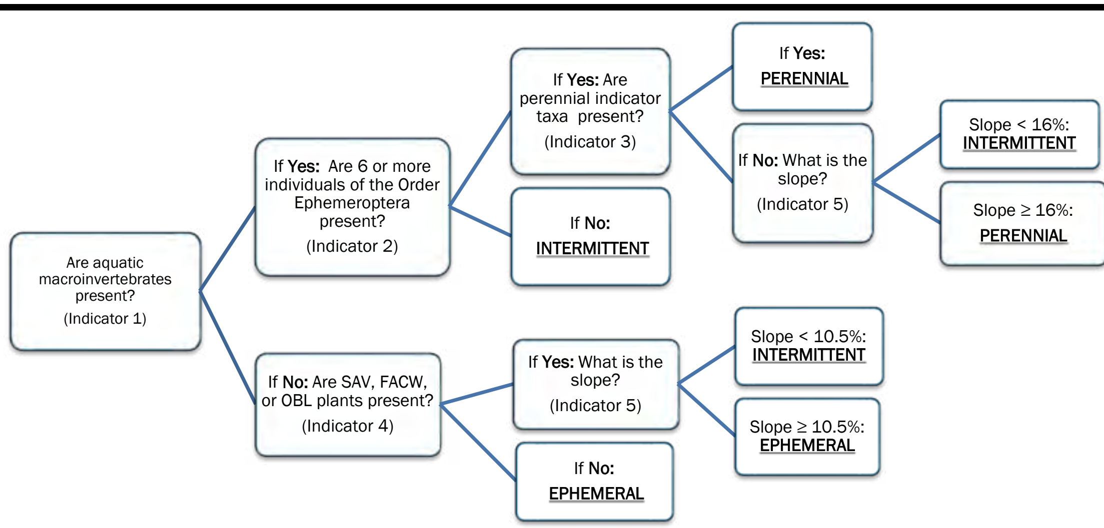
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	___5%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

- ☐ Below Average
- ☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-5 south of Washington SR-24, Attachment C Photo Log, P-11.
Reach is from the confluence upslope to Washington SR-24

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name: Ostrea Solar		Assessor: EB
Address: See Figure 4		Date: 5/9/2021
Waterway Name: S-6	Coordinates at downstream end (ddd.mm.ss)	Lat. 46°32'11.4" N
Reach Boundaries: See Figure 4		Long. 119°54'25.14" W
Precipitation w/in 48 hours (cm): 0	Channel Width (m): 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

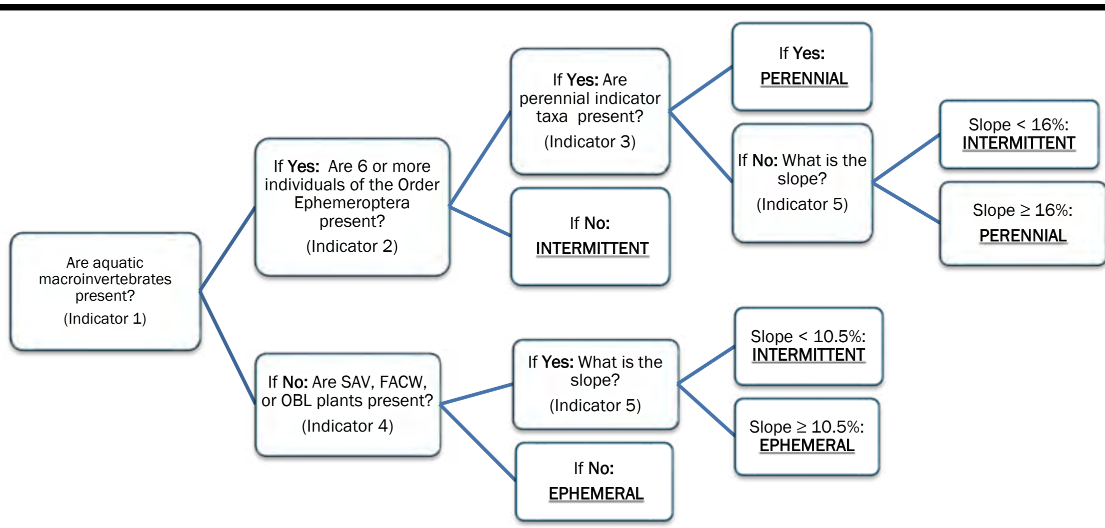
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__3%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance

Russian thistle and other dried vegetation are found in the majority of the channel.

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-6, Attachment C Photo Log, P-12. Reach is From fence upslope 100 ft

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/9/2021
Waterway Name S-7 at junction of S-8	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'26.13" N
Reach Boundaries See Figure 4	Long. 119°54'50.93" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

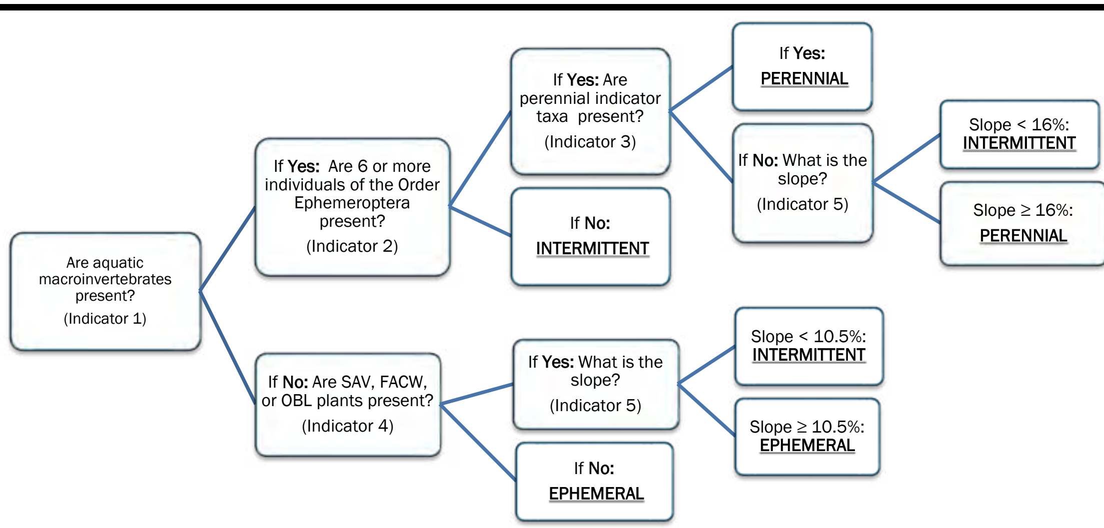
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__3%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-7 at junction of S-8 (P-13), Attachment C Photo Log, P-13.
Reach is from confluence upslope 100 ft

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/9/2021
Waterway Name S-7 at junction of S-9	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'3.25" N
Reach Boundaries See Figure 4	Long. 119°54'38.84" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.75	[x] Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

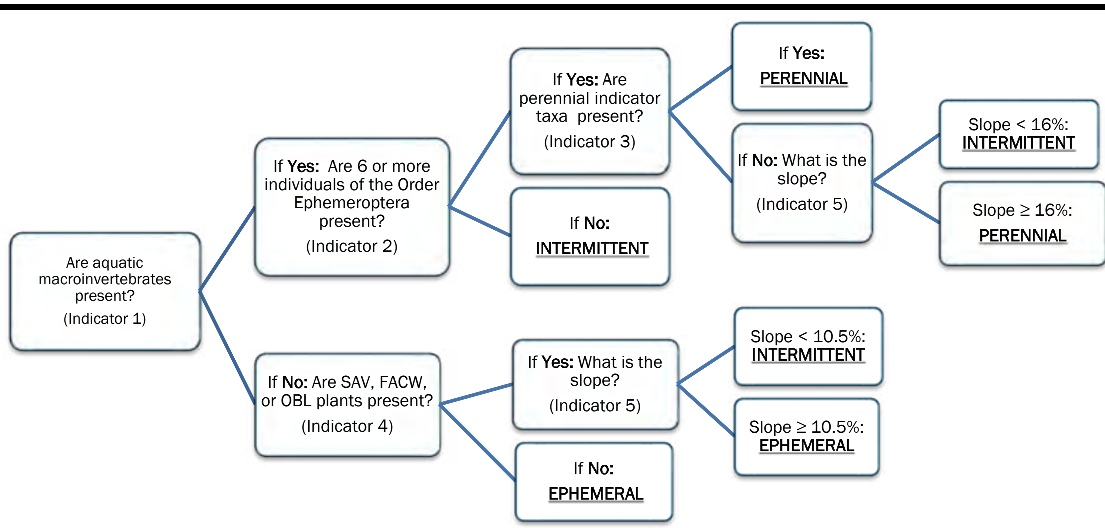
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2%	

Conclusions



Single Indicators:

☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

- ☐ Prolonged Abnormal Rainfall / Snowpack
  - ☐ Below Average
  - ☐ Above Average
- ☒ Natural or Anthropogenic Disturbance
- ☐ Other: ______________________

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

Area between S-7 and S-9 has been driven and altered. The area appears to be used as a two-track. The flow in this area appears to be overland from the end of S-7 to S-9. There are secondary channels located adjacent to the main S-7 channel that stop before S-9

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-7 at junction of S-9 (P-16), Attachment C Photo Log, P-16.
Reach is from confluence upslope 100 ft

Ancillary Information:

- ☐ Riparian Corridor
- ☐ Erosion and Deposition
- ☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name: Ostrea Solar	Assessor: EB
Address: See Figure 4	Date: 5/9/2021
Waterway Name: S-7 north of Washington SR-24	Coordinates at downstream end (ddd.mm.ss): Lat. 46°32'11.19" N; Long. 119°54'42.69" W
Reach Boundaries: See Figure 4	
Precipitation w/in 48 hours (cm): 0	Channel Width (m): 0.5
[X] Disturbed Site / Difficult Situation (Describe in "Notes")	

Observed Hydrology

% of reach w/observed surface flow_0_____

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

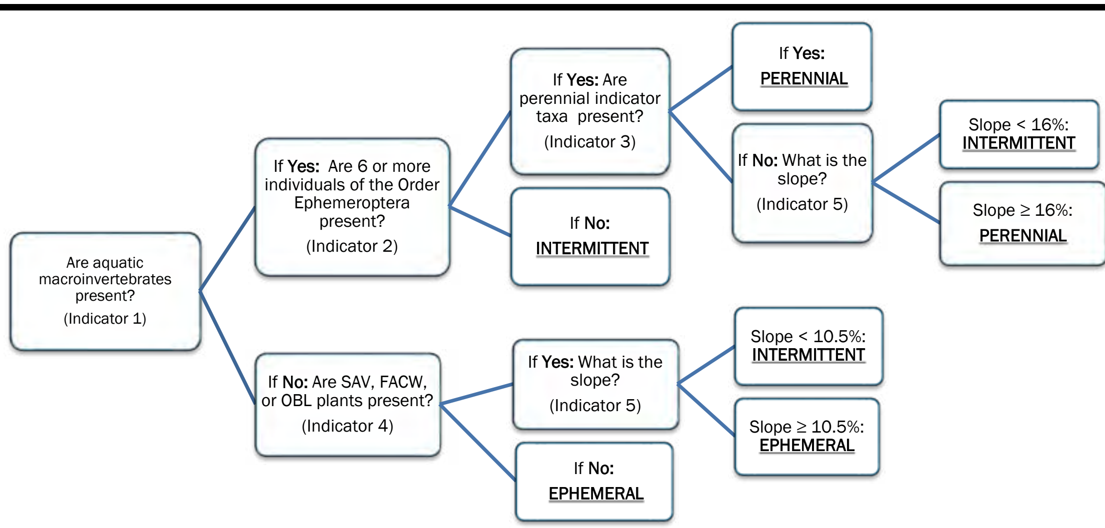
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	[ ] Yes	[X] No
2. Are 6 or more individuals of the Order Ephemeroptera present?	[ ] Yes	[X] No
3. Are perennial indicator taxa present? (refer to Table 1)	[ ] Yes	[X] No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	[ ] Yes	[X] No
5. What is the slope? (In percent, measured for the valley, not the stream)	__3%	

Conclusions



Single Indicators:

- [ ] Fish
- [ ] Amphibians

Finding:

- [X] Ephemeral
- [ ] Intermittent
- [ ] Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

- [ ] Prolonged Abnormal Rainfall / Snowpack
  - [ ] Below Average
  - [ ] Above Average
- [X] Natural or Anthropogenic Disturbance
- [ ] Other: ________________________

Russian thistle and other dried vegetation are found in the majority of the channel. Culvert is completely choked with Russian thistle and other dried vegetation.

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-7 north of Washington SR-24, Attachment C Photo Log, P-15/P33. Reach is From fence upslope 100 ft

Ancillary Information:

- [ ] Riparian Corridor
- [ ] Erosion and Deposition
- [ ] Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/9/2021
Waterway Name S-8	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'26.17" N Long. 119°54'51.15" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25	☒ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow 0

% of reach w/any flow (surface or hyporheic) 0

# of pools observed 0

Observations

Observed Wetland Plants (and indicator status):

None

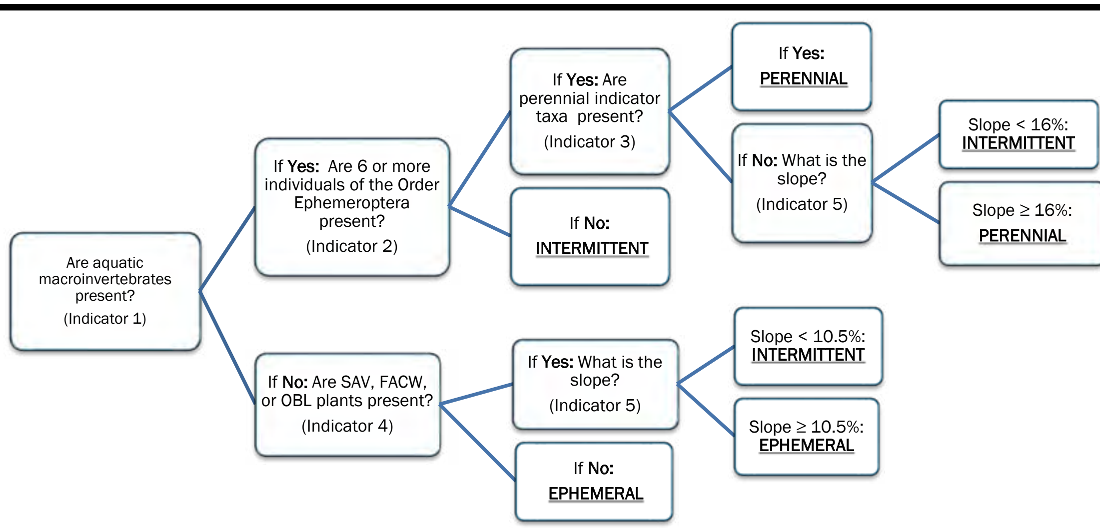
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	9%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding:
☒ Ephemeral
☐ Intermittent
☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance

Russian thistle and other dried vegetation are found in the majority of the channel.

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-8, Attachment C Photo Log, P-14. Reach is from junction to sudy area boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/14/2021
Waterway Name S-9	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'2.94" N Long. 119°54'45.28" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

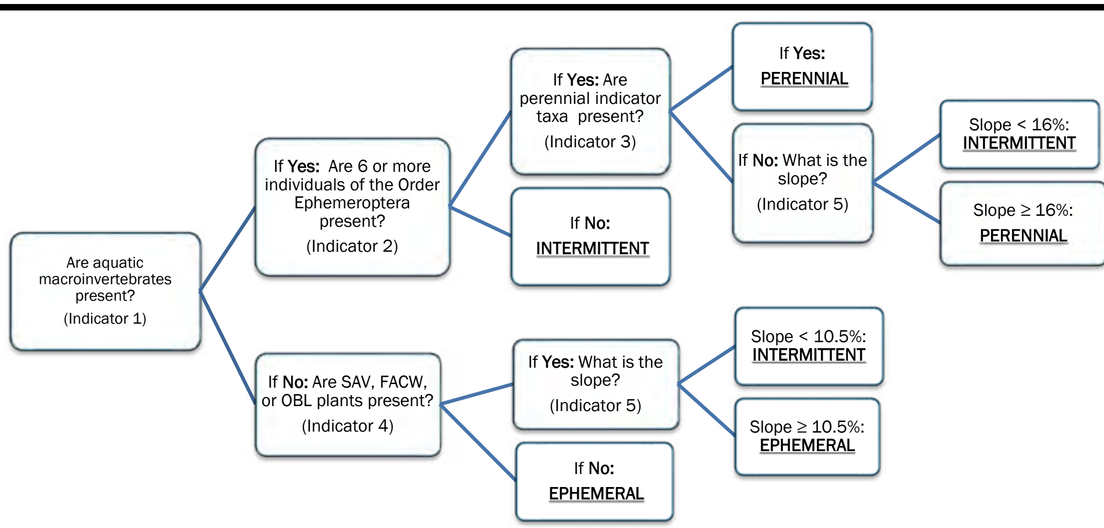
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-9, Attachment C Photo Log, P-17. Reach is from Project Area Boundary to Project Area Boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/14/2021
Waterway Name S-10	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'53.92" N
Reach Boundaries See Figure 4	Long. 119°55'18.10" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0____

Observations

Observed Wetland Plants (and indicator status):

None

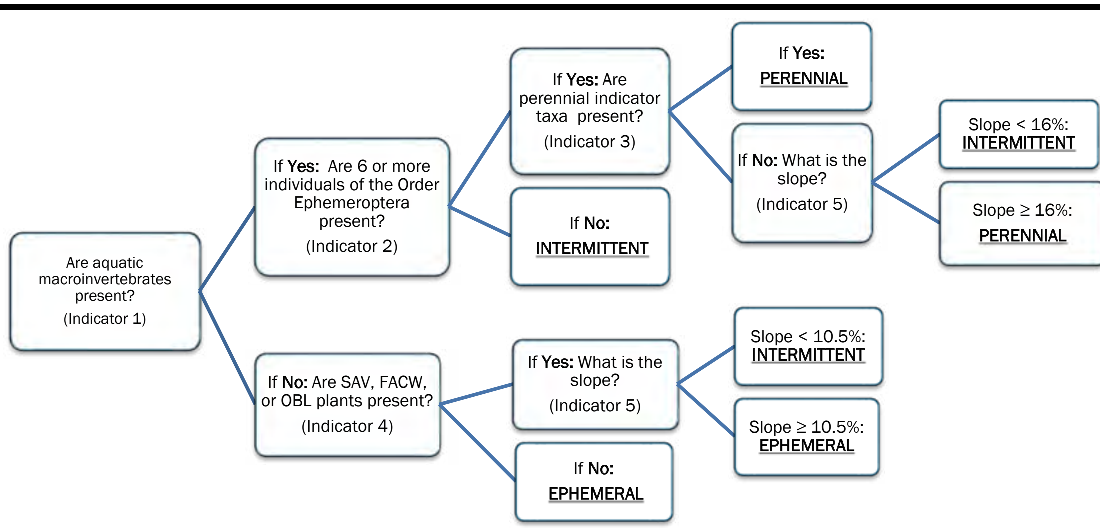
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__7%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

- ☐ Prolonged Abnormal Rainfall / Snowpack
  - ☐ Below Average
  - ☐ Above Average
- ☐ Natural or Anthropogenic Disturbance
- ☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-10, Attachment C Photo Log, P-19. Reach is from Project Area Boundary to Project Area Boundary.

Ancillary Information:

- ☐ Riparian Corridor
- ☐ Erosion and Deposition
- ☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/14/2021
Waterway Name S-11	Coordinates at downstream end (ddd.mm.ss) Lat. 46°33'02.27" N
Reach Boundaries See Figure 4	Long. 119°55'21.32" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow 0

% of reach w/any flow (surface or hyporheic) 0

# of pools observed 0

Observations

Observed Wetland Plants (and indicator status):

None

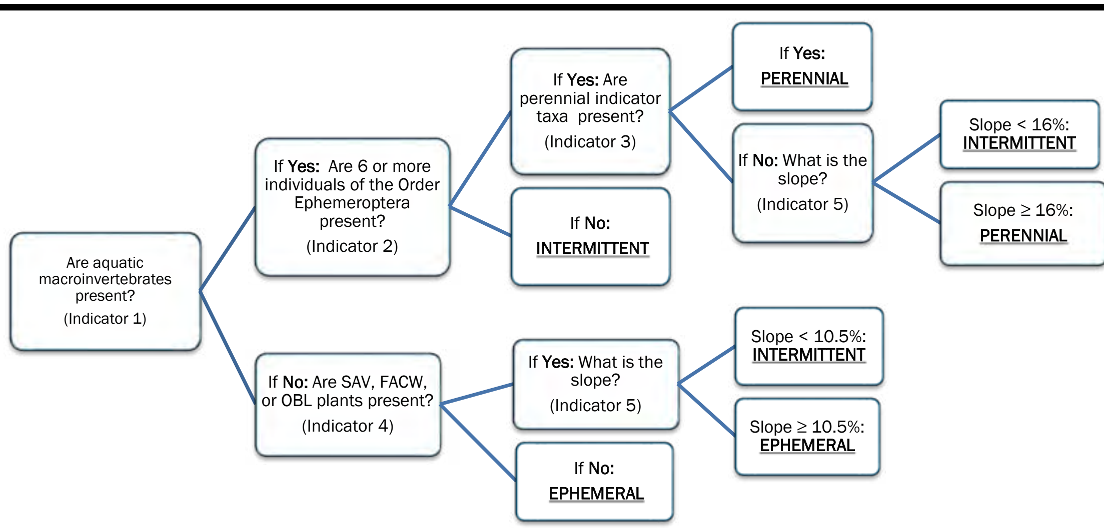
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	7%	

Conclusions



Single Indicators:
- ☐ Fish
- ☐ Amphibians

Finding:
- ☒ Ephemeral
- ☐ Intermittent
- ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

- ☐ Prolonged Abnormal Rainfall / Snowpack
  - ☐ Below Average
  - ☐ Above Average
- ☐ Natural or Anthropogenic Disturbance
- ☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-11. No photo. Reach is from start of channel to confluence.

Ancillary Information:

- ☐ Riparian Corridor
- ☐ Erosion and Deposition
- ☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/14/2021
Waterway Name S-12	Coordinates at downstream end (ddd.mm.ss) Lat. 46°33'13.17" N Long. 119°55'21.07" W
Reach Boundaries See Figure 4	

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

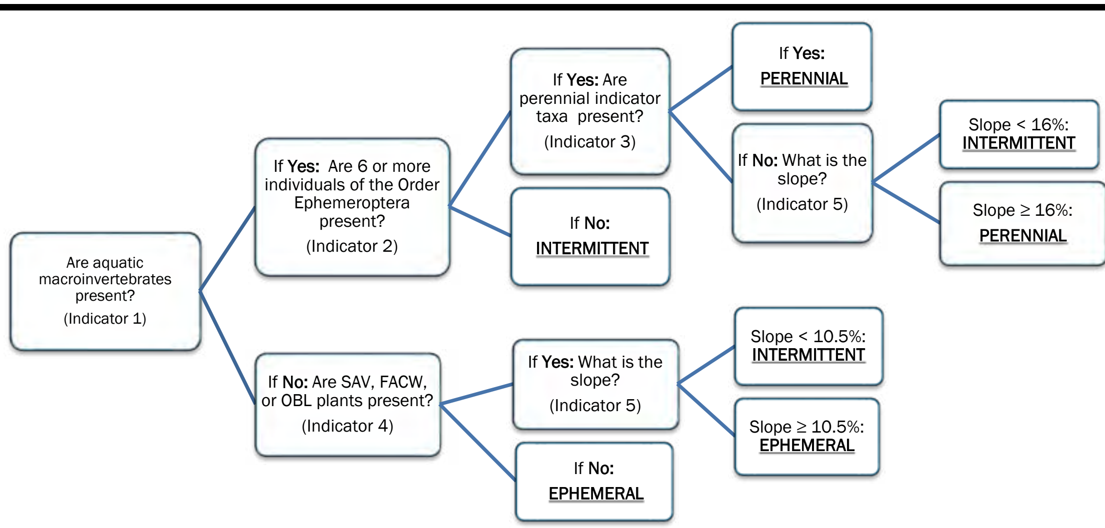
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__5%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

- ☐ Below Average
- ☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-12, Attachment C Photo Log, P-18. Reach is from Project Area Boundary to confluence.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/12/2021
Waterway Name S-13	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'36.16" N Long. 119°55'36.95" W
Reach Boundaries See Figure 4	
Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25 — ☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0____

Observations

Observed Wetland Plants (and indicator status):

None

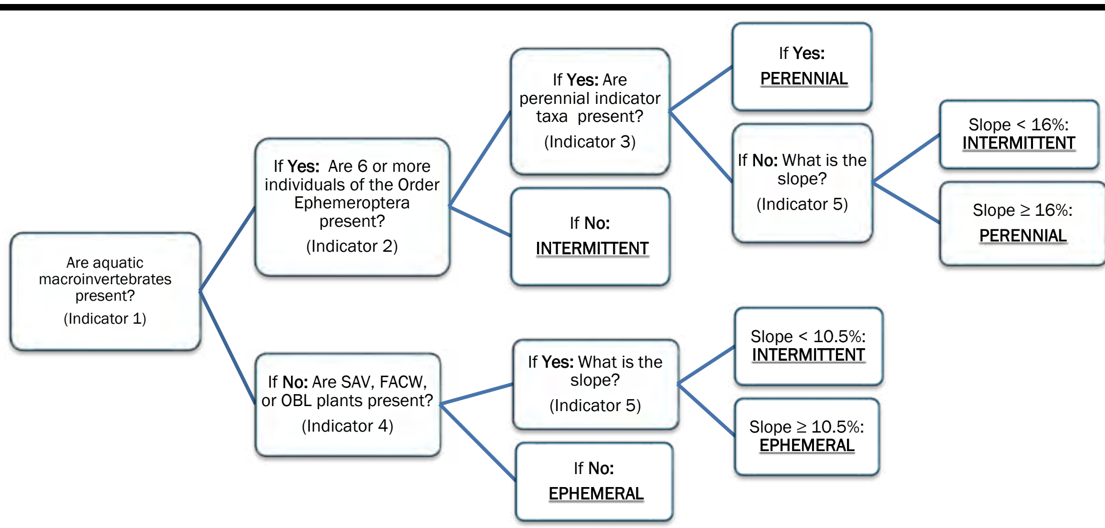
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	___6%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-13, Attachment C Photo Log, P-20. Reach is from Project Area Boundary to Project Area Boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date5/14/2021
Waterway Name S-14	Coordinates at downstream end (ddd.mm.ss) Lat. 46°33'13.17" N
Reach Boundaries See Figure 4	Long. 119°55'21.07" W

Precipitation w/in 48 hours (cm) 0 | Channel Width (m) 0.25 | ☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

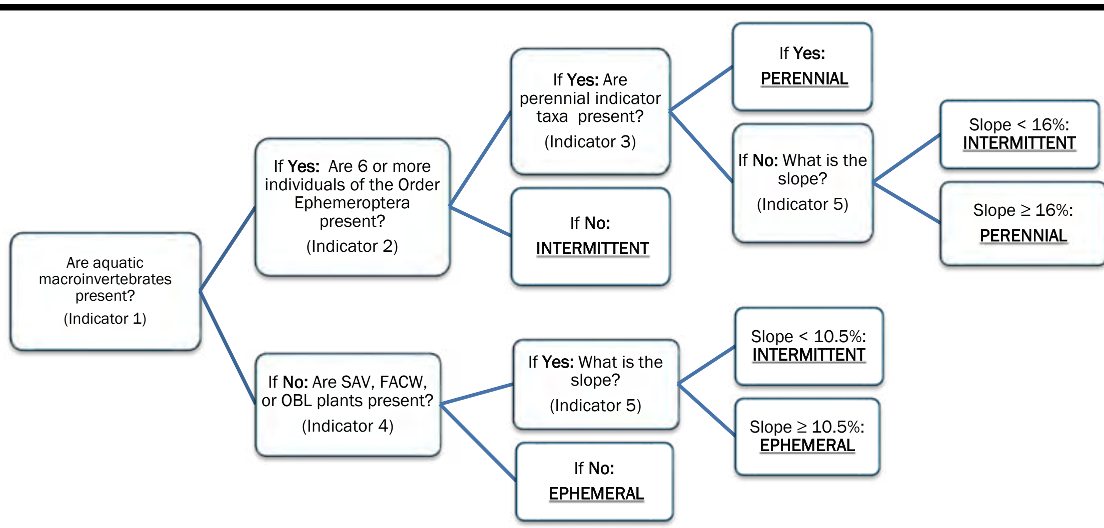
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__6%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

- ☐ Below Average
- ☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-14. Attachment C Photo Log, P-21. Reach is from Project Area Boundary to where channel flattens out.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/9/2021
Waterway Name S-15	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'7.44" N
Reach Boundaries See Figure 4	Long. 119°55'59.91" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	[x] Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

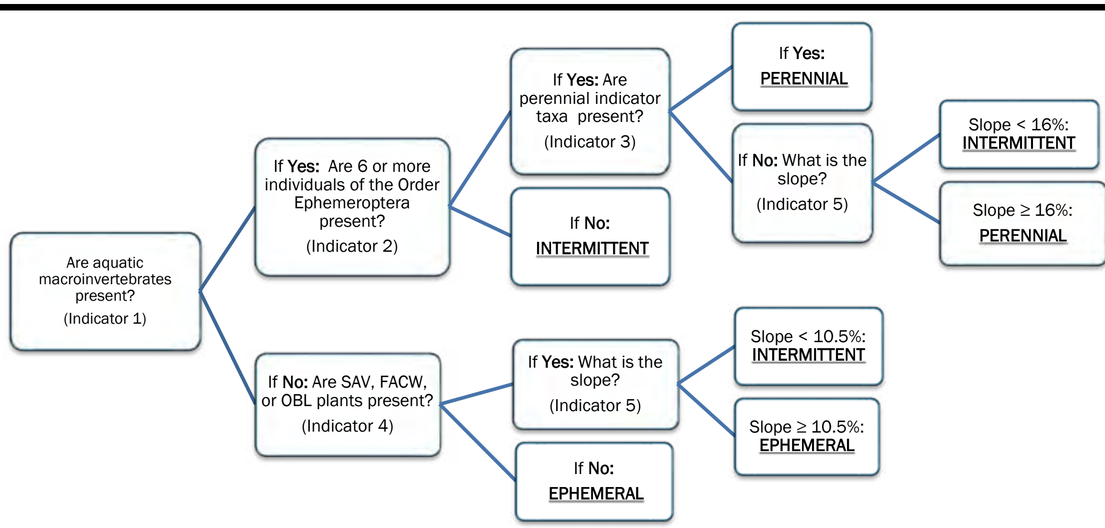
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	[X] No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	[X] No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	[X] No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	[X] No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: [x] Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance

Channel is crossed by two track road

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-15, Attachment C Photo Log, P-22. Reach is from From dirt 2-track upslope 100 ft

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/13/2021
Waterway Name S-16	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'26.67" N Long. 119°56'16.27" W
Reach Boundaries See Figure 4	
Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5
[X] Disturbed Site / Difficult Situation (Describe in "Notes")	

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0____

Observations

Observed Wetland Plants (and indicator status):

None

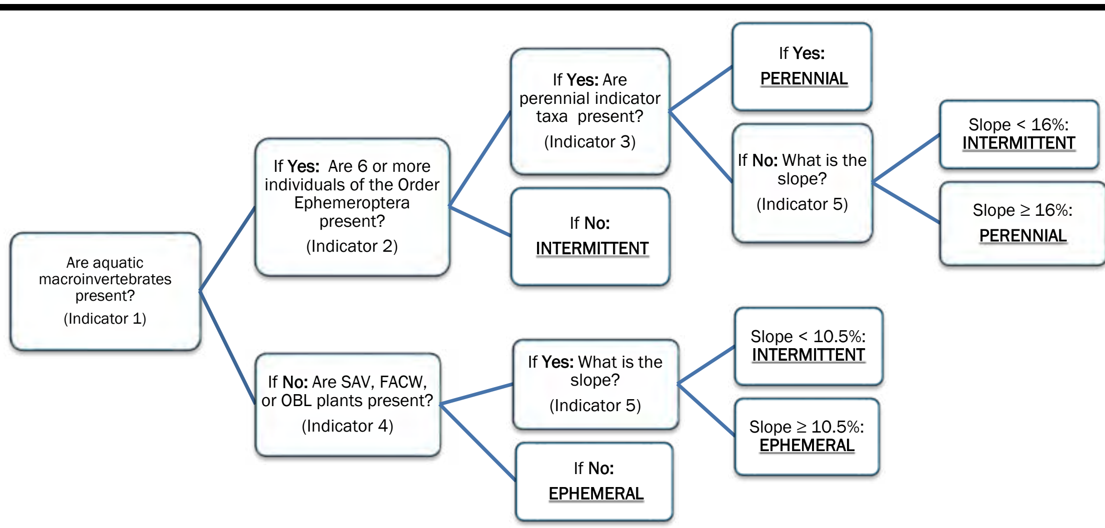
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	[ ] Yes	[X] No
2. Are 6 or more individuals of the Order Ephemeroptera present?	[ ] Yes	[X] No
3. Are perennial indicator taxa present? (refer to Table 1)	[ ] Yes	[X] No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	[ ] Yes	[X] No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2%	

Conclusions



Single Indicators:

[ ] Fish

[ ] Amphibians

Finding: [X] Ephemeral [ ] Intermittent [ ] Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☒ Natural or Anthropogenic Disturbance

Russian thistle and other dried vegetation are found in the majority of the channel and are piled up on the fence crossing the channel.

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-16, Attachment C Photo Log, P-23. Reach is from the site boundary to site boundary.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/11/2021
Waterway Name S-17	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'5.68" N
Reach Boundaries See Figure 4	Long. 119°57'14.01" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.5	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow_0______

% of reach w/any flow (surface or hyporheic) __0___

# of pools observed__0_____

Observations

Observed Wetland Plants (and indicator status):

None

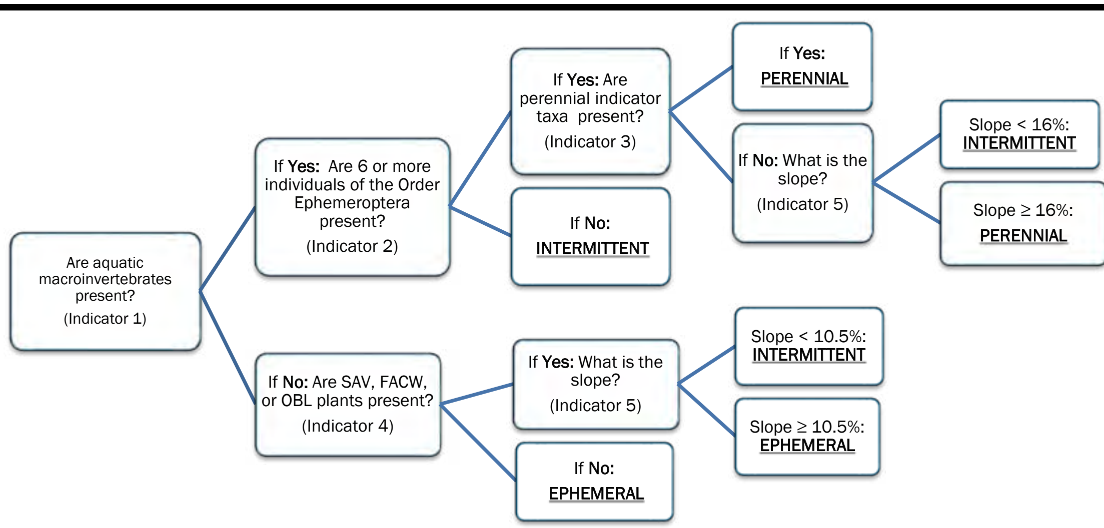
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemer-optera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	__2%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

☐ Prolonged Abnormal Rainfall / Snowpack

☐ Below Average

☐ Above Average

☐ Natural or Anthropogenic Disturbance

☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-17, Attachment C Photo Log, P-24. Reach is from confluence upslope 100 ft

.

Ancillary Information:

☐ Riparian Corridor

☐ Erosion and Deposition

☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Streamflow Duration Field Assessment Form

Project # / Name Ostrea Solar	Assessor EB
Address See Figure 4	Date 5/13/2021
Waterway Name S-18	Coordinates at downstream end (ddd.mm.ss) Lat. 46°32'3.1" N
Reach Boundaries See Figure 4	Long. 119°57'10.08" W

Precipitation w/in 48 hours (cm) 0	Channel Width (m) 0.25	☐ Disturbed Site / Difficult Situation (Describe in "Notes")

Observed Hydrology

% of reach w/observed surface flow 0

% of reach w/any flow (surface or hyporheic) 0

# of pools observed 0

Observations

Observed Wetland Plants (and indicator status):

None

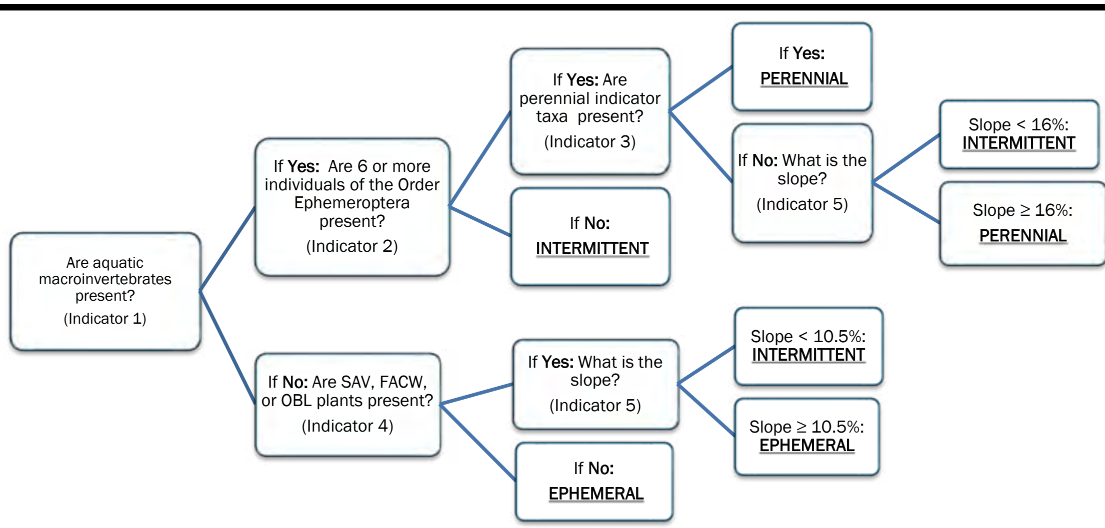
Observed Macroinvertebrates:

Taxon	Indicator Status	Ephemeroptera?	# of Individuals
None			

Indicators

1. Are aquatic macroinvertebrates present?	☐ Yes	☒ No
2. Are 6 or more individuals of the Order Ephemeroptera present?	☐ Yes	☒ No
3. Are perennial indicator taxa present? (refer to Table 1)	☐ Yes	☒ No
4. Are FACW, OBL, or SAV plants present? (Within ½ channel width)	☐ Yes	☒ No
5. What is the slope? (In percent, measured for the valley, not the stream)	1%	

Conclusions



Single Indicators:
☐ Fish
☐ Amphibians

Finding: ☒ Ephemeral ☐ Intermittent ☐ Perennial

Notes: (explanation of any single indicator conclusions, description of disturbances or modifications that may interfere with indicators, etc.)

Difficult Situation:

Describe situation. For disturbed streams, note extent, type, and history of disturbance.

- ☐ Prolonged Abnormal Rainfall / Snowpack
  - ☐ Below Average
  - ☐ Above Average
- ☐ Natural or Anthropogenic Disturbance
- ☐ Other: ______________________

Additional Notes: (sketch of site, description of photos, comments on hydrological observations, etc.) Attach additional sheets as necessary.

See Attachment B Figure 4, S-18, Attachment C Photo Log, P-25 and P-26. Reach is from From fence upslope to project boundary

Ancillary Information:

- ☐ Riparian Corridor
- ☐ Erosion and Deposition
- ☐ Floodplain Connectivity

Observed Amphibians, Snake, and Fish:

Taxa	Life History Stage	Location Observed	Number of Individuals Observed

Appendix B. Data Forms

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Ostrea City/County: Yakima, Yakima Sampling Date: 2020-07-01
Applicant/Owner: CCR State: Washington Sampling Point: W-01
Investigator(s): Nathalie Denis, Jay Lorenz Section, Township, Range: Sec 3 T12N R23E
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Hillside seepage Slope (%): 5 to 10
Subregion (LRR): LRR C Lat: 46.5522666 Long: -119.9228425 Datum: WGS84
Soil Map Unit Name: Willis silt loam, 8 to 15 percent slopes NWI classification: R4SBC
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____

Remarks:

Covertype is PEM. Area is wetland, all three wetland parameters are present.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: ________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 feet)			
1. *Phalaris arundinacea*	5	Yes	FACW
2. *Cirsium arvense*	2	Yes	FACU
3. *Lotus corniculatus*	2	Yes	FAC
4. *Carex stipata*	2	Yes	OBL
5.			
6.			
7.			
8.			
	11	= Total Cover	
Woody Vine Stratum (Plot size: ________)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 89 % Cover of Biotic Crust ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	75	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply By:	
OBL species	2	x 1 =	2
FACW species	5	x 2 =	10
FAC species	2	x 3 =	6
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals	11 (A)		26 (B)

Prevalence Index = B/A = 2.4

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤ 3.0[1]

____ Morphological Adaptation[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: W-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 11	10YR 3/1	100					Gravelly Loam	

[1]Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS = Covered or Coated Sand Grains. [2]Location: PL = Pore Lining, M = Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- _✓_ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5) **(LRR C)**
- ____ 1 cm Muck (A9) **(LRR D)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Loamy Mucky Mineral (F1)
- ____ Loamy Gleyed Matrix (F2)
- _✓_ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR C)**
- ____ 2 cm Muck (A10) **(LRR B)**
- ____ Reduced Vertic (F18)
- ____ Red Parent Material (TF2)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? Yes _✓_ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- _✓_ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1) **(Nonriverine)**
- ____ Sediment Deposits (B2) **(Nonriverine)**
- ____ Drift Deposits (B3) **(Nonriverine)**
- ____ Surface Soil Cracks (B6)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Salt Crust (B11)
- ____ Biotic Crust (B12)
- ____ Aquatic Invertebrates (B13)
- _✓_ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ____ Water Marks (B1) **(Riverine)**
- ____ Sediment Deposits (B2) **(Riverine)**
- ____ Drift Deposits (B3) **(Riverine)**
- ____ Drainage Patterns (B10)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Shallow Aquitard (D3)
- _✓_ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _✓_ No ____	Depth (inches): 1
Water Table Present?	Yes ____ No _✓_	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ____ No _✓_	Depth (inches):

Wetland Hydrology Present? Yes _✓_ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Some water in little hole on side of drainage otherwise soil wet but not saturated. Sulfur odor.

Remarks:

The criterion for wetland hydrology is met.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Ostrea **City/County:** Yakima, Yakima **Sampling Date:** 2020-07-01
Applicant/Owner: CCR **State:** WA **Sampling Point:** U-01
Investigator(s): Nathalie Denis, Jay Lorenz **Section, Township, Range:** Sec 3 T12N R23E
Landform (hillslope, terrace, etc.): Hillslope **Local relief (concave, convex, none):** Hillside seepage **Slope (%):** 5 to 10
Subregion (LRR): LRR C **Lat:** 46.552533 **Long:** -119.922827 **Datum:** WGS84
Soil Map Unit Name: Willis silt loam, 8 to 15 percent slopes **NWI classification:** Herbaceous Upland
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓

Remarks:

Covertype is UPL.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 feet)			
1. *Asclepias speciosa*	5	Yes	FAC
2. *Achillea millefolium*	3	Yes	FACU
3. *Bromus tectorum*	2	No	UPL
4. *Tragopogon dubius*	1	No	UPL
5.			
6.			
7.			
8.			
	11	= Total Cover	
Woody Vine Stratum (Plot size: ________)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 89 **% Cover of Biotic Crust** ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50	(A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply By:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	3	x 4 =	12
UPL species	3	x 5 =	15
Column Totals	11	(A)	42 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤ 3.0[1]

____ Morphological Adaptation[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: U-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type¹	Loc²	Texture	Remarks
0 - 12	10YR 3/2	100					Gravelly	

¹Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS = Covered or Coated Sand Grains. ²Location: PL = Pore Lining, M = Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

_____ Histosol (A1)
_____ Histic Epipedon (A2)
_____ Black Histic (A3)
_____ Hydrogen Sulfide (A4)
_____ Stratified Layers (A5) **(LRR C)**
_____ 1 cm Muck (A9) **(LRR D)**
_____ Depleted Below Dark Surface (A11)
_____ Thick Dark Surface (A12)
_____ Sandy Mucky Mineral (S1)
_____ Sandy Gleyed Matrix (S4)
_____ Sandy Redox (S5)
_____ Stripped Matrix (S6)
_____ Loamy Mucky Mineral (F1)
_____ Loamy Gleyed Matrix (F2)
_____ Depleted Matrix (F3)
_____ Redox Dark Surface (F6)
_____ Depleted Dark Surface (F7)
_____ Redox Depressions (F8)
_____ Vernal Pools (F9)

Indicators for Problematic Hydric Soils³:

_____ 1 cm Muck (A9) **(LRR C)**
_____ 2 cm Muck (A10) **(LRR B)**
_____ Reduced Vertic (F18)
_____ Red Parent Material (TF2)
_____ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

_____ Surface Water (A1)
_____ High Water Table (A2)
_____ Saturation (A3)
_____ Water Marks (B1) **(Nonriverine)**
_____ Sediment Deposits (B2) **(Nonriverine)**
_____ Drift Deposits (B3) **(Nonriverine)**
_____ Surface Soil Cracks (B6)
_____ Inundation Visible on Aerial Imagery (B7)
_____ Water-Stained Leaves (B9)
_____ Salt Crust (B11)
_____ Biotic Crust (B12)
_____ Aquatic Invertebrates (B13)
_____ Hydrogen Sulfide Odor (C1)
_____ Oxidized Rhizospheres on Living Roots (C3)
_____ Presence of Reduced Iron (C4)
_____ Recent Iron Reduction in Tilled Soils (C6)
_____ Thin Muck Surface (C7)
_____ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

_____ Water Marks (B1) **(Riverine)**
_____ Sediment Deposits (B2) **(Riverine)**
_____ Drift Deposits (B3) **(Riverine)**
_____ Drainage Patterns (B10)
_____ Dry-Season Water Table (C2)
_____ Crayfish Burrows (C8)
_____ Saturation Visible on Aerial Imagery (C9)
_____ Shallow Aquitard (D3)
_____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches):

Water Table Present? Yes _____ No ✓ Depth (inches):

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches):

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

Appendix C. Photographs

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Photo ID: P-1 Date Taken: 7/1/2020 Photo Direction: N Description: Wetland W-01 wetland soil pit.	
Photo ID: P-2 Date Taken: 7/1/2020 Photo Direction: S Description: Wetland W-01 upland soil pit (U-01).	

Photo ID: P-3

Date Taken: 5/10/2021

Photo Direction: NE

Description:

Channel S-1, looking upstream.

Photo ID: P-4

Date Taken: 5/10/2021

Photo Direction: NW

Description:

Channel S-2, looking upstream.

Photo ID: P-5 Date Taken: 5/10/2021 Photo Direction: NE Description: Channel S-3, looking upstream.	
Photo ID: P-6 Date Taken: 5/10/2021 Photo Direction: NW Description: Channel S-2, looking upstream.	

Photo ID: P-7	
Date Taken: 7/2/2020	
Photo Direction: N	
Description: Channel S-5, looking upstream.	
Photo ID: P-8	
Date Taken: 5/10/2021	
Photo Direction: NE	
Description: Channel S-4, looking upstream. Dried tumbleweeds are found along portions of the channel.	

<table>
<tr><td>Photo ID: P-9</td><td rowspan="4"></td></tr>
<tr><td>Date Taken: 7/2/2020</td></tr>
<tr><td>Photo Direction: NW</td></tr>
<tr><td>Description:

Channel S-5, looking upstream. Dried tumbleweeds are found along portions of the channel.</td></tr>
<tr><td>Photo ID: P-10</td><td rowspan="4"></td></tr>
<tr><td>Date Taken: 5/14/2021</td></tr>
<tr><td>Photo Direction: N</td></tr>
<tr><td>Description:

Channel S-4.</td></tr>
</table>

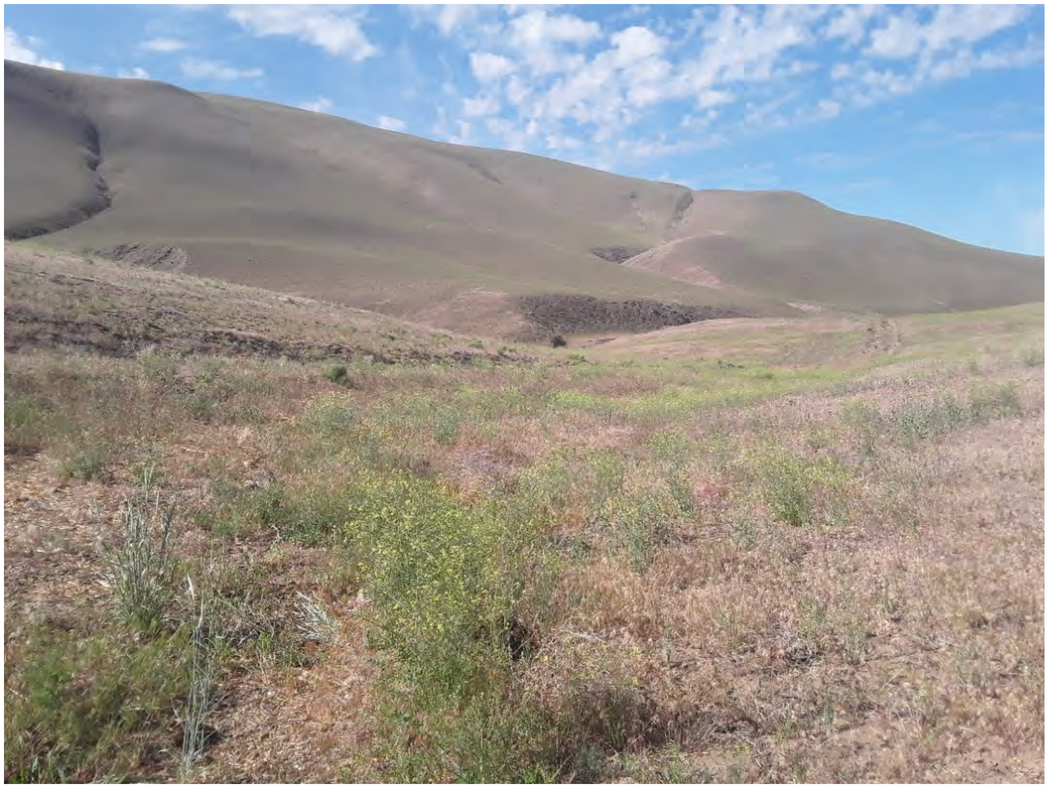
Photo ID: P-11	
Date Taken: 5/10/2021	
Photo Direction: SW	
Description: Channel S-5, looking downstream. Very faint OHWM between the highway and S-9	
Photo ID: P-12	
Date Taken: 5/9/2021	
Photo Direction: N	
Description: Channel S-6, looking upstream. Dried tumbleweeds are found along portions of the channel.	

Photo ID: P-13	
Date Taken: 7/1/2020	
Photo Direction: NW	
Description: Channel S-7, looking upstream	
Photo ID: P-14	
Date Taken: 5/10/2021	
Photo Direction: N	
Description: Channel S-8, looking upstream. Dried tumbleweeds are found along portions of the channel.	

Photo ID: P-15	
Date Taken: 7/2/2020	
Photo Direction: N	
Description: Channel S-7, looking upstream. Dried tumbleweeds are found along portions of the channel.	
Photo ID: P-16	
Date Taken: 7/1/2021	
Photo Direction: SW	
Description: S-7, looking downstream.	

Photo ID: P-17	
Date Taken: 7/1/20	
Photo Direction: SE	
Description: S-9, looking downstream.	
Photo ID: P-18	
Date Taken: 7/1/2021	
Photo Direction: N	
Description: S-12, looking upstream.	

Photo ID: P-19	
Date Taken: 7/1/2020	
Photo Direction: NW	
Description: Channel S-10, looking upstream	
Photo ID: P-20	
Date Taken: 7/11/2021	
Photo Direction: SE	
Description: S-13, looking downstream.	

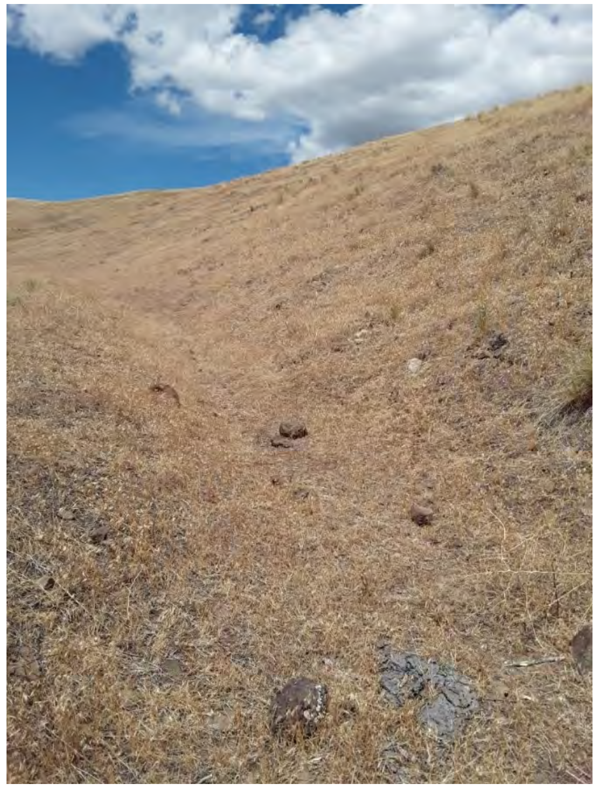
Photo ID: P-21 Date Taken: 6/30/20 Photo Direction: NW Description: S-14, looking upstream.	
Photo ID: P-22 Date Taken: 7/1/20 Photo Direction: E Description: S-15, looking across the stream.	

Photo ID: P-23

Date Taken: 7/9/2021

Photo Direction: SE

Description:

S-16, looking downstream.

Photo ID: P-24

Date Taken: 7/11/2020

Photo Direction: NW

Description:

S-17, looking upstream.

Photo ID: P-25	
Date Taken: 7/1/2020	
Photo Direction: NW	
Description: S-18, looking upstream.	
Photo ID: P-26	
Date Taken: 5/14/2021	
Photo Direction: NW	
Description: NWI/NHD feature. No OHWM indicators were observed in the field.	

Photo ID: P-27	
Date Taken: 5/9/2021	
Photo Direction: NW	
Description: NWI/NHD feature. No OHWM indicators were observed in the field.	
Photo ID: P-28	
Date Taken: 5/14/2021	
Photo Direction: NW	
Description: NWI/NHD feature. No OHWM indicators were observed in the field.	

Photo ID: P-29	
Date Taken: 6/30/2020	
Photo Direction: E	
Description: NWI/NHD feature. No OHWM indicators were observed in the field.	
Photo ID: P-30	
Date Taken: 5/9/2021	
Photo Direction: N	
Description: NWI/NHD feature. No OHWM indicators were observed in the field.	

Photo ID: P-31 Date Taken: 5/14/2021 Photo Direction: N Description: NWI/NHD feature. Predominantly upland swale that had filled with dried tumbleweeds. Discontinuous OHWM indicators were observed in the field. See P-33 for where NWI/NHD features shows a connection to S-9. No OWHM indicators were observed at P-33.	
Photo ID: P-32 Date Taken: 7/9/2021 Photo Direction: SE Description: Culvert under SR-24 on S-7. Culvert opening is filled with dried tumbleweed.	

Photo ID: P-33 Date Taken: 5/14/2021 Photo Direction: NW Description: NWI/NHD feature. No OHWM indicators observed in the field.	
Photo ID: P-34 Date Taken: 5/14/2021 Photo Direction: N Description: NWI/NHD feature. No OHWM indicators observed in the field.	

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Appendix D. Typical Culvert Installation

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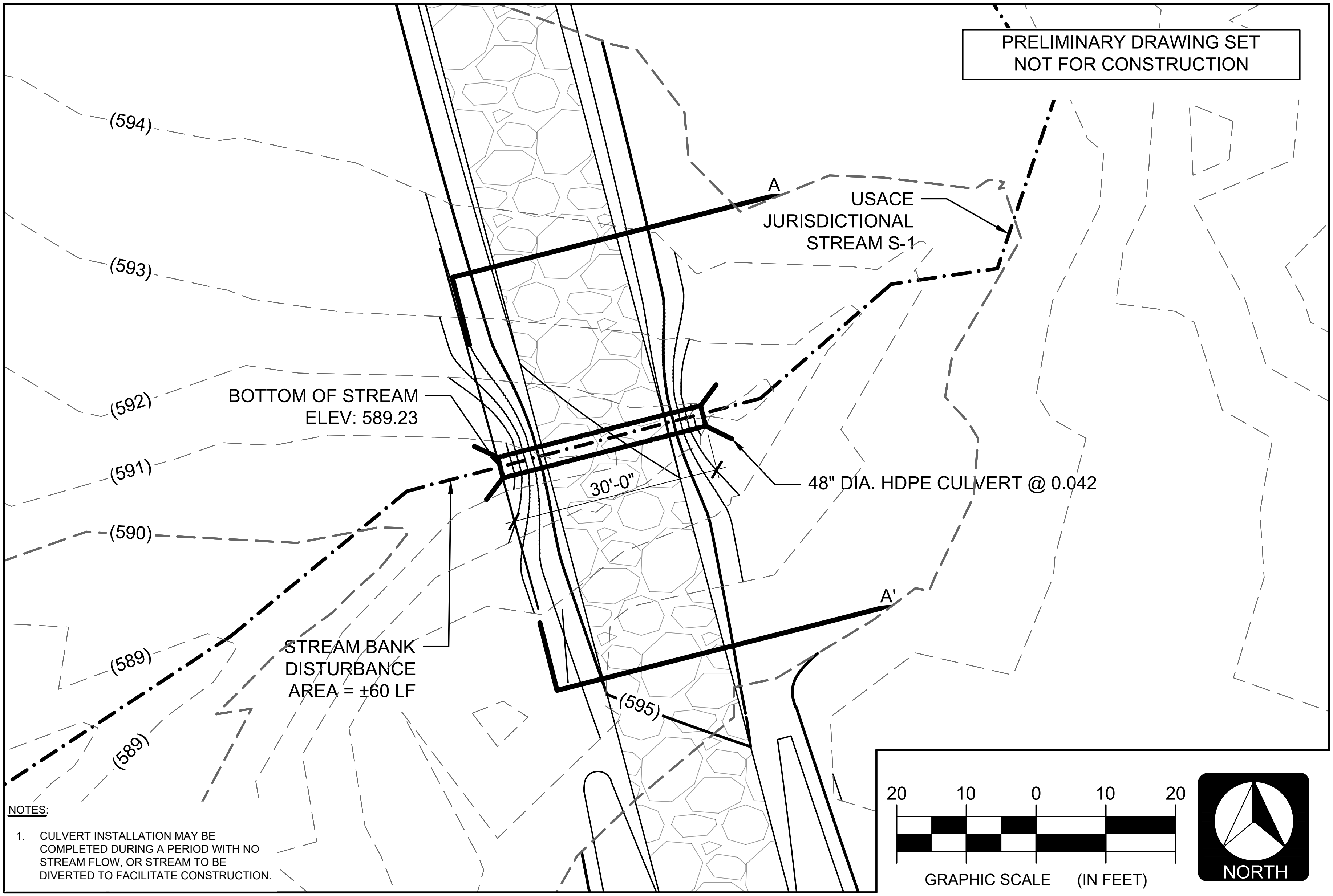


NOTES:

1. CULVERT INSTALLATION MAY BE COMPLETED DURING A PERIOD WITH NO STREAM FLOW, OR STREAM TO BE DIVERTED TO FACILITATE CONSTRUCTION.

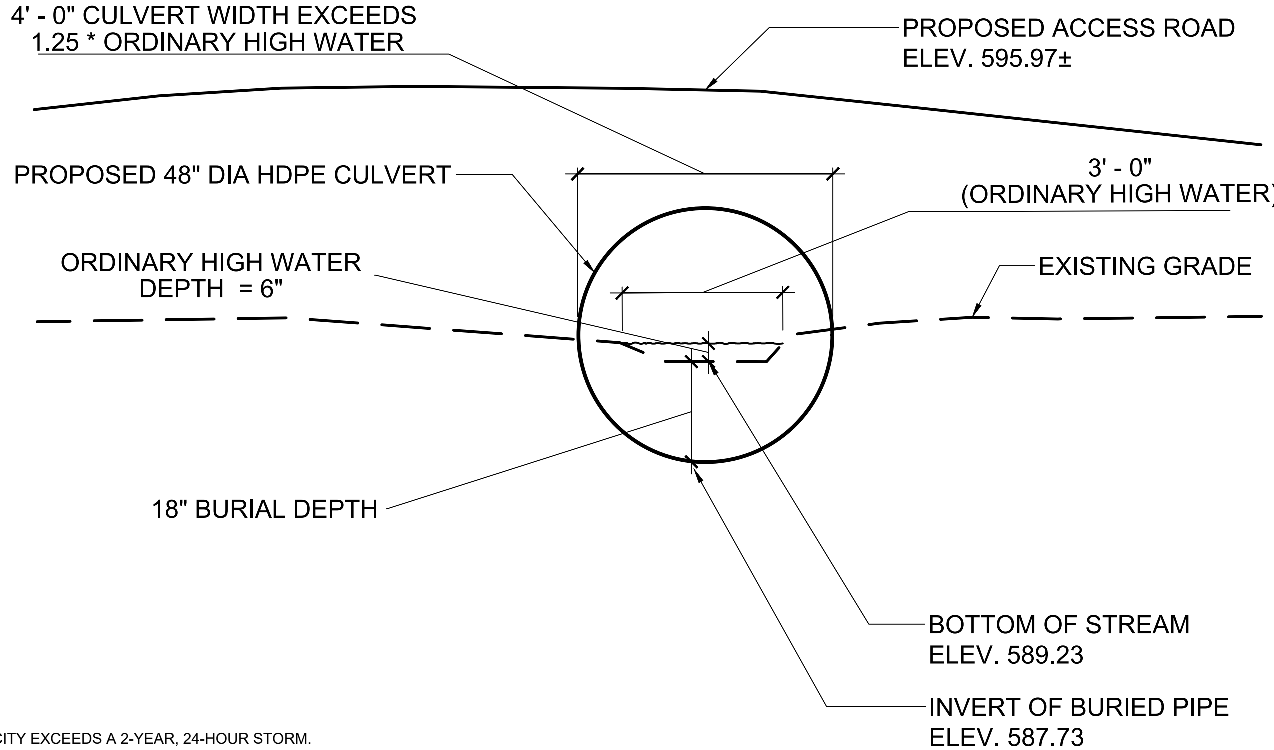
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1000
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: TAYANDENEGA SOLAR	
DRAWING TITLE: S-1 CULVERT PLAN	
DRAWN BY: PJW	CHECKED BY: CB

EDR JOB NUMBER: 19047	
DRAWING NUMBER: FIG-1	
SCALE: 1" = 20'	DATE: 03/11/2020

J:\19047 Tayandenega Solar\Cad\Working Drawings\19047_Culvert Analysis_Working.dwg

PRELIMINARY DRAWING SET
NOT FOR CONSTRUCTION



NOTES:

1. CULVERT CAPACITY EXCEEDS A 2-YEAR, 24-HOUR STORM.
2. THE WIDTH OF THE STREAM AT ORDINARY HIGH WATER IS THE SAME AS THE BANK-FULL WIDTH.

1 CULVERT ELEVATION A-A' - FIG-1 FOR LOCATION

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Landscape Architecture, Engineering
& Environmental Services, D.P.C.
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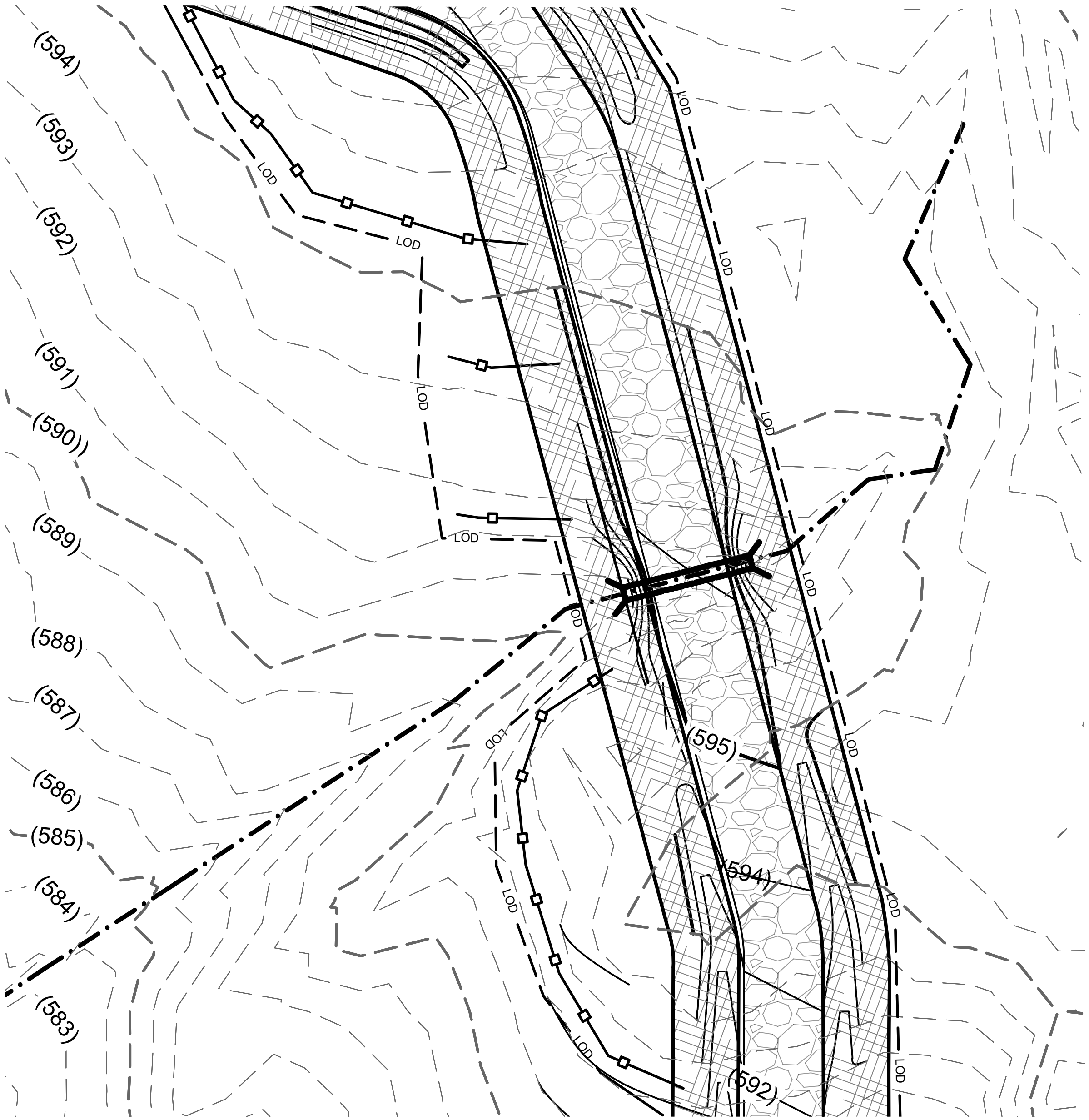
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **TAYANDENEGA SOLAR**	
DRAWING TITLE: **S-1 CULVERT DETAILS**	
DRAWN BY: **PJW**	CHECKED BY: **CB**

EDR JOB NUMBER: **19047**	
DRAWING NUMBER: FIG-2	
SCALE: **N.T.S.**	DATE: **03/11/2020**

J:\19047 Tayandenega Solar\Cad\Working Drawings\19047_Culvert Analysis_Working.dwg

PRELIMINARY DRAWING SET
NOT FOR CONSTRUCTION

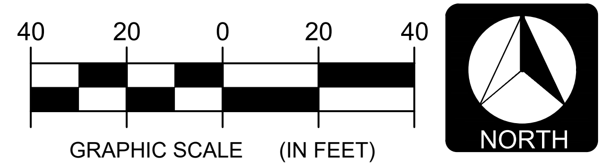


LEGEND

ITEM	SYMBOL
PROPOSED ACCESS ROAD	
ROLLED EROSION CONTROL PRODUCT (RECP)	
LIMITS OF DISTURBANCE	LOD
PROPOSED CULVERT	
SILT FENCE	

NOTES:

1. SEE FIG-1 FOR NOTES.
2. ROLLED EROSION CONTROL PRODUCT (RECP) SHALL BE TENSAR NORTH AMERICAN GREEN SC150, OR APPROVED EQUAL.

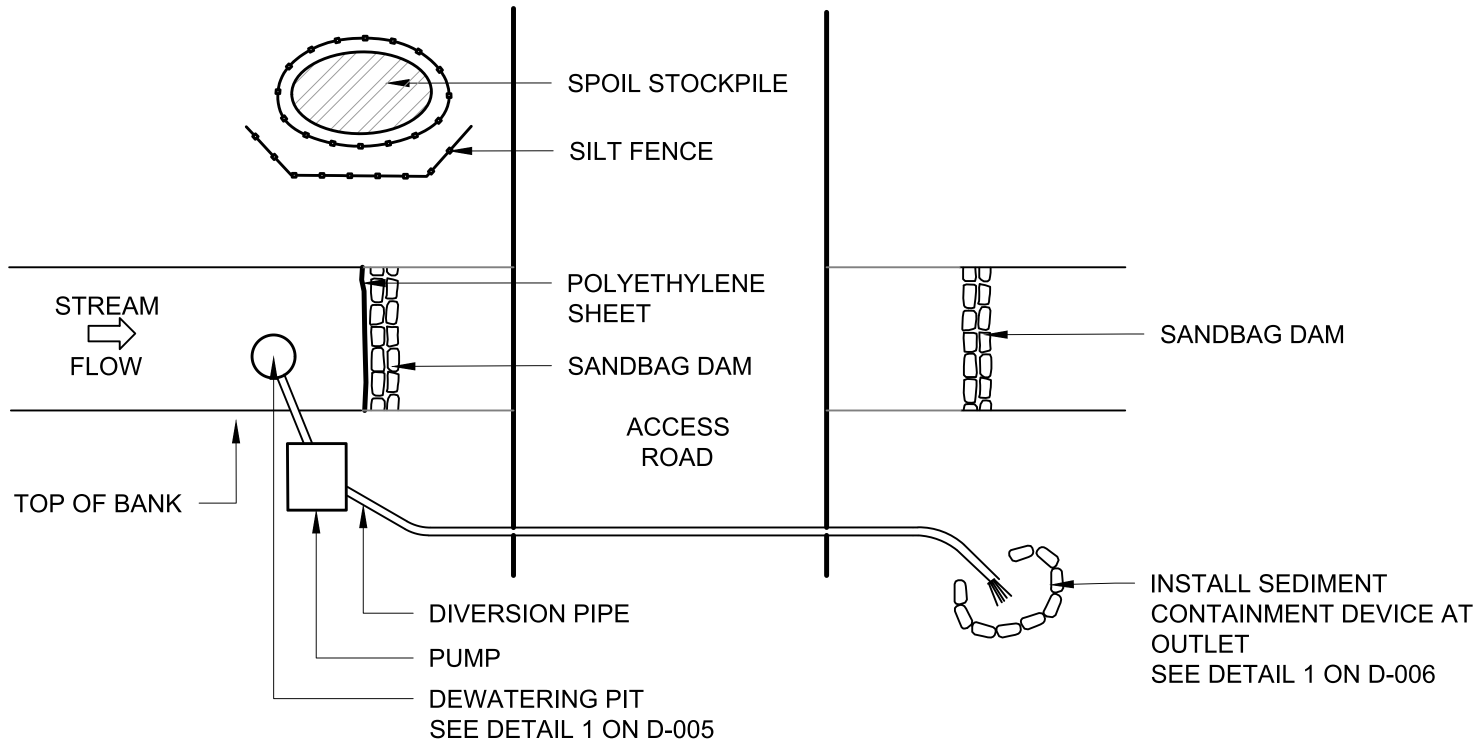


Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1000
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **TAYANDENEGA SOLAR**	EDR JOB NUMBER: **19047**
DRAWING TITLE: **S-1 CULVERT EROSION & SEDIMENT CONTROL PLAN**	DRAWING NUMBER: FIG-3
DRAWN BY: **PJW** / CHECKED BY: **CB**	SCALE: **1" = 40'** / DATE: **03/11/2020**

J:\19047 Tayandenega Solar\Cad\Working Drawings\19047_Culvert Analysis_Working.dwg

PRELIMINARY DRAWING SET
NOT FOR CONSTRUCTION



PLAN

1 TEMPORARY STREAM DIVERSION SCHEMATIC

Scale: NTS

TEMPORARY

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Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: TAYANDENEGA SOLAR	EDR JOB NUMBER: 19047
DRAWING TITLE: S-1 CULVERT DETAILS	DRAWING NUMBER: D-003
DRAWN BY: PJW / CHECKED BY: CB	SCALE: N.T.S. / DATE: 03/11/2020

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October 28, 2020
Preliminary Hydrologic & Hydraulic Assessment Ostrea Solar Project, Yakima County Washington

Prepared for:

Ostrea Solar, LLC.

Prepared by:

SIERRA OVERHEAD ANALYTICS

18859 Microtronics Way, Suite B7
Sonora, CA 95370

SIERRA OVERHEAD ANALYTICS

Table of Contents

Table 1: Table of Data Sources

Data Type	Data Source
Elevation Data	National Map Data Elevation Mapping – 1 arc second
Rainfall	NOAA Atlas 2 Rainfall Data, taken at the centroid of each basin
Soils Data	NRCS/SSURGO Soils Information
Flood Zones	FEMA Firm Panels and Shapefiles
Land Use	USDA Shapefiles

Introduction

On behalf of Ostrea Solar, LLC Sierra Overhead Analytics, Inc (SOA) has prepared this hydrology report (report) for the Ostrea Solar Project, located in Yakima County, Washington. This report summarizes the results of the hydrology study which was performed to assess peak flows and flood risk across the project site. A rainfall-runoff model was developed using HEC-HMS to determine the impacts from a 100-year recurrence interval storm event. A two-dimensional (2D) hydraulic model was developed for the 100-year storm using HEC-RAS rain on grid modeling to assess on-site depth and velocity during a large storm. Publicly available rainfall data, United States Department of Agriculture (USDA) SSURGO database soils data, land use mapping, and United States Geological Survey (USGS) digital elevation mapping (DEM) topographic data was used to delineate the watersheds and to approximate runoff volumes across the project area. The methods used in this report generally follow the guidelines of the National Resource Conservation Service (NRCS), and HEC documentation. Relevant excerpts are contained in **Appendix A.**

1. Site Description/Existing Conditions

The site is in Yakima County, approximately ten miles south of Desert Aire, Washington, is bounded to the south by State Route 24, and surrounded by, range land, or agricultural land. The approximate center point of the project is located at: 46.566667˚N, -120.134833˚W. The project site is primarily agricultural/range land that appears to be well kept and is oriented on a generally south-facing hillside. Multiple small channels are evident in satellite imagery and hydraulic modeling results. None of the man-made structures near the site appear to have a great effect on the hydraulics of the project site. The entirety of the project is located within a FEMA Zone X flood zone.

1.1. Pre-Development Drainage

The existing drainages are characterized by primarily agricultural/range land. The site model contains 11 sub-basins (9 on-site basins), which generally drain to the south or southwest. Channelized areas of flow are found on site as evidenced by modeled flow patterns and satellite imagery. The site is generally gradually sloping with some moderate to high velocity flow found in the channelized portions of the site. Little ponding of water is shown in the models beyond mapped ponding locations.

The site falls entirely in FEMA Zone X – outside of the 100-year floodplain.

1.2. Site Soils

NRCS soils mapping and land use shows on site soils ranging from A to D, representing well-draining to poorly draining soil and low to high runoff potential when saturated. The average curve number for the site is approximately 70, meaning that of the approximate 2.2 inches of water that falls on the site during the 100-year return period storm, 1.5 inches will be excess flow that will impact onsite and downstream structures. Within the site boundaries, erosion potential appears to be low to moderate based on computational modeling. A list of soils types has been included in Table 1. Soil Conservation Service area-weighted curve numbers ranged from 60-81, as shown in Appendix 2.

1.3. Topography

Due to the size of the basins affecting the construction location, SOA utilized National Map Data to create the model domain. The site has general southern exposure, with all basins draining to the south or southwest.

Table 2: Basin Soil Types

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Bakeoven very cobbly silt loam, 0 to 30 percent slopes	83.1	5.30%
33	Esquatzel silt loam, 2 to 5 percent slopes	2.8	0.20%
35	Finley fine sandy loam, 0 to 5 percent slopes	32.1	2.10%
36	Finley cobbly fine sandy loam, 0 to 5 percent slopes	6	0.40%
58	Hezel loamy fine sand, 2 to 15 percent slopes	3.5	0.20%
65	Kiona stony silt loam, 15 to 45 percent slopes	93.5	6.00%
68	Lickskillet very stony silt loam, 5 to 45 percent slopes	10	0.60%
81	Mikkalo silt loam, 15 to 30 percent slopes	15.2	1.00%
83	Moxee silt loam, 2 to 15 percent slopes	559.1	35.70%
127	Scooteney cobbly silt loam, 0 to 5 percent slopes	17.8	1.10%
129	Selah silt loam, 5 to 8 percent slopes	30.8	2.00%
130	Selah silt loam, 8 to 15 percent slopes	80.7	5.20%
132	Shano silt loam, 2 to 5 percent slopes	75.9	4.80%
142	Starbuck silt loam, 2 to 15 percent slopes	30.2	1.90%
143	Starbuck-Rock outcrop complex, 0 to 45 percent slopes	59.5	3.80%
179	Warden silt loam, 8 to 15 percent slopes	10.1	0.60%
180	Warden silt loam, 15 to 30 percent slopes	12.3	0.80%
187	Willis silt loam, 2 to 5 percent slopes	56.6	3.60%
189	Willis silt loam, 8 to 15 percent slopes	383.7	24.50%
208	Kiona stony silt loam, 15 to 45 percent slopes	1.5	0.10%
209	Lickskillet very stony silt loam, 5 to 45 percent slopes	0.9	0.10%
214	Willis silt loam, 8 to 15 percent slopes	0.2	0.00%
215	Bakeoven very cobbly silt loam, 0 to 30 percent slopes	0.3	0.00%
Totals for Area of Interest		**1565.90**	100%

2. Methods

2.1. Computational Hydrologic Modeling

HEC-1 modeling software was used to calculate the rainfall-runoff hydrographs for the basins. Pre-construction and post-construction HEC-1 models were created and run for 100-year return period storm. It should be noted that upon final design the engineer of record shall establish that the selected BMP and other water quantity and quality measures adhere to the standards set forth by the governing AHJ. No specific requirements could be found for this area of Washington for the purpose of this model.

2.1.1. Basin Delineation

Basins impacting the site were delineated using TOPAZ software, ARCGIS basin delineation mapping, and National Map Data Publicly Available Data. For the purpose of one-dimensional hydrologic routing, nine basins were delineated across the site. Locations and boundaries of the basins are shown in Figure 4. Shapefiles of the basin outlines and 1D flow centerlines are available upon request.

2.1.2. Rainfall

Rainfall depth was determined at the centroid of each basin through NOAA ATLAS 2. Given the nature of the mapping, the entire site was modeled to receive 1.5″ of rainfall in the 100-year 24-hour event. Rainfall for each basin was temporally distributed through use of the Type-II, 24-hour storm. The basins' main characteristics (e.g. area, curve numbers) are shown in **Table 2**. Full information about each basin is given in **Appendix B.**

Table 3: Basin Drainage Data

Basin	1B	2B	6B	7B	8B	9B	10B	12B	13B	14B
Area (mi^2)	**2.741**	**0.386**	**0.269**	**1.126**	**1.185**	**0.436**	**0.629**	**0.735**	**0.491**	2.62
Pre-CN	69.98	73.37	77.15	73.63	60.08	63.37	71.13	69.19	81.56	68.86

For this site, it is anticipated that the solar arrays will be spaced accordingly for evaluation as a pervious surface and that native vegetation will largely remain or be replanted at the end of construction. Therefore, an estimate for only gravel roads and concrete pads was considered for the post-construction impervious percentage for all basins. Further investigation of the final site layout should be undertaken before a final pervious/non-pervious areal estimate for the system is made.

2.1.3. Curve Numbers

Basin curve numbers for the existing condition were determined using SSURGO soils data and USDA land use data. Composite curve numbers were determined from percent areas of each soil type / land use combination, typical values for which are available in TR-55 **Appendix A**. The soil curve numbers used were estimated according to NRCS method as per TR-55. The pre-construction conditions assumed zero impervious area unless otherwise stated in the detailed curve number calculation, **Appendix B**. Post-construction curve numbers are discussed in the previous section. The current curve numbers are approximations, and will be verified by site geotechnical reports.

2.1.4. Time of Concentration

Lag time was calculated using the SCS Unit Hydrograph method, the equation for which is:

$$T_{lag} = \frac{L^{0.8}(S+1)^{0.7}}{1900\ (\%Slope)^{0.5}}$$

L is the longest drainage path in feet, S = (1000/CN)-10, CN is SCS curve number, and %Slope is the average slope of the watershed, determined through topographic analysis. Time of Concentration is determined by dividing Lag Time by 0.6.

2.1.5. Antecedent Moisture Condition

Antecedent Moisture condition (AMC) is defined by the USDA as the preceding relative moisture of the pervious surfaces prior to the rainfall event. The "Average" AMC-II condition was used for the site. This resulted in no modification to the curve numbers calculated in Section 4.1.3.

2.2. 2D Hydraulic Modeling

A 2D hydraulic model was developed for the 100-year storm event to model maximum depths and velocities across the site for the pre-construction scenario. The chosen modeling software was HEC-RAS. Grid cells of 40 feet by 40 feet were used for the model. Topography was interpolated to the grid cells based on the LiDAR data also used to delineate and route the one-dimensional flood waves on Section 4.1. An average Manning's n value of 0.1 was assigned to each open area / cropland grid cell to represent a mix of croplands and light brush. Heavily forested areas and channels were assigned a Manning's n value of 0.085 to represent vegetation-lined channels as was observed on site. The 100-year rainfall return event was temporally distributed using the Type II curve and was used as in input to the rain-on-grid HEC-RAS model.

The two-dimensional set of equations was solved using the diffuse wave method. Stability was maintained through variable timestepping dictated by maximal and minimal Courant numbers (0.25 and 0.95, respectively). The small cell size dictated a small timestep, on average around 3.5 seconds.

Only excess rainfall was modeled as contributing to overland flow. Initial abstraction was calculated by the following equation, where λ is a fixed initial abstraction parameter (0.2) and CN is the average Curve Number of the site, estimated at 70 for this site:

$$I_a = \lambda\left(\frac{1000}{CN} - 10\right) = 0.7\ inches\ of\ water$$

3. Discussion of Post Construction BMP

As previously stated, this model and its results generally assume that the site is maintained, post-construction, to pre-construction levels and types of vegetative cover. The model results also assume that only gravel roads and concrete pads will be added to the sub basins as impervious surfaces.

No infiltration basins have been modeled. Given the assumptions listed above, increase to surface runoff is minimal to moderate, and should be able to be remediated using vegetative cover or lined channels therefore maximizing buildable area on site.

Final design and infiltration parameters shall be the responsibility of the Civil EOR chosen for the project.

4. Results

4.1. Computational Hydrologic Modeling

The results of the hydrologic modeling are discussed below. Without knowledge of the post construction site layout, no assumptions were made about pre-construction versus post-construction one-dimensional runoff beyond a small increase to the impervious area percentage for each basin. Final volumetric flowrate difference calculations can be determined once a final layout is chosen and provided for hydraulic modeling purposes.

4.2. 2D Hydraulic Model Results

4.2.1. Pre-Construction (Existing Condition)

The 100-year rainfall return event was temporally distributed using the Type II curve and was used as in input to the rain-on-grid HEC-RAS model to obtain the maximum depths and velocities anticipated in the 100-year event. HEC-RAS output for maximum depth, velocity, and scour is shown on Figures 1-3. Figure 4 shows the impacting drainage basins.

Scour depth was calculated using the methods of Chapter 7 of the HEC 18 Scour Manual. K1, K2, and K3 were calculated to be 1.1, 1.3, and 1.1 respectively, and a box pile of dimensions a=1/2' and L=1/3' were used. For simplicity, the angle of attack was assumed to be zero for all piles. The proper excerpt pages are included in Appendix B.

Channelized flow is apparent on site in natural flow concentration areas. Flow depths within these areas appear to reach just over 13 feet in the deepest part of the channels. Overland flow is negligible as enough channels exist on site to adequately drain most overland flow before it can pool. No ponding areas are visible within the site, nor is evidence of ponding found in the publicly available aerial images. The site is banded along topographic lines with very shallow overland flow, which is an artifact of the elevation data and modeling method. This data was not smoothed as to not artificially affect the results. Tiff surfaces are available upon request

Site flow velocities follow a similar pattern to flow depth onsite. Channelized flow sees velocities as high as 6.5 feet per second, while overland flow is generally very low velocity. Scour depth does not exceed 2.0 feet and is limited to the naturally occurring channels. Generally, the soil matrix on site appears to be stable given the aerial images and model results, but further investigation in the form of a Geotechnical Site Investigation would be required before final determinations could be made. Overall, brushing, grading, and slope stabilization within the site may promote increased drainage, while minimizing site soil erosion. Offsite channels should be protected from scour if imperviousness is increased. SOA can run further 2D site models as grading plans are developed. Within the buildable area, flow velocity and erosion potential are not critical items of concern for this site. The site should remain stable under normal flow characteristics. Increased impervious areas can lead to further concentrated flow areas, and therefore a post-construction study should be undertaken before construction begins. Stabilization should be added to the pre-existing drainage structures in order to preserve their integrity.

Table 4 shows the anticipated increase in runoff due to PV installation. Results of the model run show an increase to effected basins, totaling approximately 2.7-acre feet, based on additional impervious area estimates. The methods used to determine this additional runoff volume rely on HEC-1 modeling of impervious area over the entire basin area. Once final grading plans are developed, individual onsite basins should be investigated for additional runoff volume due to additional impervious area. The developer and engineer of the project should account for this additional storage volume in their design.

Table 4: Basin Peak Flows and Volume Increases

Basin	Pre-construction Peak Q (cfs)	Post-construction Peak Q (cfs)	Percent Increase	Runoff Volume Difference (acre-ft)
1B	152.835	152.835	0.00%	0.0000
2B	49.55	49.57	0.05%	0.2340
6B	41.98	41.99	0.03%	0.1590
7B	104.28	104.33	0.05%	0.3550
8B	10.28	10.28	0.00%	0.1460
9B	8.51	8.54	0.36%	0.4330
10B	45.21	45.24	0.06%	0.2270
12B	35.94	35.97	0.08%	0.3350
13B	101.44	101.46	0.02%	0.3110
14B	92.34	92.49	0.16%	0.4850

Assumptions

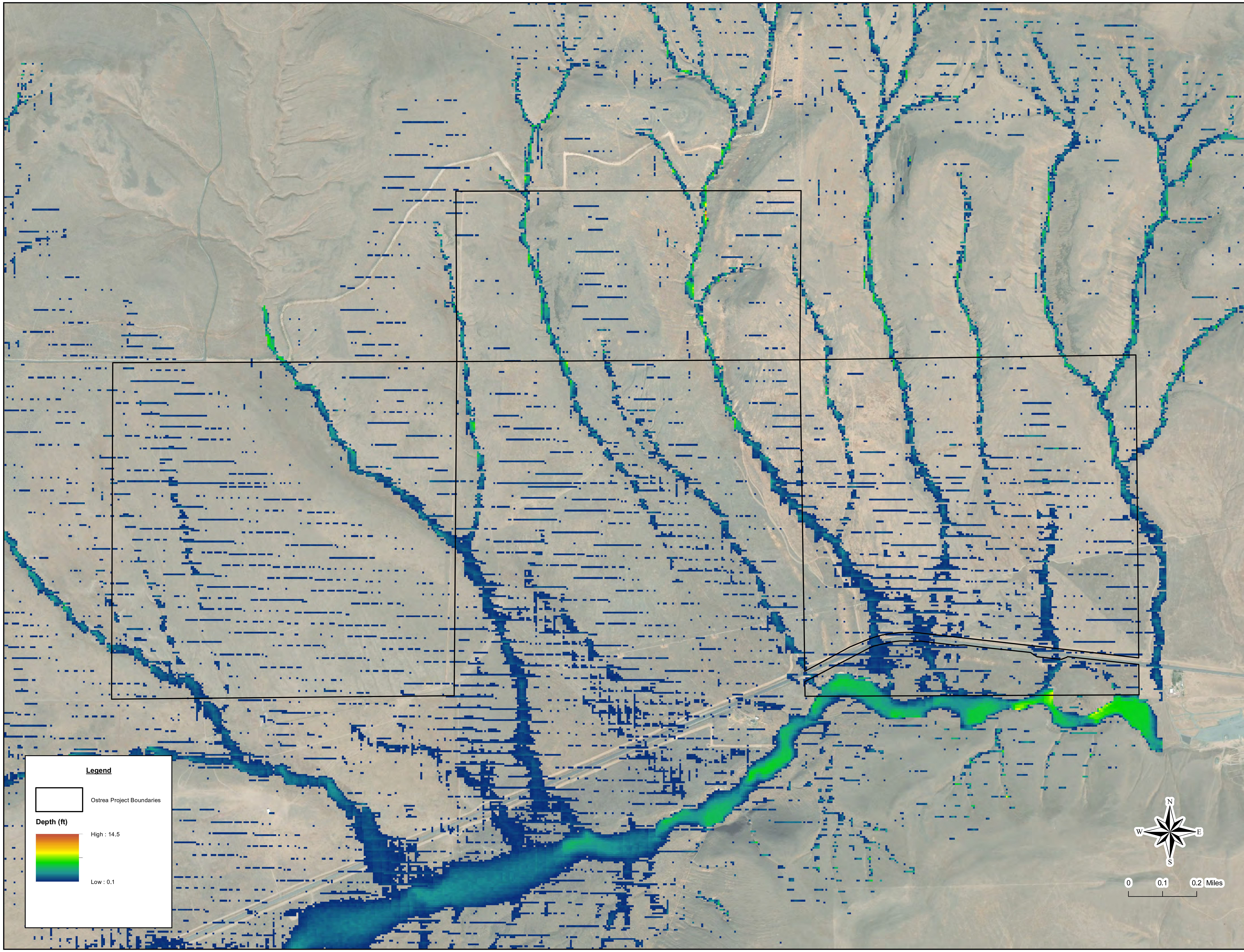
1. National Map data is adequate for 2D modeling purposes
2. The elevation data has been deemed appropriate for use in pre-construction 2D hydraulic modeling (HEC-RAS)
3. To the greatest extent practical this model represents ponding and flow conditions for excess rainfall occurring on the model surface. This model is an approximation of real-life flow conditions but is limited in its accuracy by the type and accuracy of its inputs. If future calibration data is gathered, the model can be rerun using the calibration data as inputs to check the viability and accuracy of the model.

SIERRA OVERHEAD ANALYTICS

FIGURES

Ostrea, LLC.

Sierra Overhead Analytics, Inc.



SIERRA OVERHEAD ANALYTICS

Sierra Overhead Analytics, Inc.
P.O. Box 1716
Twain Harte, CA 95383

(T) 209-677-3041
(F) 209-215-2799
info@sierraoverhead.com

REV #	DESCRIPTION	DATE

PROJECT NAME:
Ostrea Solar, WA

PROJECT ADDRESS:
46.539˚ lat, -119.962˚ long.

SEAL:

DATE:
2020-10-20

PROJECT #:
2020-CCR-9

DRAWN BY:
OTR

CHECKED BY:
DRG

SHEET NAME:
100-Year 24-Hour Event Maximum Depth

SHEET NUMBER:
Figure 1

REV #:

Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 Ft US Basemap Source: ESRI Land Ownership and PLSS Source: BLM SEZ Source: Argonne National Laboratory

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DATE:
2020-10-20

PROJECT #:
2020-CCR-9

DRAWN BY:
OTR

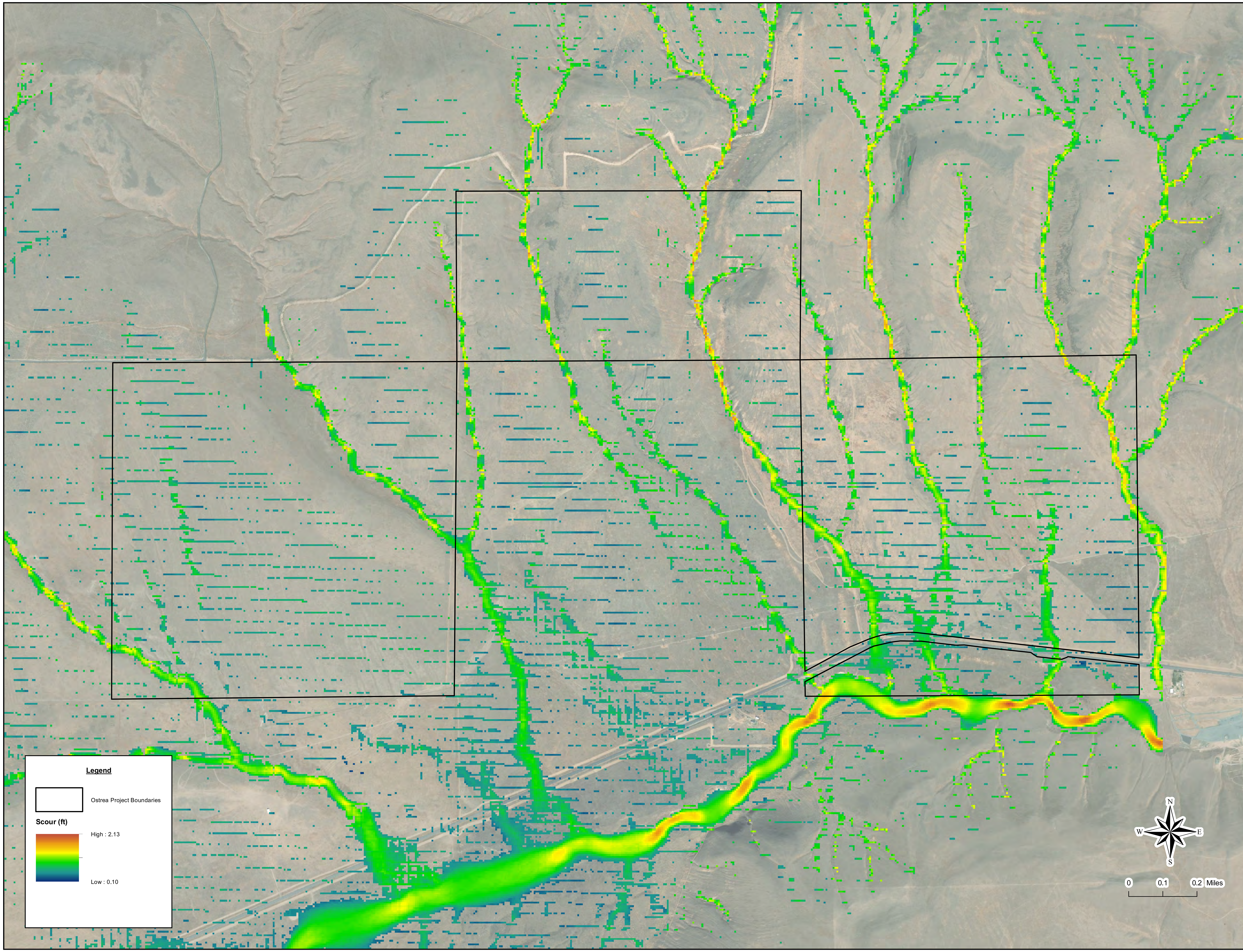
CHECKED BY:
DRG

SHEET NAME:
100-Year 24-Hour Event Maximum Velocity

SHEET NUMBER:
Figure 2

REV #:

Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 Ft US Basemap Source: ESRI Land Ownership and PLSS Source: BLM SEZ Source: Argonne National Laboratory



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REV #	DESCRIPTION	DATE

PROJECT NAME: Ostrea Solar, WA

PROJECT ADDRESS: 46.539° lat, -119.962° long.

SEAL:

DATE: 2020-10-20

PROJECT #: 2020-CCR-9

DRAWN BY: OTR

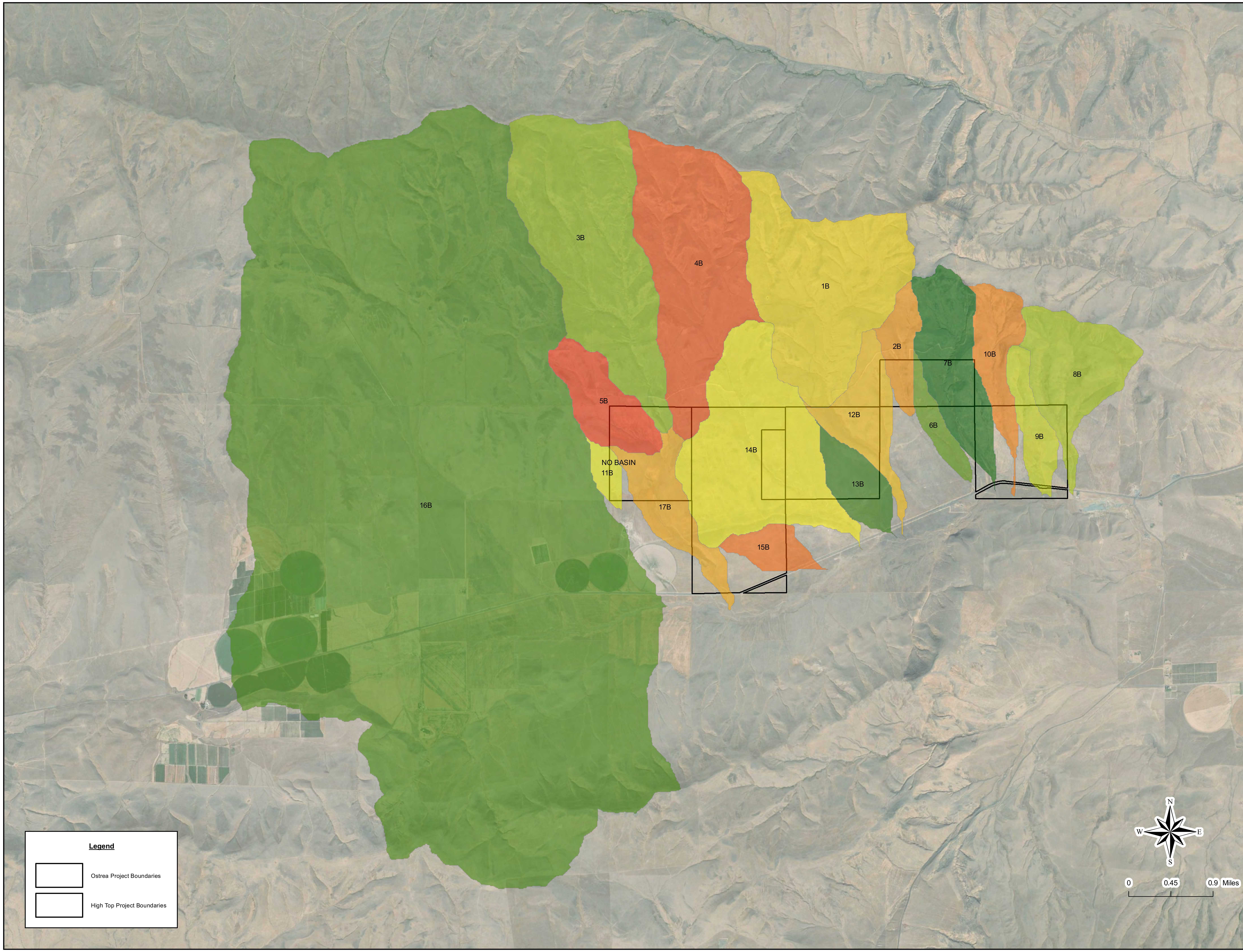
CHECKED BY: DRG

SHEET NAME: 100-Year 24-Hour Event Maximum Scour Depth

SHEET NUMBER: Figure 3

REV #:

Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 Ft US Basemap Source: ESRI Land Ownership and PLSS Source: BLM SEZ Source: Argonne National Laboratory



SIERRA OVERHEAD ANALYTICS

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REV #	DESCRIPTION	DATE

PROJECT NAME: High Top and Ostrea Solar, WA

PROJECT ADDRESS: 46.539˚ lat, -119.962˚ long.

SEAL:

DATE: 2020-10-20

PROJECT #: 2020-CCR-9

DRAWN BY: OTR

CHECKED BY: DRG

SHEET NAME: Sub-Watershed Basins

SHEET NUMBER: Figure 4

REV #:

Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 Ft US   Basemap Source: ESRI   Land Ownership and PLSS Source: BLM   SEZ Source: Argonne National Laboratory

SIERRA OVERHEAD ANALYTICS

APPENDIX A

Supporting Documentation

Soils Mapping

FEMA Panels

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1 Average runoff condition, and I_a=0.2S
2 Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.
3 Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2/]	A [3/]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Figure 2-3 Composite CN with connected impervious area.

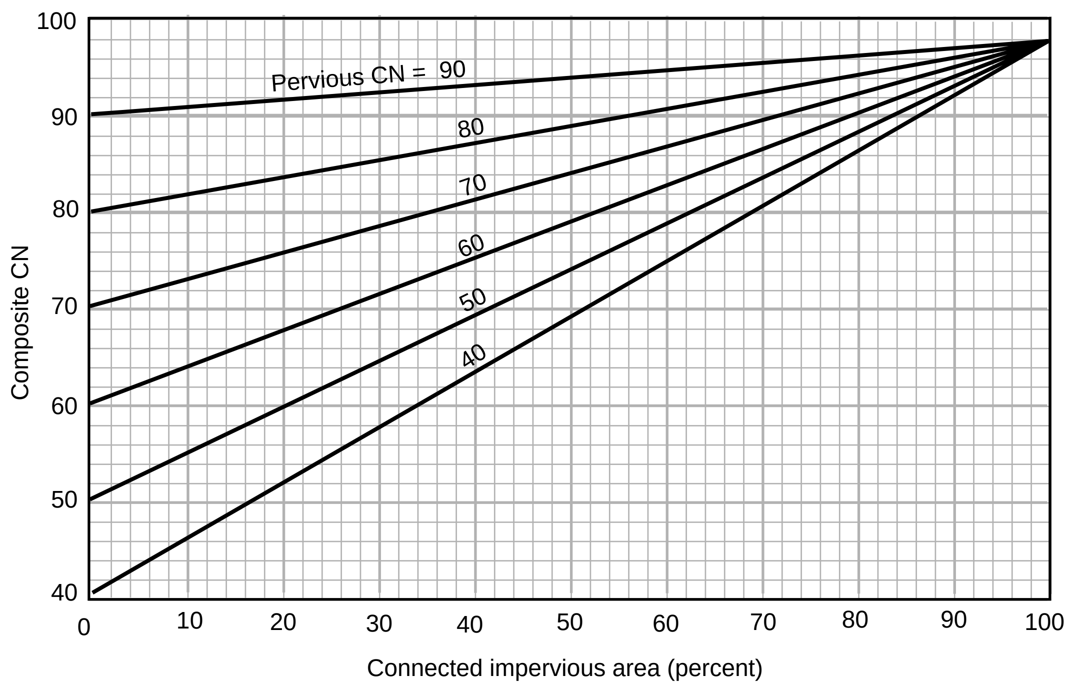
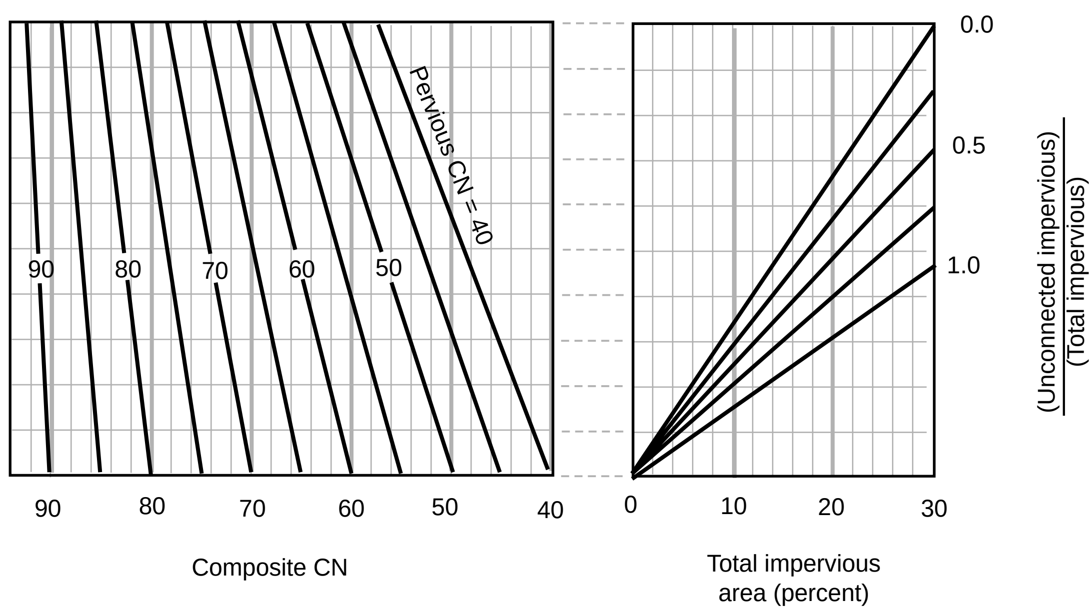


Figure 2-4 Composite CN with unconnected impervious areas and total impervious area less than 30%



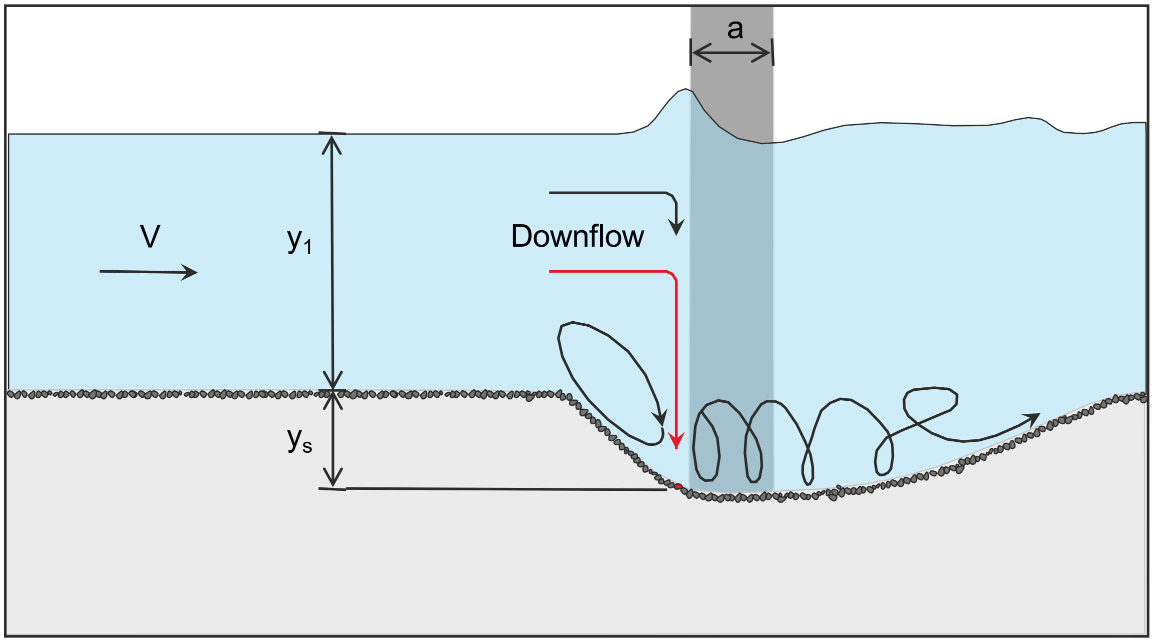


Figure 7.2. Definition sketch for pier scour.

The HEC-18 equation is:

$$\frac{y_s}{y_1} = 2.0\ K_1\ K_2\ K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43} \tag{7.1}$$

As a Rule of Thumb, the maximum scour depth for round nose piers aligned with the flow is:

$y_s \leq 2.4$ times the pier width (a) for $Fr \leq 0.8$ (7.2)
$y_s \leq 3.0$ times the pier width (a) for $Fr > 0.8$

In terms of y_s/a, Equation 7.1 is:

$$\frac{y_s}{a} = 2.0\ K_1\ K_2\ K_3 \left(\frac{y_1}{a}\right)^{0.35} Fr_1^{0.43} \tag{7.3}$$

where:

y_s	=	Scour depth, ft (m)
y_1	=	Flow depth directly upstream of the pier, ft (m)
K_1	=	Correction factor for pier nose shape from Figure 7.3 and Table 7.1
K_2	=	Correction factor for angle of attack of flow from Table 7.2 or Equation 7.4
K_3	=	Correction factor for bed condition from Table 7.3
a	=	Pier width, ft (m)
L	=	Length of pier, ft (m)
Fr_1	=	Froude Number directly upstream of the pier = $V_1/(gy_1)^{1/2}$
V_1	=	Mean velocity of flow directly upstream of the pier, ft/s (m/s)
g	=	Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)

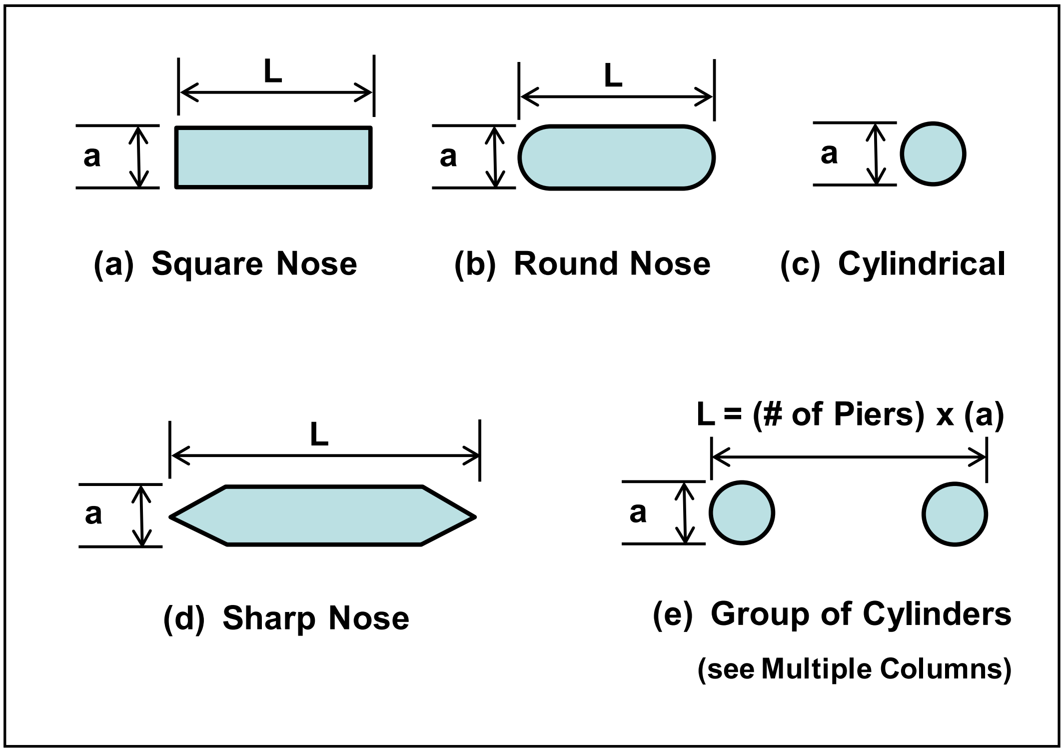


Figure 7.3. Common pier shapes.

The correction factor, K_2, for angle of attack of the flow, 2, is calculated using the following equation:

$$K_2 = (\text{Cos } \theta + \frac{L}{a} \text{ Sin } \theta)^{0.65} \tag{7.4}$$

If L/a is larger than 12, use L/a = 12 as a maximum in Equation 7.4 and Table 7.2. Table 7.2 illustrates the magnitude of the effect of the angle of attack on local pier scour.

Table 7.1. Correction Factor, K_1, for Pier Nose Shape.

Shape of Pier Nose	K_1
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose	0.9

Table 7.2. Correction Factor, K_2, for Angle of Attack, 2, of the Flow.

Angle	L/a=4	L/a=8	L/a=12
0	1.0	1.0	1.0
15	1.5	2.0	2.5
30	2.0	2.75	3.5
45	2.3	3.3	4.3
90	2.5	3.9	5.0

Angle = skew angle of flow
L = length of pier

Table 7.3. Increase in Equilibrium Pier Scour Depths, K_3, for Bed Condition.		
Bed Condition	Dune Height ft	K_3
Clear-Water Scour	N/A	1.1
Plane bed and Antidune flow	N/A	1.1
Small Dunes	$10 > H \geq 2$	1.1
Medium Dunes	$30 > H \geq 10$	1.2 to 1.1
Large Dunes	$H \geq 30$	1.3

Notes:

1. The correction factor K_1 for pier nose shape should be determined using Table 7.1 for angles of attack up to 5 degrees. **For greater angles, K_2 dominates and K_1 should be considered as 1.0**. If L/a is larger than 12, use the values for L/a = 12 as a maximum in Table 7.2 and Equation 7.4.

2. The values of the correction factor K_2 should be applied only when the field conditions are such that the entire length of the pier is subjected to the angle of attack of the flow. Use of this factor will result in a significant over-prediction of scour if (1) a portion of the pier is shielded from the direct impingement of the flow by an abutment or another pier; or (2) an abutment or another pier redirects the flow in a direction parallel to the pier. For such cases, judgment must be exercised to reduce the value of the K_2 factor by selecting the effective length of the pier actually subjected to the angle of attack of the flow. **Equation 7.4 should be used for evaluation and design**. Table 7.2 is intended to illustrate the importance of angle of attack in pier scour computations and to establish a cutoff point for K_2 (i.e., a maximum value of 5.0).

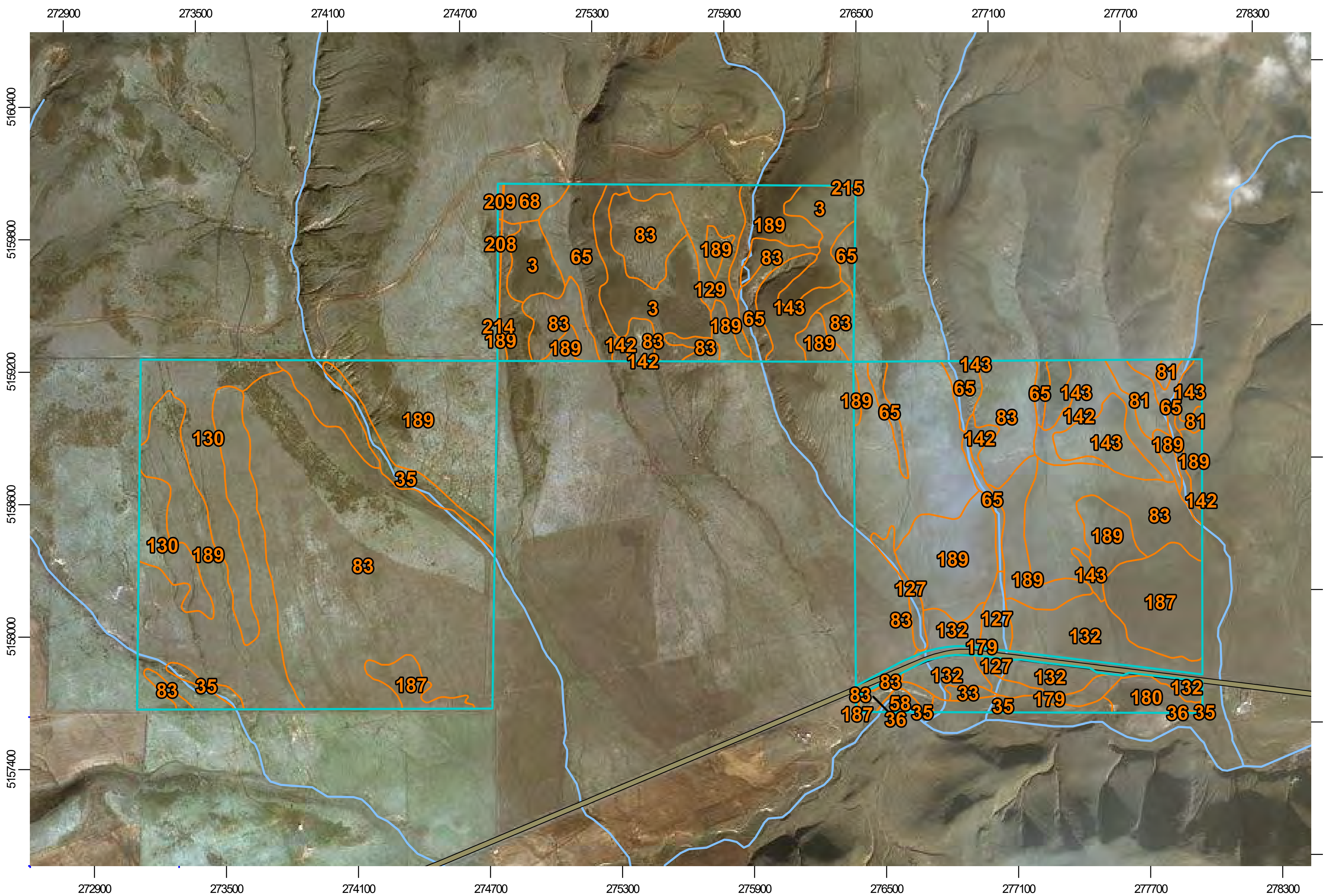
3. The correction factor K_3 results from the fact that for plane-bed conditions, which is typical of most bridge sites for the flood frequencies employed in scour design, the maximum scour may be 10 percent greater than computed with Equation 7.1. In the **unusual** situation where a dune bed configuration **with large dunes** exists at a site during flood flow, the maximum pier scour may be 30 percent greater than the predicted equation value. This may occur on very large rivers, such as the Mississippi. For smaller streams that have a dune bed configuration at flood flow, the dunes will be smaller and the maximum scour may be only 10 to 20 percent larger than equilibrium scour. For antidune bed configuration the maximum scour depth may be 10 percent greater than the computed equilibrium pier scour depth.

4. Piers set close to abutments (for example at the toe of a spill through abutment) must be carefully evaluated for the angle of attack and velocity of the flow coming around the abutment.

7.3 FLORIDA DOT PIER SCOUR METHODOLOGY

Equation 7.1 has been included in all previous versions of HEC-18 and has been used for bridge scour evaluations and bridge design for countless bridges in the U.S. and worldwide. This equation, which was developed and modified over several decades, could be improved by including bed material size and a more detailed consideration of the bridge pier flow field (see Section 3.6.2). An NCHRP study (NCHRP 2011a) evaluated 22 pier scour equations and found that although the HEC-18 equation did well in comparison to the other equations, the Sheppard and Miller (2006) equation generally performed better for both laboratory and

Soil Map—Yakima County Area, Washington; and Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington
(Project Boundaries)



Map Scale: 1:26,600 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 350, 700, 1400, 2100

Feet: 0, 1000, 2000, 4000, 6000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 20, Jun 4, 2020

Soil Survey Area: Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington
Survey Area Data: Version 17, Jun 4, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2015—Mar 5, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Bakeoven very cobbly silt loam, 0 to 30 percent slopes	83.1	5.3%
33	Esquatzel silt loam, 2 to 5 percent slopes	2.8	0.2%
35	Finley fine sandy loam, 0 to 5 percent slopes	32.1	2.1%
36	Finley cobbly fine sandy loam, 0 to 5 percent slopes	6.0	0.4%
58	Hezel loamy fine sand, 2 to 15 percent slopes	3.5	0.2%
65	Kiona stony silt loam, 15 to 45 percent slopes	93.5	6.0%
68	Lickskillet very stony silt loam, 5 to 45 percent slopes	10.0	0.6%
81	Mikkalo silt loam, 15 to 30 percent slopes	15.2	1.0%
83	Moxee silt loam, 2 to 15 percent slopes	559.1	35.7%
127	Scooteney cobbly silt loam, 0 to 5 percent slopes	17.8	1.1%
129	Selah silt loam, 5 to 8 percent slopes	30.8	2.0%
130	Selah silt loam, 8 to 15 percent slopes	80.7	5.2%
132	Shano silt loam, 2 to 5 percent slopes	75.9	4.8%
142	Starbuck silt loam, 2 to 15 percent slopes	30.2	1.9%
143	Starbuck-Rock outcrop complex, 0 to 45 percent slopes	59.5	3.8%
179	Warden silt loam, 8 to 15 percent slopes	10.1	0.6%
180	Warden silt loam, 15 to 30 percent slopes	12.3	0.8%
187	Willis silt loam, 2 to 5 percent slopes	56.6	3.6%
189	Willis silt loam, 8 to 15 percent slopes	383.7	24.5%
Subtotals for Soil Survey Area		**1,562.9**	**99.8%**
Totals for Area of Interest		**1,565.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
208	Kiona stony silt loam, 15 to 45 percent slopes	1.5	0.1%
209	Lickskillet very stony silt loam, 5 to 45 percent slopes	0.9	0.1%
214	Willis silt loam, 8 to 15 percent slopes	0.2	0.0%
215	Bakeoven very cobbly silt loam, 0 to 30 percent slopes	0.3	0.0%
Subtotals for Soil Survey Area		**2.9**	**0.2%**
Totals for Area of Interest		**1,565.9**	**100.0%**

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Yakima County GIS and Washington State Department of Natural Resources. This information was compiled at scales of 1:400 to 1:100,000 during the time period 1991-2006.

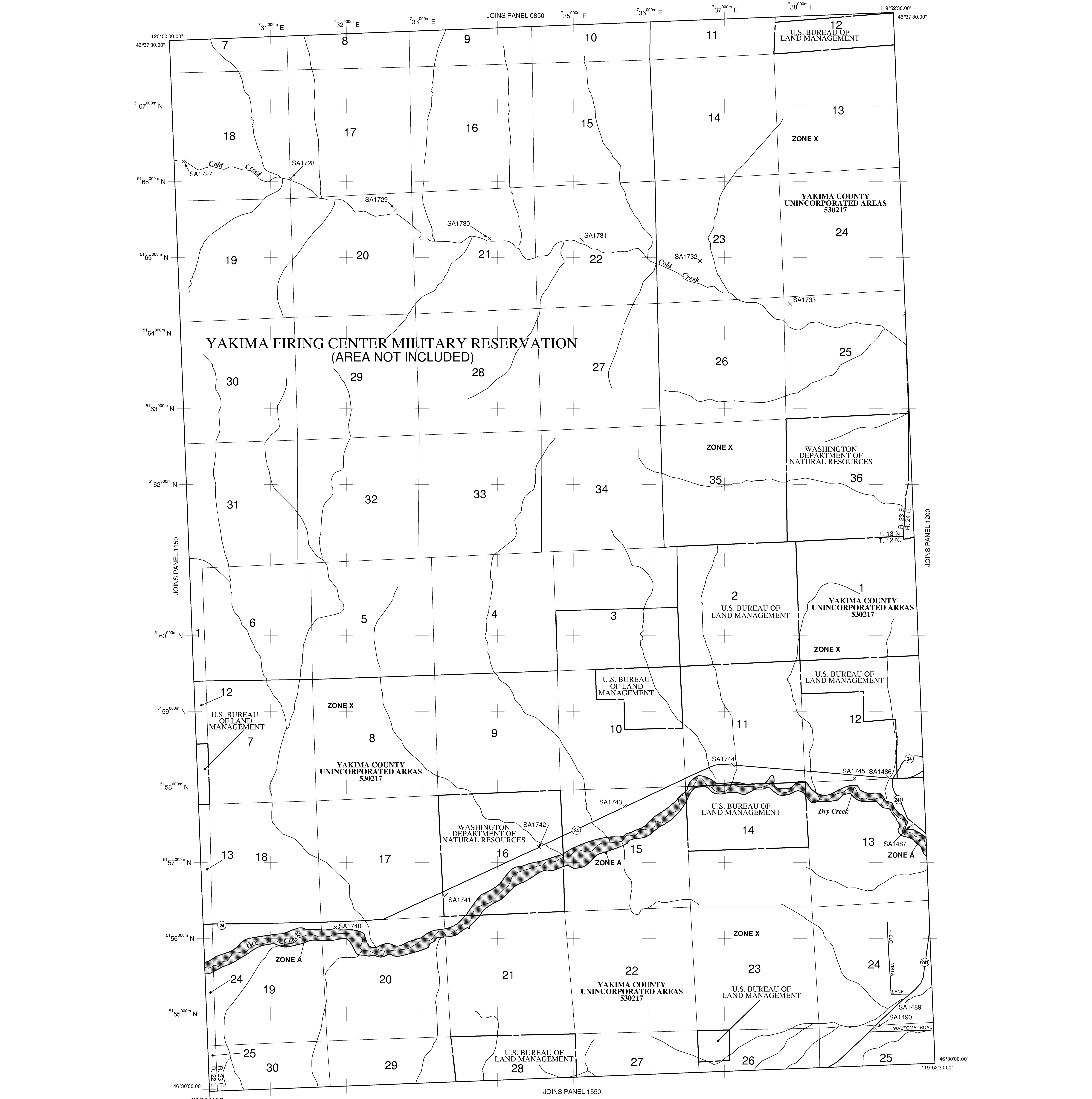
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 10
6000000 M	5000-foot grid ticks: Washington State Plane coordinate system, south zone (FIPSZONE 4602), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP

PANEL 1175D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

YAKIMA COUNTY, WASHINGTON
AND INCORPORATED AREAS

PANEL 1175 OF 2700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
YAKIMA COUNTY	530217	1175	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53077C1175D

EFFECTIVE DATE
NOVEMBER 18, 2009

Federal Emergency Management Agency

SIERRA OVERHEAD ANALYTICS

APPENDIX B

Basin Curve Number Estimation

Runoff Curve Number Report for Basin 1B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Mixed Rangeland	70	1.197	83.766
B	Mixed Rangeland	56	0.489	27.360
D	Mixed Rangeland	77	1.041	80.148
A	Mixed Rangeland	35	0.014	0.496

CN (Weighted) = Total Product \ Total Area
==
69.9819

Runoff Curve Number Report for Basin 2B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Mixed Rangeland	70	0.089	6.230
D	Mixed Rangeland	77	0.260	19.986
B	Mixed Rangeland	56	0.037	2.077

CN (Weighted) = Total Product \ Total Area
==
73.3654

Runoff Curve Number Report for Basin 3B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
B	Shrub and Brush Rangeland	56	0.255	14.306
C	Shrub and Brush Rangeland	70	0.234	16.392
B	Mixed Rangeland	56	0.135	7.550
C	Mixed Rangeland	70	1.228	85.936
D	Mixed Rangeland	77	0.866	66.663
D	Shrub and Brush Rangeland	77	0.433	33.331
D	Cropland and Pasture	84	0.043	3.577
C	Cropland and Pasture	79	0.035	2.803

CN (Weighted) = Total Product \ Total Area
==
71.4066

Runoff Curve Number Report for Basin 4B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Shrub and Brush Rangeland	70	0.021	1.486
D	Shrub and Brush Rangeland	77	0.191	14.709
C	Mixed Rangeland	70	0.913	63.890
D	Mixed Rangeland	77	1.111	85.533
B	Mixed Rangeland	56	0.488	27.339
C	Cropland and Pasture	79	0.021	1.677

CN (Weighted) = Total Product \ Total Area
==
70.8995

Runoff Curve Number Report for Basin 5B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
D	Mixed Rangeland	77	0.340	26.210
C	Mixed Rangeland	70	0.206	14.396
B	Mixed Rangeland	56	0.121	6.751
C	Cropland and Pasture	79	0.043	3.361
D	Cropland and Pasture	84	0.043	3.574

CN (Weighted) = Total Product \ Total Area
==
72.2264

Runoff Curve Number Report for Basin 6B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
D	Mixed Rangeland	77	0.158	12.184
C	Mixed Rangeland	70	0.014	0.963
B	Mixed Rangeland	56	0.007	0.385
D	Cropland and Pasture	84	0.062	5.201
A	Cropland and Pasture	49	0.007	0.337
C	Cropland and Pasture	79	0.021	1.630

CN (Weighted) = Total Product \ Total Area
==
77.1538

Runoff Curve Number Report for Basin 7B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Mixed Rangeland	70	0.139	9.717
D	Mixed Rangeland	77	0.753	57.943
B	Mixed Rangeland	56	0.117	6.546
D	Cropland and Pasture	84	0.088	7.364
A	Mixed Rangeland	35	0.022	0.767
B	Cropland and Pasture	69	0.007	0.504

CN (Weighted) = Total Product \ Total Area
==
73.6299

Runoff Curve Number Report for Basin 8B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Mixed Rangeland	70	0.362	25.350
D	Mixed Rangeland	77	0.085	6.561
B	Mixed Rangeland	56	0.575	32.210
C	Cropland and Pasture	79	0.014	1.122
D	Cropland and Pasture	84	0.007	0.596
B	Cropland and Pasture	69	0.007	0.490
A	Cropland and Pasture	49	0.014	0.696
A	Mixed Rangeland	35	0.121	4.225

CN (Weighted) = Total Product \ Total Area
==
60.0838

Runoff Curve Number Report for Basin 9B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
B	Mixed Rangeland	56	0.136	7.594
A	Mixed Rangeland	35	0.043	1.499
D	Mixed Rangeland	77	0.029	2.198
C	Mixed Rangeland	70	0.114	7.994
C	Cropland and Pasture	79	0.071	5.638
B	Cropland and Pasture	69	0.029	1.970
A	Cropland and Pasture	49	0.014	0.699

CN (Weighted) = Total Product \ Total Area
==
63.377

Runoff Curve Number Report for Basin 10B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
A	Mixed Rangeland	35	0.015	0.516
D	Mixed Rangeland	77	0.384	29.538
B	Mixed Rangeland	56	0.133	7.436
C	Mixed Rangeland	70	0.052	3.615
D	Cropland and Pasture	84	0.030	2.479
B	Cropland and Pasture	69	0.015	1.018

CN (Weighted) = Total Product \ Total Area
==
71.1294

Runoff Curve Number Report for Basin 11B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
B	Mixed Rangeland	56	0.075	4.223
C	Mixed Rangeland	70	0.075	5.279
D	Mixed Rangeland	77	0.019	1.452

CN (Weighted) = Total Product \ Total Area
==
64.5556

Runoff Curve Number Report for Basin 12B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
B	Mixed Rangeland	56	0.233	13.036
D	Mixed Rangeland	77	0.113	8.691
C	Mixed Rangeland	70	0.219	15.308
D	Cropland and Pasture	84	0.071	5.926
C	Cropland and Pasture	79	0.099	7.802

CN (Weighted) = Total Product \ Total Area
==
69.1923

Runoff Curve Number Report for Basin 13B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
D	Mixed Rangeland	77	0.074	5.727
D	Cropland and Pasture	84	0.335	28.113
C	Mixed Rangeland	70	0.030	2.082
C	Cropland and Pasture	79	0.052	4.113

CN (Weighted) = Total Product \ Total Area
==
81.5606

Runoff Curve Number Report for Basin 14B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
D	Cropland and Pasture	84	0.219	18.397
A	Cropland and Pasture	49	0.007	0.346
B	Cropland and Pasture	69	0.791	54.597
C	Mixed Rangeland	70	0.572	40.058
D	Mixed Rangeland	77	0.374	28.832
C	Cropland and Pasture	79	0.064	5.023
B	Mixed Rangeland	56	0.593	33.233

CN (Weighted) = Total Product \ Total Area
==
68.8598

Runoff Curve Number Report for Basin 15B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
D	Cropland and Pasture	84	0.026	2.210
B	Cropland and Pasture	69	0.099	6.806
B	Mixed Rangeland	56	0.178	9.943
C	Mixed Rangeland	70	0.033	2.302

CN (Weighted) = Total Product \ Total Area
==
63.3922

Runoff Curve Number Report for Basin 16B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
C	Mixed Rangeland	70	6.747	472.261
B	Mixed Rangeland	56	2.751	154.039
D	Mixed Rangeland	77	3.447	265.431
C	Cropland and Pasture	79	4.137	326.791
B	Cropland and Pasture	69	4.917	339.306
D	Shrub and Brush Rangeland	77	1.984	152.758
B	Shrub and Brush Rangeland	56	0.331	18.516
C	Shrub and Brush Rangeland	70	0.915	64.019

D	Cropland and Pasture	84	1.421	119.370
A	Cropland and Pasture	49	0.661	32.403
A	Mixed Rangeland	35	0.190	6.648

CN (Weighted) = Total Product \ Total Area
==
70.9655

Runoff Curve Number Report for Basin 17B

HSG	Land Use Description	CN	Area mi^2	Product CN x A
B	Mixed Rangeland	56	0.064	3.595
B	Cropland and Pasture	69	0.171	11.813
C	Cropland and Pasture	79	0.257	20.287
D	Mixed Rangeland	77	0.007	0.549
D	Cropland and Pasture	84	0.178	14.980
C	Mixed Rangeland	70	0.021	1.498
A	Cropland and Pasture	49	0.036	1.748

CN (Weighted) = Total Product \ Total Area
==
74.1359

Attachment F. Cultural Resources Report

February 25, 2022

Ostrea Solar, LLC Project

Prepared For:

Cypress Creek Renewables, LLC
3402 Pico Blvd
Santa Monica, CA 90405

Prepared By:

TRC
Fort Collins, CO

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Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

Notation	Definition
AC	Alternating Current
APE	Area of Potential Effects
BESS	Battery energy storage system
bgs	Below ground surface
B.P.	Before Present
BPA	Bonneville Power Administration
ca.	Circa
CCR	Cypress Creek Renewables, LLC
CCS	cryptocrystalline silicate
CE	Current Era
CFR	Code of Federal Regulations
cm	centimeter
cmbs	Centimeters below surface
CTWSRO	Confederated Tribes of the Warm Springs Reservation of Oregon
DAHP	Washington State Department of Archaeology and Historic Preservation
ft	Foot/feet
in	Inch(es)
kV	Kilovolt
MPE	Maximum Project Extent is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
m	Meters
mm	Millimeter
MPDF	Multiple Property Documentation Form
MW	Megawatts
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
Project	Ostrea Solar, LLC Project
Project Site Control Boundary	Total of the leased areas and easements for the Project
RCW	Revised Code of Washington
ROW	Right-of-way
SEPA	State Environmental Policy Act
Site	Location of the proposed Ostrea Solar, LLC Project
SR	State Route
STP	Shovel test probe
Study Area	Analysis Area for cultural resources
TRC	TRC Environmental Corporation
USGS	U.S. Geological Survey
WHR	Washington Heritage Register

Notation	Definition
WISAARD	Washington Information System for Architectural and Archaeological Records Data

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). TRC Environmental Corporation (TRC) was contracted by CCR to inventory cultural resources for the Project and develop appropriate contextual information for interpretation of those resources. This report includes a cultural context, brief history of the area, a cultural resources records search of the property plus a one-mile buffer, Native American outreach, historic map and aerial photography review, an intensive-level pedestrian survey including the excavation of two shovel test probes (STPs) and an evaluation of the potential environmental effects to cultural resources associated with proposed Project development.

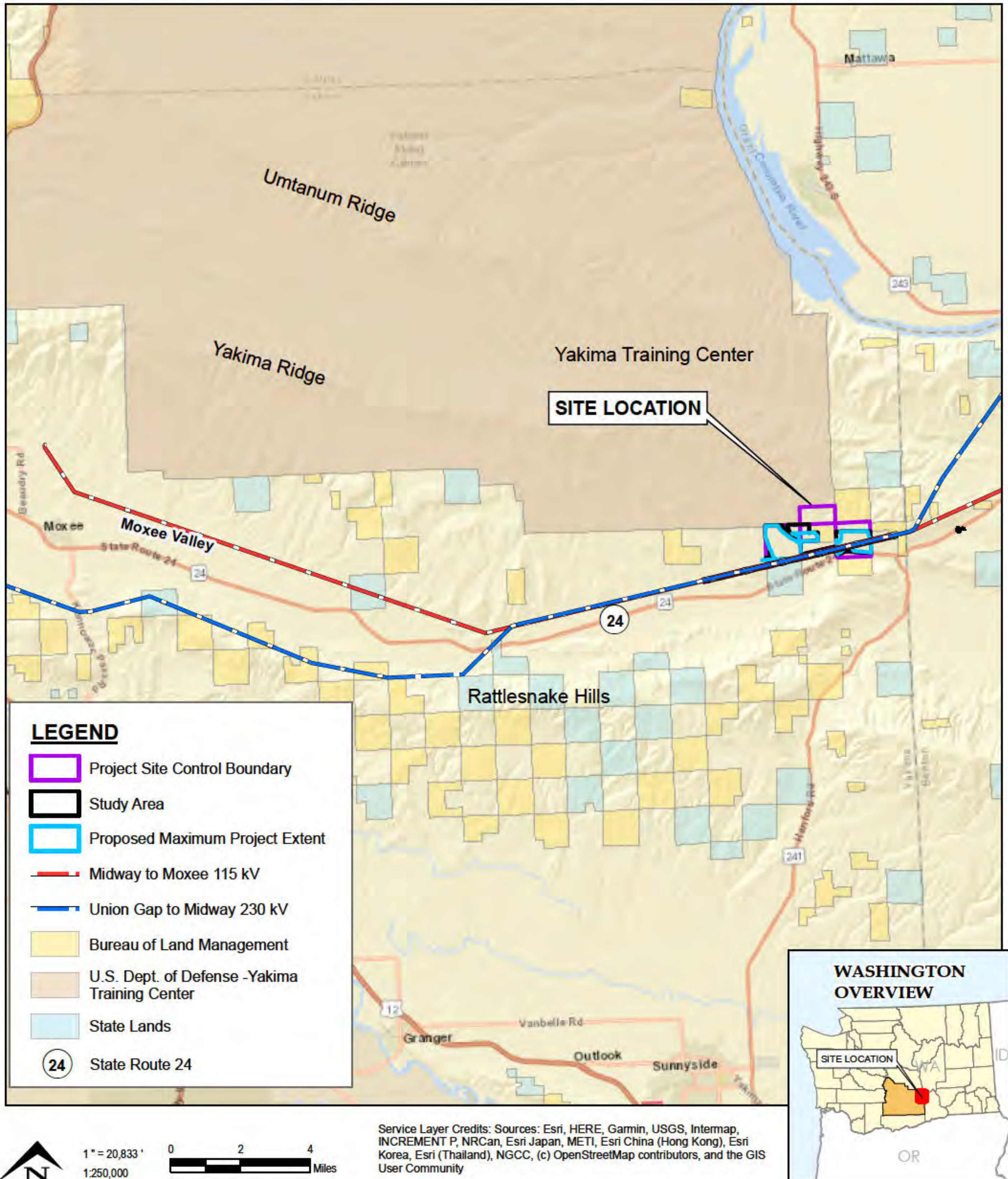
1.1 Background

The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1-1). Within the Project Site Control Boundary, a smaller Study Area (1,123 acres) was defined for the cultural resource surveys (Figure 1-1). The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design 811.3 acres).

The Project will use solar photovoltaic panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts (MW) of alternating current (AC) solar capacity at the point of interconnection to the electric power grid. The Project will inter-connect through a line tap to Bonneville Power Administration's (BPA's) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project. BPA's Moxee to Midway 115 kV transmission line connects to BPA's Moxee substation, which is approximately 23 miles west and north of the Project and BPA's shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based on the final approved design for the Project.

A Battery Energy Storage System (BESS) may be required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. If required, the BESS will be located next to the Project substation (for AC coupled) or as smaller battery cabinets collocated throughout the MPE at the inverter pad locations (for Direct Current coupled).

An Operations and Maintenance trailer, and employee parking will be located just west of the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the Operations and Maintenance trailer footprint will be used as a construction laydown yard. Access to the Project will be from Washington State Route 24 (SR-24) on the east side of the MPE.



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

TRC

11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROJECT OVERVIEW MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE: Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd	

FIGURE 1-1

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd – Saved By: RBLAKE on 3/13/2022, 20:01:38 PM

2.0 Permitting and Regulatory Requirements

This section identifies federal and state legislation and local statutes, ordinances, and guidelines that govern the identification and treatment of cultural resources; and the analysis of Project-related effects to these resources. The lead agency must consider these requirements when making decisions on projects that may affect cultural resources. The proposed Project is being developed in conformance with these regulations.

2.1 State Regulations

This Project is subject to the Washington State Environmental Policy Act (SEPA), which requires that impacts to cultural resources be considered during the public environmental review process. Under SEPA, the Department of Archaeology & Historic Preservation (DAHP) is the sole agency with technical expertise concerning cultural resources and provides formal opinions to local governments and other state agencies on a site's significance and the impact of proposed projects upon such sites.

Because the Project is not using federal funding and does not require federal permits, it is not subject to Section 106 of the National Historic Preservation Act (NHPA), as amended. Cultural and historic resource issues were assessed pursuant to the regulations implementing SEPA. SEPA requires the Project proponent to identify any places or objects listed on, or eligible for, national, state, or local preservation registers in the vicinity of the Project; describe evidence for sites of historic, archaeological, scientific, or cultural importance in the vicinity of the Project; and describe proposed measures to reduce or control impacts to those sites.

Other Washington State laws regarding cultural resources that apply to this Project include the Archaeological Sites and Resources Act (Revised Code of Washington [RCW] Chapter 27.53), which prohibits knowingly excavating or disturbing precontract and historical archaeological sites on public or private land without a permit from DAHP and the Indian Graves and Records Act [RCW Chapter 27.44], which prohibits knowingly destroying American Indian graves and requires their inadvertent disturbance by construction or other activity to be followed by re-interment under supervision of the appropriate Indian tribe.

2.2 Evaluation Criteria

Under SEPA, register evaluations are limited to the Washington Heritage Register (WHR), except for historic property sites, which DAHP requires to be evaluated under the National Register of Historic Places (NRHP) as well.

2.3 NRHP Criteria

The NRHP was established by the NHPA of 1966 as "an authoritative guide to be used by federal, state, and local governments, private groups and citizens to identify the Nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment" (36 Code of Federal Regulations [CFR] part 60.2). The NRHP recognizes properties that are significant at the national, state, and local levels. To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects of potential significance must also possess integrity of location, design, setting, materials, workmanship, feeling, and association.

2.3.1 Significance

A property is eligible for the NRHP if it is significant under one or more of the following criteria:

- **Criterion A:** It is associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B:** It is associated with the lives of persons who are significant in our past.
- **Criterion C:** It embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D:** It has yielded, or may be likely to yield, information important in prehistory or history. Ordinarily cemeteries, birthplaces, or graves of historic figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; and properties that are primarily commemorative in nature are not considered eligible for the NRHP unless they satisfy certain conditions. In general, a resource must be 50 years of age to be considered for the NRHP unless it satisfies a standard of exceptional importance.

2.3.2 Integrity

In addition to meeting the significance criteria, a property must retain historic *integrity*, which is defined in National Register Bulletin 15 as the “ability of a property to convey its significance” (National Park Service 1990). In order to assess integrity, the National Park Service recognizes seven aspects or qualities that, considered together, define historic integrity. To retain integrity, a property must possess several, if not all, of these seven qualities, which are defined in the following manner in National Register Bulletin 15:

- **Location:** The place where the historic property was constructed or the place where the historic event occurred.
- **Design:** The combination of elements that create the form, plan, space, structure, and style of a property.
- **Setting:** The physical environment of a historic property.
- **Materials:** The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- **Workmanship:** The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- **Feeling:** A property’s expression of the aesthetic or historic sense of a particular period of time.
- **Association:** The direct link between an important historic event or person and a historic property.

Cultural resources were evaluated based on the criteria listed above. Eligible sites are those that meet one or more of the criteria for eligibility. In addition, sites evaluated as eligible must retain physical integrity. Eroded or otherwise heavily disturbed sites are generally not considered eligible. Sites evaluated as needing data are those sites that may conform to the eligibility criteria but require further work to determine NRHP status. In most cases, these sites are pre-contact or historic sites with suspected buried materials, or historic sites where additional research is necessary to determine historical importance. Sites that are evaluated as not eligible do not meet any of the eligibility criteria and/or have lost physical integrity.

2.3.3 WHR Criteria

The WHR is maintained by DAHP and includes districts, sites, buildings, structures, and objects that have been identified and documented as being significant in local or state history, architecture, archaeology, engineering, or culture. Listing offers no protection against alteration or demolition, although preservation is encouraged by DAHP. Private owners of WHR properties using private funds may alter or demolish these properties within existing local building regulations. Projects involving federal or state agency actions are reviewed by DAHP under SEPA, such as this Project, with the goal of preserving historic resources whenever possible. SEPA requires that significant properties, specifically those listed in or eligible for the WHR, be given consideration when state undertakings (permits, grants, construction, etc.) affect historic and cultural values. If significant resources are identified, DAHP considers the effects of a proposed Project on such resources and makes a professional recommendation for appropriate treatments or actions. A local governing authority may choose to uphold DAHP's recommendation and may require mitigation of adverse effects to significant properties.

The WHR has similar requirements for listing, including the age of 50 years or older; a high to medium level of integrity; and a documented historical importance at the local, state, or federal level under one or more of the following areas of significance (DAHP 2021a):

- The property belongs to the early settlement, commercial development, or original native occupation of a community or region.
- The property is directly connected to a movement, organization, institution, religion, or club that served as a focal point for a community or group.
- The property is directly connected to specific activities or events that had a lasting impact on the community or region.
- The property is associated with legends, spiritual or religious practices, or life ways that are uniquely related to a piece of land or to a natural feature.
- The property displays strong patterns of land use or alterations of the environment that occurred during the historic period.
- The property is directly associated with an individual who made an important contribution to a community or to a group of people.
- The property has strong artistic, architectural, or engineering qualities, or displays unusual materials or craftwork belonging to a historic era.
- The property was designed or built by an influential architect or reflects the work of an important artisan.
- Archaeological investigation of the property has or will increase our understanding of past cultures or life ways.
- Architectural resources within the survey area that met the 50-year age limit were also evaluated for eligibility using the WHR criteria.

3.0 Summary of Consultation

3.1 DAHP

TRC contacted DAHP on February 11, 2021, to discuss the Project. Topics included a brief introduction to the Project, getting set up in the Washington Information System for Architectural and Archaeological Records Data (WISAARD) database, and acceptable survey methodology expectations. In the discussion with DAHP, they stated they typically like to see an STP every 30 meters (m) on every transect. However, DAHP was aware of the large size of the Study Area and stated that would be too many and too large of an effort. They recommended using the cultural resource staff's best judgment for determination of the number of STPs for the Study Area and did not provide further specific official guidance.

3.2 Native American Coordination

Based on DAHP's database, the Project is located in the historic territory of the Yakama Nation and Confederated Tribes of Warms Springs Reservation of Oregon (CTWSRO).

Yakama Nation and Confederated Tribes of the Warm Springs Reservation of Oregon

On October 14, 2020, CCR submitted letters to the Confederated Tribes and Bands of the Yakama Nation and requested an opportunity to meet with their staff in the future to discuss the proposed development plans and the coordination on cultural and archaeological field studies. Based on a virtual meeting on March 4, 2021, the Yakama Nation recommended full coverage of the Study Area with standard survey transects of 10-30 m apart. The Yakama Nation indicated that it would likely not have the time to participate in field survey efforts but would like to be asked to review any significant finds in the field.

On February 12, 2021, TRC submitted a letter to the CTWSRO to request information regarding the Study Area. On February 18, 2021, TRC received a response from Mr. Christian Nauer regarding the Tribes' concerns on the Project. Mr. Nauer stated as a general comment that the CTWSRO "has concerns with the potential effects to historic properties or cultural resources within the LOD of Potential Effects (APE) [Study Area]. The Project APE is within the areas of concern for the CTWSRO." Mr. Nauer further stated that their "office would like to defer comment on cultural resource issues associated with this Project to our [their] neighbors to the north [Yakama Nation]. Mr. Nauer requested the Project "contact the Yakama Nation cultural resources department [Cultural Resources Program] for comment". They also requested a copy of the forthcoming cultural resources report.

These correspondences are provided in Appendix A.

4.0 Approach/Methods

4.1 Objectives

The objective of this cultural resource investigation is to identify any significant archaeological sites or historic properties that could be affected by Project actions. Thus, the investigation seeks to identify whether archaeological sites, traditional cultural properties, and historic buildings or structures are present within the Study Area and assess and evaluate those resources. Sites found within the Study Area are documented and evaluated, so that potential impacts to those resources can be assessed and mitigated. These objectives are accomplished through archival research, pedestrian survey, and subsurface archaeological investigations.

4.2 Archaeological Predictive Model

The DAHP statewide archaeological predictive model uses environmental data about the locations of known archaeological sites to identify where previously unknown sites are more likely to be found. The model correlates locations of known archaeological data to environmental data “to determine the probability that, under a particular set of environmental conditions, another location would be expected to contain an archaeological site” (Kauhi and Markert 2009: 2-3). Environmental data categories included in the model are elevation, slope, aspect, distance to water, geology, soils, and landforms. TRC accessed the DAHP archaeological predictive model on February 3, 2021. According to the model, approximately 153 acres that include the northwestern and northeastern portions of Section 9, the northeastern portion of Section 10, and the western portion of Section 11 were identified as very high risk for archaeological resources and the rest of the 1,123-acre Study Area consists of low to moderate risk (Figure 4-1). Precontact sites in the general area surrounding the Study Area are typically small lithic scatters indicating small camp or tool maintenance sites. Historic sites in the area are typically early twentieth century trash scatters associated with ranching and farming activities in the Yakima area.

4.3 Records Search

On February 3, 2021, TRC conducted a records search through the DAHP WISAARD (DAHP 2021b). Research was conducted to identify any previously recorded historic or precontact cultural resources, including isolated artifacts, archaeological sites, historic buildings, and structures that are in and within a one-mile radius of the Study Area. TRC also reviewed records to identify any previously conducted cultural resources surveys conducted in and within one mile of the subject property.

4.4 Field Survey

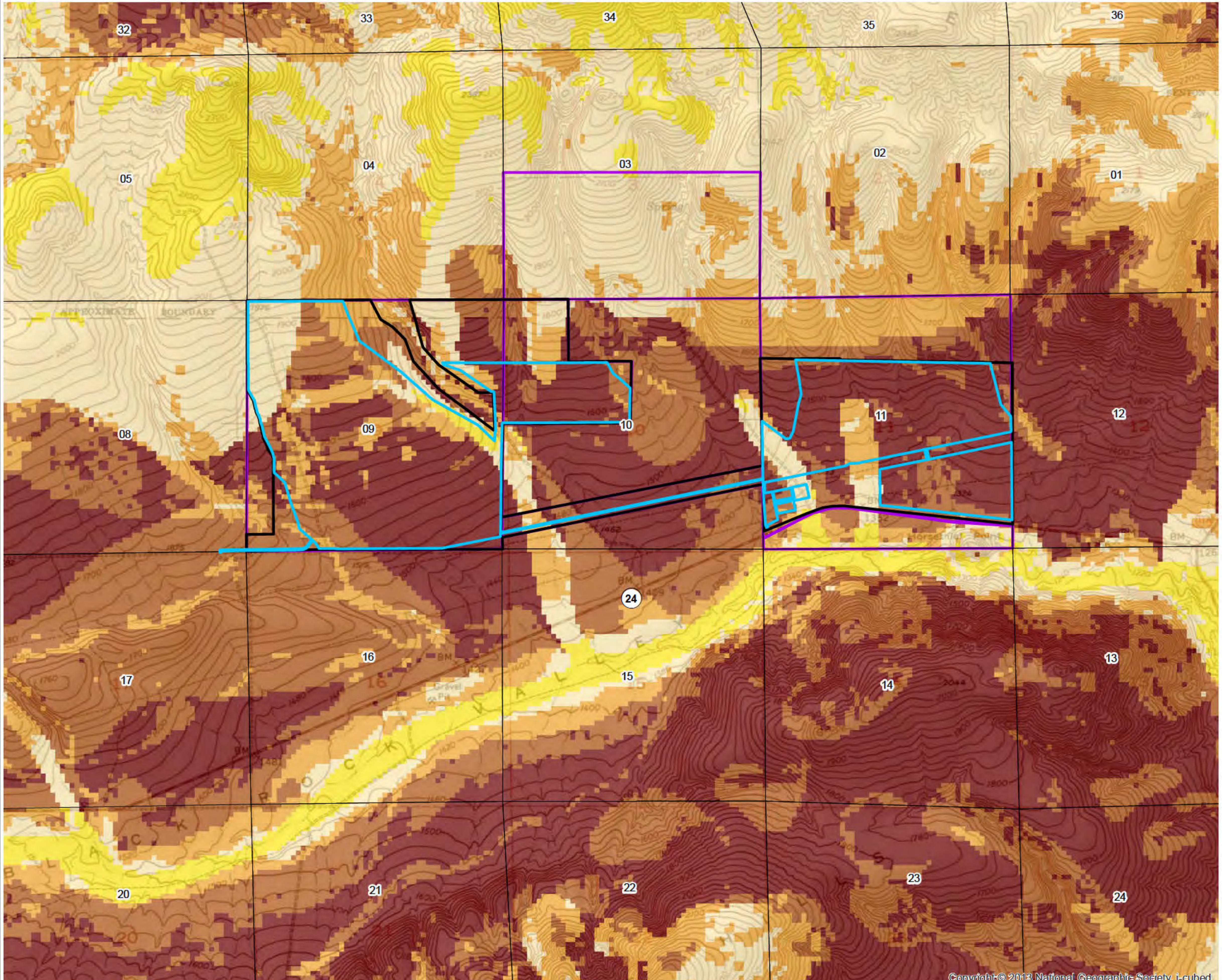
Due to the large number of acres of the Study Area, initial field surveys were conducted in areas that were determined to have a high probability for known and unknown archaeological resources to determine if resources are present and the extent of disturbance to the area. The 153 acres surveyed within the Study Area were identified based on the DAHP’s archaeological predictive model (Levels 4 and 5 [High Risk] for archaeological resources).

The results of the spring and summer 2021 cultural surveys and biological surveys conducted were used to develop the Project Site Plan. The MPE where proposed ground-disturbing activities will take place was developed from the Project Site Plan. Additional cultural field surveys are planned in 2022 for approximately 819 acres located in the Study Area that were not surveyed during the initial spring and summer 2021 surveys where surface disturbance may occur. The results of the spring 2022 surveys will be summarized in an addendum to this report. Archaeological field surveys consist of an intensive-level pedestrian survey and STPs using the methods below.

Between May 24 and 28, and on October 5, 2021, TRC lead archaeologist Matthew Wetherbee, MSc., RPA; and TRC archaeologists Corinne Blair, BA, Patrick Lowinger, MA, and Arthur Ramcharan, BA; carried out the intensive-level, pedestrian field survey. Resumes for survey staff are included in Appendix B. During the survey, the archaeologists walked parallel east-west transects spaced 20 m (approximately 65 feet [ft]) apart. Transect accuracy was maintained through the use of maps, compasses, and handheld sub-meter accurate Trimble GPS receivers. An opportunistic survey was conducted in areas where steep terrain (greater than 60 degrees) or dense vegetation precluded more intensive examination and within areas that are low risk for encountering archaeological resources. In this way, the ground surface, where accessible, was systematically and carefully examined for any evidence of human activities dating to the precontact or historic periods (i.e., 50 years ago or older). TRC archaeologists recorded succinct field notes describing terrain and vegetation, cultural resources encountered (including isolated occurrences of artifacts), observation problems, and procedures used to accommodate or compensate for them.

While in the field, TRC assessed areas with high possibility for new site discovery (e.g., streams), as well as existing and future roads. Where new archaeological resources/isolates were found, the discoveries were photo-documented using a digital camera of 10 megapixels or better resolution in JPEG, PNG, or TIFF format and recorded on appropriate Washington site inventory forms, and their locations mapped using a GPS unit. All identified sites were recorded to their complete extent within the Study Area. No artifacts or other materials were collected during the survey and no subsurface testing occurred. All site records or site record updates will be submitted to the Washington DAHP located in Seattle, Washington, and the Yakama Nation.

In addition to the pedestrian survey, subsurface inspections were performed by excavating STPs within areas with the potential to yield subsurface cultural materials. Washington DAHP's archaeological predictive model was used to identify areas of High Risk for encountering archaeological resources; STPs were focused in these areas. Factors considered in their placement included soil deposition, history of land use, proximity to water, distribution patterns of cultural resources in the Study Area and the surrounding area, and professional judgement. A total of 62 STPs were excavated. STPs measured approximately 30 to 40 centimeters (cm) in diameter at the surface and, where possible, were excavated in arbitrary 10-cm levels to either 50 cm below surface (cmbs), C-horizon, or until two sterile levels after an observed resource (i.e., 20 cm). All excavated sediments were screened through 1/4-inch mesh. STP results were documented on TRC shovel/auger testing forms. Stratigraphic context was recorded by depth. Any archaeological materials found during the survey and/or STP excavation were documented by depth, photographed, described, and left on site. Artifacts identified with a STP were placed in a plastic bag and buried for future analysis. GPS data was collected for each excavation unit and delivered in ArcGIS files or Google Earth (kmz/kml) files and as tabular data in an excel spreadsheet. There was no collection of artifacts during the fieldwork portion of this Project unless circumstances of the find required collection and further analysis. The results from the field efforts are described below.



LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- 1 - Survey Contingent Upon Project Parameters: Low Risk (Color: Brick Red)
- 2 - Survey Contingent Upon Project Parameters: Moderately Low Risk (Color: Burnt Orange)
- 3 - Survey Recommended: Moderate Risk (Color: Orange)
- 4 - Survey Highly Advised: High Risk (Color: Pale Yellow)
- 5 - Survey Highly Advised: Very High Risk (Color: Brightest Yellow/Canary Yellow)
- (24) State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/MAXAR 2019.
2. SOURCE: WASHINGTON DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION (DAHP). 2021.

0 1,000 2,000 Feet
1 " = 2,000 '
1:24,000

PROJECT:
CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:
DAHP PREDICTIVE MODEL OF THE OSTREA STUDY AREA

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	M. WETHERBEE		
APPROVED BY:	E. BERGQUIST		**FIGURE 4-1**
DATE:	MARCH 2022		

TRC
11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

FILE NO.: Fig 4-1 Ostrea DAHP's Predictive Model Map of Project Area.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0
Plot Date: 3/13/2022, 17:46:32 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 4-1 Ostrea DAHP's Predictive Model Map of Project Area.mxd

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5.0 Results

5.1 Records Search

TRC conducted a records search through the WISAARD online database on February 3, 2021 (DAHP 2021b), to identify known cultural resources located within the Study Area and vicinity. The records search revealed that five previous archaeological surveys have been conducted within one mile of the Study Area with one including a portion of the subject property (Table 5-1). In 2015, Applied Archaeological Research, Inc., conducted a single survey within the Study Area for the Midway-Moxee Transmission Line Rebuild and the Midway-Grandview Transmission Line Upgrade Project (Becker et al. 2015). As part of that survey, the Midway-Moxee transmission line right-of-way (ROW) that passes through the Study Area was subjected to pedestrian and subsurface archaeological survey with negative results. The transmission line survey identified a precontact lithic scatter also within the current Study Area. Additionally, the survey evaluated the NRHP eligibility of the Midway-Moxee Transmission Line.

Table 5-1. Previous Cultural Resources Studies within One Mile of the Study Area.

NADB Report Number	Author	Year	Report Title	Relationship to Study Area
1687474	Becker, Thomas, E., Bill R. Roulette, Lucille E. Harris, Donald D. Pattee, Kendal L. McDonald, and Aimee A. Finley	2015	Volume 1: Cultural Resources Study of the Midway-Moxee Transmission Line Rebuild and the Midway-Grandview Transmission Line Upgrade Project, Benton and Yakima Counties, Washington	Within Study Area
1689509	Noll, Christopher	2017	A Cultural Resources Inventory of 947.6 Acres for the 2016 Range 12 Fire ESR in Yakima, and Benton Counties, Washington	Within one mile
1680282	Schlegel, Trinity	2011	Class III Cultural Resource Inventory of Selected Tracts of Bureau of Land Management Public Lands for Grazing Lease Inventories in Chelan, Douglas, Franklin, Grant, Kittitas, Lincoln, Okanogan and Yakima Counties on Lands Administered by the Spokane District Office, Spokane County, Washington	Within one mile
1341332	Wills, Carrie	2002	Archaeological Survey for the Proposed Black Rock Dam Geotechnical Testing, Yakima, Washington	Within one mile
1341450	Regan, Dennis C.	1999	A Cultural Resources Survey of the Washington State Department of Transportation's SR-241 Realignment Project: MP 20.72 to SR-24 Junction at MP 25.21, Yakima and Benton Counties, Washington	Within one mile

As a result of these prior surveys, one historic property ([redacted]—Midway-Moxee [No. 1 115 kV] Transmission Line) and one archeological site (45YA01587)—have been previously identified within the Study Area and five archaeological resources have been recorded within the one-mile radius. These resources comprise three precontact lithic scatters, one precontact isolate, and one historic debris scatter (Table 5-2). The Midway-Moxee transmission line (676383) is considered eligible for the NRHP and the precontact lithic scatter (45YA01587) is considered not eligible. Proposed gravel access roads will cross under the transmission line; however, the road will not alter the transmission line poles, thus not affecting the historical significance of the transmission line. The other previously recorded resources are located outside the Study Area and are not expected to be impacted by Project activities.

Table 5-2. Previous Cultural Resources within One Mile of the Study Area.

Resource ID	Smithsonian Number	Resource Type	Description	Recorder(s) and Year(s)	Relationship to Study Area	NRHP Status
[redacted]		Historic	Midway-Moxee No. 1 115 kV Transmission Line	2014 (Aimee Finley) 2020 (Julia Mates, Brady Berger	Within	Eligible
[redacted]	45YA00641	Precontact	Lithic scatter	1999 (S. Gilbert)	Outside (within one mile)	Eligible
[redacted]	45YA00818	Historic	Debris scatter	1999 (J. Carter)	Outside (within one mile)	Potentially eligible
[redacted]	45YA00574	Precontact	Lithic scatter	1995 (D. Regan, Cheung, Walker, Ives, Umtuch, Kiona F. Crisson)	Outside (within one mile)	Unknown
[redacted]	45YA01581	Precontact	Isolate	2014 (T. Becker)	Outside (within one mile)	Not eligible
[redacted]	45YA01587	Precontact	Lithic scatter	2014 (T. Becker)	Within	Not eligible
[redacted]	45YA00661	Precontact	Lithic scatter	1999 (S. Gilbert)	Outside (within one mile)	Unknown

5.1.1 Previously Recorded Archaeological Sites and Built Environment Resources

Resource 676383 (Midway-Moxee [No. 1 115kV] Transmission Line)

DAHP Resource Type: Historic built environment resource
Time Period: Mid-twentieth century; circa (ca.) 1941-present
Site Type: Midway-Moxee No. 1 115 kV Transmission Line
Dimensions: 33.98 miles in total length
NRHP Recommendation: Recommended NRHP eligible
Proximity to Study Area: Within
Ownership: Private

In 1941, the BPA constructed the Midway-Moxee [No. 1 115 kV] Transmission Line, which is 33.98 miles long and connects the Midway Substation located on the Hanford Site with the Moxee Substation, located about 2.75 miles north of Moxee, Washington. The transmission line corridor runs parallel to and to the north of SR-24. The line is composed of 224 wood structures, which support the 115-kV conductor. Most of the structures have a two-pole configuration, except for the 10 three-pole structures. The three-pole structures are usually located where the transmission line ROW changes angles or enters or exits a substation (Berger et al. 2020).

Tetra Tech, Inc. evaluated the transmission line for listing in the NRHP in 2020 (Berger et al. 2020). The Midway-Moxee Transmission Line meets the requirements for eligibility and integrity listed in the system's Multiple Property Documentation Form (MPDF) for transmission lines eligible for listing under Criterion A, as contributing elements of the BPA Transmission Network constructed between 1938 and 1974. The line is associated specifically with the Master Grid Development (1938-1945) of the network (Berger et al. 2020).

The transmission line meets the eligibility requirements of the MPDF and retains all seven aspects of integrity, also outlined in the MPDF. As such, it is recommended eligible for listing in the NRHP as a contributing element to the BPA Transmission Network under Criterion A. It is not recommended that the transmission line is eligible under Criterion C because the historical record does not indicate it is significant for its design or technological aspects (Berger et al. 2020). As noted above, the transmission line is situated within the overall Study Area but will not be impacted by the Project. A site record update form was not completed.

Resource [redacted]/45YA01587

DAHP Resource Type: Precontact archaeological site
Time Period: Precontact
Site Type: Lithic scatter
Dimensions: [redacted]
NRHP Recommendation: Not eligible
Proximity to Study Area: Within
Ownership: Private

Site 45YA01587 is a prehistoric lithic scatter measuring [redacted] The topography surrounding the site consists of drainages to the west and east, and a gentle slope rises to the north. On-site vegetation is primarily bunch grasses and the site has been disturbed by access road construction and use.

Site 45YA01587 comprises five pieces of debitage, including two of cryptocrystalline silicate (CCS) and three of petrified wood. The artifacts included percussion flakes and flake fragments and two pieces of angular shatter. Seven STPs were excavated within and near the site and all STPs were negative for yielding artifacts. The site was subsequently recommended not eligible for listing on the NRHP (Becker et al. 2015). Site 45YA01587 is located within the overall Study Area, but outside the current survey area and it is anticipated that it will not be impacted by the proposed project.

5.2 Historic Maps and Aerial Photography Review

In addition to consulting records maintained by DAHP, TRC reviewed 1934 and 1955 Metsker maps; the 1917, 1948, 1951, 1953, and 1965 United States Geological Survey (USGS) quadrangle maps; Google Earth historic aerial imagery; and the NRHP for historic properties or features that may have once been located within the proposed Study Area. The Metsker maps showed no buildings within the proposed Study Area. Sometime between 1934 and 1955, the maps showed a change in the SR-24 alignment and the addition of transmission lines within the Study Area. The 1917 USGS map shows a series of short dirt roads leaving SR-24 and terminating at structures. On the 1948 USGS map, the roads and structures do not appear. The roads and structures were likely associated with early oil and gas exploration, which began in the area in the early 1900s and was mostly abandoned by the 1950s. Historic aerials (NETR 2021) and Google Earth historic aerial imagery of the Study Area begin in 1994 and show no changes between then and the present.

5.3 Field Survey

The Study Area was vacant and undeveloped and bounded on the south by SR-24, on the east and west by vacant land, and on the north by a fence line and the Yakima Training Center. The topography is characterized by a slope to the south, gentle rolling hills, and seasonal drainages traversing the property (Figures 5-1 through 5-5). Vegetation on the property included Steppe and Shrub-steppe vegetation zones of the Columbia Basin. Further site characterization is included in Section 6.0. Ground surface visibility throughout the Study Area was good (80 to 90 percent). Native soil, when visible, consisted of surficial deposits of brown silty sand and Pleistocene continental glacial till throughout the property. Modern refuse was observed throughout the Study Area. No structures or buildings are located on the Study Area. During the field surveys, TRC identified and recorded one new cultural resource within the Study Area composed of a precontact lithic site. Confidential Site records can be found in Appendix C.

Figure 5-1. Cultural Resources Field Results for the Ostrea Study Area

Confidential – Not for Public Distribution

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The 62 STPs were excavated within the Study Area in arbitrary locations that were devoid of surface vegetation debris and reached depths ranging from 35 to 70 cmbs (Figure 5-1). The results of the STPs have been used to infer the relative potential for subsurface archaeological deposits in the Study Area. STPs were not excavated on hill slopes that were not conducive for subsurface archaeological deposits. Towards the southern end of the Study Area, the soil encountered was a 10 YR 5/3 yellowish brown, silty loam, with moderate to loose compaction, less than 10 percent sub-rounded to sub-angular pebbles and gravels, and larger rocks at depth. At the northern portion of the Study Area, the soil was 5 YR 4/3 yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; less than 5 percent sub-rounded to sub-angular pebbles and gravels; no large rocks encountered. The Holocene soils observed lacked significant stratigraphy. Rock impasses are responsible for the termination of any listed STP that did not extend beyond 30 cmbs. Of the 62 STPs excavated across the Study area, three (STPs 9, 11, and 16) were positive and included precontact artifacts. All probes were backfilled following excavation and documentation. STP results are provided in Appendix D, including maximum depth, soils descriptions, and results.

5.3.1 Newly Recorded Archaeological Sites

5.3.1.1 TRC-Ostrea-001

Resource Type: Precontact archaeological site
Time Period: Precontact
Site Type: Lithic scatter
Dimensions: [redacted]
NRHP/WHR Recommendation: Eligible
Proximity to Study Area: Within

Site TRC-Ostrea-001 is a precontact lithic site measuring [redacted]. Site TRC-Ostrea-001 consists of four artifacts including a white chalcedony flake (STP 9), one projectile point (STP 11), one CCS debitage fragment, and one small fragment of petrified wood (STP 16) that were all recovered from STPs. [redacted]

STP 9 contained one white chalcedony flake collected from the 10 to 20-cmbs level. An additional four radial STPs at 10-meter spacing in the cardinal directions around the positive shovel probe were excavated to 50 cmbs. The four STPs were negative for additional artifacts. The single flake measured 15 millimeters (mm) long x 11 mm wide (see Figure 5-6) and was recovered approximately 40 m west of a drainage.

STP 11 yielded one projectile point manufactured from chert (Figure 5-7) from the upper 10 to 20-cmbs level. An additional four radial STPs at 10-meter spacing in the cardinal directions around the positive STP were excavated to between 45 and 60 cmbs and were negative for cultural resources. The chert projectile point measures 28 mm long x 11 mm wide at the base. The point is triangular in shape and the blade is straight. The base and notches are broken off and the blade exhibits flaking patterns.

STP 16 yielded two additional artifacts, one CCS debitage fragment and one small fragment of petrified wood (Figure 5-8). One additional STP (STP 17) was excavated 10 m north of STP 16 and yielded no further artifacts. The CCS debitage measures five mm (long) x five mm (wide) and the petrified wood fragment measures nine mm (long) x two mm (wide).

5.3.1.2 WHR Eligibility Evaluation

These artifacts appear to be related to the original native occupation of the region and may have washed down from previously recorded site 45YA01587, [redacted] as they were located in close proximity to a seasonal drainage. CCR consultations with the Yakama Nation are ongoing and it is unclear if the area is associated with legends, spiritual or religious practices, or lifeways that are uniquely related to a piece of land or to a natural feature. Therefore, the area is protected by the WHR, potentially meeting at least one of the areas of significance for listing on that register.

Figure 5-2. Study Area Overview from the Northwest. View to the northwest.
Photo taken on May 26, 2021.

Figure 5-3. Study Area Overview from the North. View taken to the north.
Photo taken on May 27, 2021.

Figure 5-4. Study Area Overview from the Northeast. View to the northeast.
Photo taken on May 28, 2021.

Figure 5-5.Study Area Overview from the South. View to the south.
Photo taken on October 5, 2021.

[redacted]

Figure 5-6. Chalcedony Flake from STP 9. ***Confidential – Not for Public Distribution***

[redacted]

Figure 5-7. Chert Northern Side-Notched Point from STP 11. ***Confidential – Not for Public Distribution***

[redacted]

Figure 5-8. CCS Debitage and Petrified Wood Fragments from STP 16. ***Confidential – Not for Public Distribution***

6.0 Characterization of Affected Environment

6.1 Geologic Context

The Study Area is situated in the Columbia Plateau, Columbia Gorge, and Western Cascades physiographic regions, which reflect numerous episodes of volcanic activity that began some 58 million years ago and have continued sporadically to the present. The history of this volcanic activity is overlain with a complex history of uplifting, folding, and tilting of the landmass. Most of this activity occurred in the late Miocene and early Pliocene epochs, when massive eruptions of volcanic lava, originating in central and eastern Washington and Oregon, streamed westward down the Columbia River valley to the sea (Allen et al. 1986). Each eruption expelled large volumes (cubic miles) of lava, which covered extensive areas (Alt and Hyndman 1984:163). These flows are typically known as flood basalts because they spread away from their point of origin before solidifying, often leaving little trace of a volcanic cone at the site of issue (Easterbrook and Rahm 1970: 110). Over time, these successive layers reached a thickness of at least 8,000 ft. Between some of the flows, ash-rich eolian deposits stabilized and supported temperate forests around lakes and bogs. Later eruption flows known as the Ellensburg Formation covered these forests, encasing the trees and other organic material (Benson and Riche 1993: 2). Over time, volcanic ash mixed with the basalt deposits that encased these organic materials and formed silica precipitates such as chalcedony, opal, petrified wood, and silicified "bog."

Following the deposition of the Yakima Basalt, the Cascade Mountains began to rise, as did the low hills between the Yakima and the Columbia rivers. As these mountains and hills were forming, the land around present-day Pasco began to subside as a result of the loss of underground magma and the immense weight of the over 8,000 ft of dense basaltic rock, forming the Pasco Basin. As the mountains were rising, the Columbia River was cutting down through the range, creating a deep canyon. Later, during the Plio-Pleistocene epoch, renewed volcanic activity led to the formation of the High Cascades (Baldwin 1976: 61-63) and produced lava flows that filled the tributaries of the Columbia. This displaced the Columbia River to the north, near its present position. Concurrent with the uplifting of the High Cascades was the sinking of the Cascade graben, a lowered block between two faults. The stratovolcano peaks of Mt. Hood, Mt. St. Helens, and Mt. Adams began to rise 700,000 years ago, a process that continues into the present. The up-arching of the Cascades created a barrier to easterly flowing moist marine air and resulted in the climatic division of the region into the moist western and dry eastern portions (Allen et al. 1986). Intersecting the High Cascades is the Yakima fold belt, which is a Miocene-age southwest-northeast trending structural fold of the Columbia River basalts. Folding of the basalts created a series of anticlines and synclines which include Umtanum Ridge, Saddle Mountains, Yakima Ridge, and Rattlesnake Hills (Orr et al. 1992).

In the Project vicinity, deep gravel deposits were left behind as the Pleistocene glacial floodwaters spread out and slowed and alluvial sediments settled out (McKee 1972: 283-289). These glacial lake outburst flood gravels are present on the ground surface or below a few centimeters of sediment throughout the Project region. After the flooding, wind-blown sands and silts were deposited over the landscape, creating dunes. In the region, thousands of low mounds, regionally known as mima mounds (Berg 1990), are composed of these wind-blown sediments.

Columbia Basin soils are generally classified as Andisols, which form in volcanic materials and from weathering processes, and Entisols, which form from actively eroding slopes, flood plains, and glacial outwash plains. Soils in the Study Area are listed in Table 6-1 and shown in Figure 6-1. In the Study Area, hardpan or other restrictive layer is typically reached in the Willis series at 34 inches (in) below ground surface (bgs), at 18 in bgs in the Moxee series, below 60 in bgs in the Finley series, and more than 80 in bgs in the Kiona and Ritzville series (USDA NRCS 2021). The surface geology has been mapped as Quaternary eolian silt and fine sand; it includes clay, caliche, tephra, and paleosols; locally it includes outburst flood deposits (WDNR 2021).

Table 6-1. Soils in the Study Area.

Soil Map Unit Symbol	Soil Map unit Name	Acres in Study Area	Percent of Study Area
35	Finley fine sandy loam, 0 to 5 percent slopes	11.4	1
65	Kiona stony silt loam, 15 to 45 percent slopes	17.7	2
83	Moxee silt loam, 2 to 15 percent slopes	512.8	46
127	Scooteney cobbly silt loam, 0 to 5 percent slopes	16.6	1
130	Selah silt loam, 8 to 15 percent slopes	73.5	7
132	Shano silt loam, 2 to 5 percent slopes	56.1	5
142	Starbuck silt loam, 2 to 15 percent slopes	17.1	2

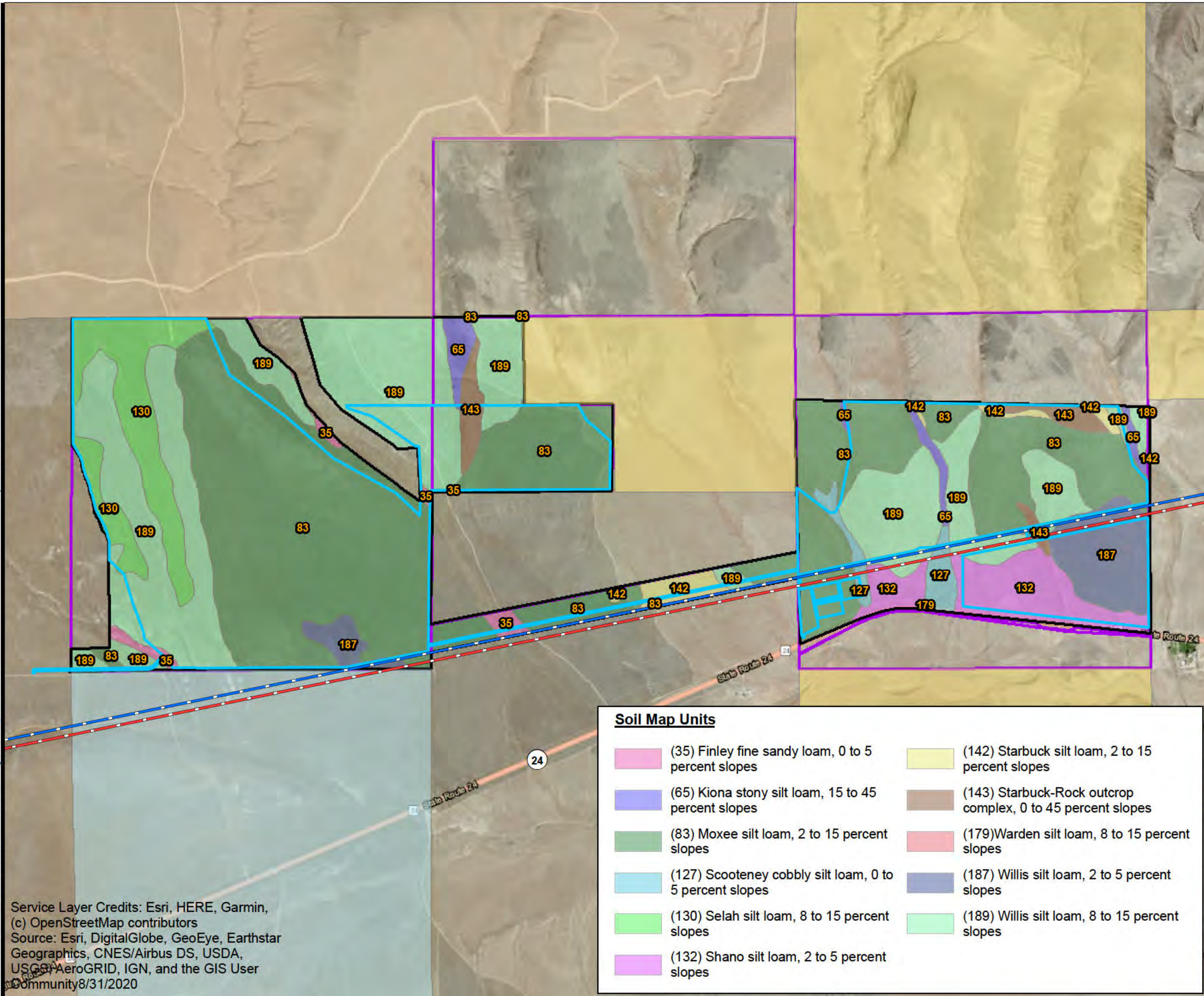
Soil Map Unit Symbol	Soil Map unit Name	Acres in Study Area	Percent of Study Area
143	Starbuck-Rock outcrop complex, 0 to 45 percent slopes	20.7	2
179	Warden silt loam, 8 to 15 percent slopes	0.3	<1
187	Willis silt loam, 2 to 5 percent slopes	56.7	5
189	Willis silt loam, 8 to 15 percent slopes	340.1	30

Source USDA NRCS 2021

6.2 Vegetation and Fauna

The Study Area is located in the Columbia Basin, a dry area receiving on average 10 in of precipitation yearly. The basin supports vegetation of the *Artemisia tridentata-Agropyron* association of the Steppe and Shrub-Steppe vegetation zone of the Columbia Basin (Chatters 1989: 35; Franklin and Dyrness 1973: 212). This association conforms to the Eastside Shrubland and Grassland wildlife habitat area. The native vegetation in this habitat is dominated by small numbers of shrubs, grasses, and forbs with a microbiotic crust of lichen and moss that bind the upper surface of the soil (Vander Haegen et al. 2001: 292). Trees are absent except in riparian areas. Species typical of this habitat include big sagebrush, Idaho fescue, rabbitbrush, threetip sagebrush, spiny hopsage, bluebunch wheatgrass, needlegrasses, bluegrasses, bottlebrush squirreltail, cheatgrass, western stickseed, and crustal lichens and mosses (Franklin and Dyrness 1973: 216- 217). At present, much of the native vegetation communities in these areas have been disturbed or destroyed; areas containing intact native vegetation associations are limited to where cultivation and/or grazing are not and have not been economically feasible (Vander Haegen et al. 2001: 292). The Ostrea Rare Plants and Vegetation Communities Report (Application for Site Certification, Attachment B) summarizes the habitats identified in the Study Area during field surveys.

On the Columbia Plateau, mule deer, elk, and pronghorn antelope are common. Deer and elk were the preferred large prey species hunted by the aboriginal inhabitants of the region, although bear and bighorn sheep were also taken (Hunn and French 1998: 382-383). While bighorn sheep are not generally associated with the shrub-steppe environment, they are known to have occurred precontact in mountainous areas flanking the shrub-steppe region (Vander Haegen et al. 2001: 300). Medium-sized mammals include jackrabbits, cottontails, marmots, and a variety of squirrels. Coyote, badger, bobcat, mountain lion, and weasel are the modern carnivores of the shrub-steppe region (Vander Haegen et al. 2001: 299). Game birds in the region included several species of grouse, duck, quail, and swan (Hunn and French 1998: 383). Waterfowl such as Canada geese were (and are) found only in the riparian areas of the Columbia River and its tributaries. Fish, primarily salmon, were an important food source for the area's original inhabitants. Five salmon varieties were found in the Columbia River and its tributaries (Hunn and French 1998: 382). Other species of fish that were of economic importance include two species of sucker and lamprey eels. The Ostrea General Wildlife Surveys Report (Application for Site Certification, Attachment C) summarizes the habitats identified in the Study Area during field surveys.



TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2022, 20:40:13 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 6-1 Ostrea_Soils.mxd

LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Bureau of Land Management
- U.S. Dept. of Defense -Yakima Training Center
- State Lands
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/ MAXAR 2019.
2. SOIL SURVEY STAFF, NATURAL RESOURCES CONSERVATION SERVICE, UNITES STATES DEPARTMENT OF AGRICULTURE. WEBSOIL SURVEY. ACCESSED 02/21/2022.

0 1,000 2,000 Feet
1" = 1,417 '
1:17,000

PROJECT:
CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:
SOIL MAP UNITS IN THE STUDY AREA

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	M. WETHERBEE		**FIGURE 6-1**
APPROVED BY:	E. BERGQUIST		
DATE:	MARCH 2022		

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6.3 Prehistoric Context

The prehistory of the Columbia Plateau is characterized by varied and unique precontact cultural adaptations to specific resources and environments (Chatters and Pokotylo 1998: 73). The evidence for different adaptive strategies and trajectories throughout the Plateau and across time has complicated efforts to formulate a uniform model of culture history, especially in the late precontact period. Focusing on changes in technology, settlement, and resource use that have been noted in the archaeological record, numerous competing models of precontact adaptation and land use have been advanced to describe the prehistory of various regions within the Columbia Plateau (e.g., Ames 1988; Ames and Marshall 1980; Ames et al. 1998; Andrefsky 2004; Chance and Chance 1982, 1985; Campbell 1985; Chatters 1995; Leonhardy and Rice 1970; Lohse and Sammons-Lohse 1986; Schalk and Cleveland 1983).

For this report, we use the Southern Plateau chronology developed by Ames et al. (1998). This framework divides Southern Plateau prehistory into three basic periods (I, II, and III) based on major trends or developments in patterned human behavior and changes in material culture. Each of these three periods is further divided into subperiods that represent more nuanced developments within the major periods. This framework also distinguishes three geographic subregions within the Southern Plateau (southwest, southeast, and south-central) on the basis of differences in how Period I, II, and III cultural patterns are expressed among the subregions.

Period I (13,500 to 7000/6400 Before Present [B.P.])

Period I can be divided into two subperiods, designated IA and IB, and both are highly mobile foraging adaptations that are not well-represented in the archaeological record due to the limited evidence for storage or residential structures and uniform inter-site tool assemblage variability (Ames et al. 1998; Schalk and Cleveland 1983).

Subperiod IA (13,500 to 13,000 Before Present [B.P.]), also known as the Paleoindian period, is typically treated as the earlier of the two subperiods. It is known primarily from surface finds of fluted points across the Northwest, but also from a few buried components. Consequently, the identification of Subperiod IA sites depends largely on the presence of diagnostic elements of material culture, most notably the distinctive fluted (Clovis) point. Other known elements of Subperiod IA assemblages are large bifaces, bifacial blades, unifaces, and bone foreshafts and spear shaft spacers. The only known Clovis site in Washington State that contains intact deposits is the Richey Clovis site (45DO432), which is located near East Wenatchee in Douglas County. As presently understood, that site consists of an artifact cache that contained 14 fluted points, eight bifacial knives, adzes, sidescrapers and 13 beveled bone rods, which some researchers believe may be sled runners (Gramly 1993: 7-8). As a whole, Subperiod IA cultural adaptations are thought to represent highly mobile, large game-oriented systems.

Subperiod IB (13,000 to 7000/6400 B.P.) follows Subperiod IA and is best known from the southeast plateau, where it is further divided into the Windust (13,000 to 9000 B.P.) and Cascade (9000 to 7000/6400 B.P.) Phases. These names have become common across much of the Northwest to differentiate chronologically and stylistically distinct, yet closely related, Subperiod IB assemblages. Both Windust and Cascade tool assemblages include points, burins, gravers, cores, chipped and edge ground cobble tools, utilized flakes, scrapers, and to a lesser extent bola stones, bone points (some barbed), needles, and awls. The Windust Phase is associated with characteristic shouldered, stemmed, and lanceolate projectile points, known as Windust points, from which the cultural phase derives its name. The Cascade Phase is marked by a transition around 9000 B.P. to predominate use of laurel leaf-shaped points, or Cascade points. Cascade points are virtually the only point form during the Early Cascade phase (9000 to 7800 B.P.). Afterward, during the Late Cascade Phase (7800 to 7000/6400 B.P.), Subperiod IB assemblages begin to be associated with large side and corner notched points (in addition to the laurel leaf-shaped type points). These new point forms are designated Northern Sidenotched and Cold Springs Side-notched points. The Late Cascade Phase is also notable for the disappearance of edge-ground cobbles from tool assemblages.

Most Subperiod IB sites, particularly Windust phase sites, are found along major rivers and their tributaries in the Central and Eastern Plateau. In the south-central Plateau, Cascade material is better represented, while little material dating to before 10,500 B.P. has been found in the southwest Plateau. Faunal remains are rare in Subperiod IB sites, but when recovered tend to be highly diverse. Bison, elk, deer, and pronghorn were found at Marmes Rockshelter and Lind Coulee, while evidence for extensive salmon use is found at Five Mile Rapids and rabbit and fish remains are common at many sites.

Generally, Subperiod IB sites are thought to represent a high mobility forager adaptation focused on a broad-spectrum diet. Assemblages are fairly uniform across the Plateau, particularly during the Cascade Phase. The complex differentiation of site types typically associated with more sedentary or logistically organized adaptations is not found during Subperiod IB. What variation there is in site types likely represents localized differences in resource acquisition and use, for example, the large number of edge-ground cobbles found at Goldendale (Schalk and Cleveland 1983). Structures have been found along the Wells Reservoir and on the Upper Columbia dating to Period IB, but are small and by all measures, temporary shelters, lacking subterranean depressions or evidence of substantial labor-intensive superstructures.

Period II (7000/6400 to 3800 B.P.)

This period is relatively well-represented in the southeastern and south-central regions of the Plateau but is comparatively ephemeral in the southwest Plateau. As a whole, Period II is marked by the disappearance of many Period IB technologies and by the appearance of semi-subterranean housepits. Period II tool assemblages are typically composed of a diverse range of projectile points and become a proportionally smaller component of assemblages. There is also a notable reduction in the overall quality of lithic tool workmanship compared to preceding periods. Edge ground cobbles and prepared cores, both characteristic of Period I assemblages, are no longer present in Period II assemblages. Finally, where milling stones were small during Period I, they become large and substantial tools during Period II, suggesting increased importance in the processing of certain plant foods.

The appearance of housepits during this period is notable because it is indicative of a change in forager mobility strategies, from high year-round mobility to seasonal sedentism. However, little supportive data has been recovered to suggest that this early period of housepit use corresponds to an associated shift in economic practices (e.g., from foraging to collecting, *sensu* [Binford 1980]). For instance, storage features are not found in association with these early housepits and faunal assemblages indicating a broad-based diet, not one focused on one or a few key species as is common in collector-type strategies (Andrefsky 2004). The end of Period II is marked by a distinct break or hiatus in housepit use between ca. 4000 to 3800 B.P.

Period II is characterized by a high degree of variability in its expression across the Southern Plateau. On the southeast Plateau, the earliest dated housepits occur at Alpowa, Hatwai, and Hatuhpuh and date between 5200 to 4400 B.P. House styles were similar at all three sites, being seven to eight m in diameter, one to two m in depth, and circular to rectangular in plan. All lack direct evidence for a superstructure over the housepit. Tool assemblages included side and corner-notched points, large hopper mortar bases, and anvils. Faunal remains indicate use of freshwater mussels, elk, deer, pronghorn antelope, an array of small mammals, and fish. Large stone hopper mortars found at some sites hint at the important role in the diet played by roots (Ames and Marshall 1980). These structures are thought to represent an early expression of seasonal sedentism associated with a foraging strategy.

Similarly, early dating housepits (ca. 5200 B.P.) have been identified on the southcentral Plateau. These houses are similar to Period II housepits from the southeast Plateau, except that they tend to be shallower and can be as large as 12 m in diameter. Tool assemblages are largely the same, but faunal assemblages associated with Period II residential sites from the south-central Plateau tend to be more diverse than those from the southeast Plateau and include evidence for greater utilization of fish and freshwater shellfish, particularly in contexts post-dating 5000 B.P. Unlike the southeast Plateau, Period II on the south-central Plateau is thought to represent year-round, not seasonal, sedentism within the context of a central-place foraging system. This adaptation, based largely on evidence from a previously recorded precontact site (45OK11) is believed to be the result of strategic settlement location that allowed residents to forage for a wide range of resources throughout the year from a single central base (Lohse and Sammons-Lohse 1986).

Little evidence for Period II is found in the southwest Plateau. Few habitation sites are known, and assemblages differ little from the previous Cascade Phase. Thus, Period II is not as well defined as either the proceeding Period IB or later Period III deposits and is considered to be "largely hypothetical" for the southwest Plateau region (Ames et al. 1998: 110). Ames et al. (1998) suggest Period II in this area is transitional in nature between subperiod IB and Period III, with the absence of residential structures taken to imply retention of the subperiod IB high mobility foraging pattern.

Period III (3800 to 200 B.P.)

Following the apparent 200-year hiatus in housepit occupation that marks the end of Period II, housepits again reappeared on the Southern Plateau. This second episode of housepit use marks Period III. Period III sites and assemblages bear strong resemblance to the ethnographically documented pattern of seasonal sedentism coupled with a logistically organized collecting system that made use of bulk processing and storage of a few key resources, specifically roots and salmon. This system is associated with the presence of storage pits (some containing salmon remains), as well as special use sites in upland areas.

On the southeast Plateau, between 3800 and 2400 B.P. (Subperiod IIIA), housepits were typically smaller than Period II housepits but show evidence for greater frequency of reoccupation. This pattern of reoccupation is indicative of greater stability in seasonal movement. Tool assemblages contain low frequencies of projectile points, although of styles similar to the preceding Period II styles, and include comparatively high frequencies of cobble tools, mortars and pestles, and fishing-related gear, including net weights. Faunal assemblages typically show greater diversity than those from Period II housepit contexts, suggesting utilization of a broader resource base, and are dominated by deer. Evidence is also found for the use of elk, pronghorn antelope, fish, and birds. Subperiod IIIB on the southeast Plateau begins around 2400 B.P. and is associated with an increase in identified housepits. The superstructure of these houses is inferred to have been a light pole framework covered with mats, similar to those used historically. Artifact assemblages associated with IIIB occupations tend to be more diverse than IIIA assemblages, and include large numbers of net weights, mortars and pestles, and other grinding implements. Projectile points tend to be the dominant artifact type in these assemblages, although stemmed and leaf shaped points disappear and are replaced by smaller, basal- and corner-notched varieties. Faunal assemblages remain dominated by deer, but bison appear, and overall diversity of utilized species increases. After 1500 B.P. (Subperiod IIIC), large housepit villages are evident at the confluence of the Snake and Columbia rivers. The housepits at some of these sites range in size from three to 20 m or more in diameter. Also, it is within this period that mat covered long houses are thought to have come into use. Faunal assemblages are similar to those from the preceding subperiod, although bison occurs in significantly lower frequencies. Subperiod IIIC terminates with the introduction of the horse, ca. 300 years ago.

On the south-central Plateau, Subperiod IIIA (3800 to 1900 B.P.) is marked by larger overall numbers of sites, the presence of larger villages, and the first appearance of communal dwellings. In general, these data are taken as evidence for larger populations and a greater overall degree of sedentism. Semi-subterranean housepits remain in use, but house styles diversify to include square and rectangular forms in addition to the classic circular and oval forms. Houses range in size from four to five m in diameter to upwards of 11 m. Artifact assemblages become more diverse but are dominated by a wide variety of expedient flake tools made on locally occurring silicate materials. Faunal assemblages are dominated by salmon, particularly in areas along the Columbia River, but large mammals such as deer and elk continue to represent a significant component of the diet. A variety of upland special purpose camps are associated with Subperiod IIIA, including those used for hunting, plant processing, and raw material acquisition.

The circular semi-subterranean housepit remains the most common house form during Subperiod IIIB (1900 B.P. to 300 B.P.) on the south-central Plateau, although there is an increase in average house size to between 10 and 14 m in diameter. Large communal houses continue to be used during this period, and the first documented longhouses appear; the earlier versions of which were semi-subterranean. Artifact assemblages continue to diversify, with the inclusion of a variety of new tool forms such as large cobble choppers, bifacial knives, and formed scrapers. Small, side, corner- and basal-notched, and stemmed points become common, but frequencies of the different types vary greatly among sites. The small point forms that appear near the beginning of this subperiod are thought to mark the introduction of bow and arrow technology. One notable aspect of artifact assemblages from village contexts during this period is the comparatively high frequency of ornamental objects such as bone and shell beads, steatite pendants, and bone pins, many of which (e.g., dentalia and olivella shell beads) are indicative of long distance trade or trade networks that linked Plateau peoples to adjoining regions.

The horse was introduced to the Columbia Plateau toward the end of the Period III. The greater mobility afforded by the horse altered subsistence practices and is believed to have led to changes in settlement patterns, including increasing use of the more portable mat house at the expense of the housepit during this period. Horses also allowed greater frequency and range of fall and winter hunting (and concomitantly less dependence on winter stores), and in some cases, the coordinated procurement of bison from the western margins of the Great Plains (Meatte 1990; Schalk and Cleveland 1983: 38-39). Undoubtedly, the increased mobility linked to the acquisition of the horse factored into the increasing complexity of regional societies in the later part of the period.

6.4 Ethnography

The Study Area is located within the traditional territories of Sahaptin-speaking Wanapum and Yakama peoples. In the ethnographic period, the Wanapum occupied an area along the Columbia River stretching from Priest Rapids to the mouth of the Snake River. A community of Wanapum currently resides at the present site of the Priest Rapids Dam. In the ethnographic period, the Yakama occupied a large territory to the south and west of the Wanapum that stretched westward to the Cascade Range. Other groups including the Nez Perce and the Umatilla periodically made use of the area as well (Anastasio 1972; Stern 1998; Walker 1967). Prior to the historical period, the Wanapum and Yakama, as with other Plateau peoples, were organized into “closely related but independent bands and villages of families” (Schuster 1998: 327). Although the village was the largest politically autonomous unit in these societies, various villages both within and between groups were interconnected socially and culturally through ties of kinship forming far-reaching social networks. Brief descriptions of the aboriginal lifeways of the Wanapum and Yakama peoples are provided below. For further information, see Anastasio (1972), Daugherty (1973), Ray (1936), Schuster (1998), Stern (1998), and Teit (1928).

Ethnographically, the Wanapum and the Yakama had very similar lifeways, which were based on a pattern of seasonal sedentism. Their subsistence economies focused most intensely on root crops and salmon, although they also targeted berries, grouse, and a variety of large and small mammals. The people followed a seasonal round that involved strategic movements throughout the year to collect or harvest resources as they came into season.

In general, the seasonal round began in late February or early March when the snow melted when one of the earliest ripening plant foods, lomatium, became available and the first salmon began running in the rivers. These early fresh foods provided a welcome relief to the staples of stored dried foods that had sustained the peoples over the long winter (Schuster 1998: 331). At this time, winter village groups broke into smaller family groups and traveled to root grounds (typically women and children) and fishing stations (typically men). Through late spring and summer, groups moved up the tributaries with the fish runs. Toward late April when the salmon runs diminished, family groups moved to areas rich in root crops such as camas, bitterroot, and wild carrots, where these items were gathered and processed for storage. Families might spend several weeks in the uplands hunting deer and elk, while women and children picked berries, gathered roots, and dried fish. In June, the second and most prolific salmon run began, and families moved again to their fishing stations. Following this run, during the hottest summer months, groups relocated to the higher elevations of the mountains where the men hunted while women and children gathered roots and other plant products such as huckleberries, which were available by late August. During the autumn months, people returned to their fishing stations for the final runs and made preparations for storing foods for winter consumption. Hunting parties spread out into nearby mountainous areas where deer, elk, antelope, bears, and other large and small mammals were taken by means of decoys and drives (Stern 1998: 400). Hunting camps were established to butcher and dry the meat and to process the skins. By mid-November families returned to their winter villages. Over the winter, stored food gathered during the previous months was consumed with fresh meat supplied by occasional hunting expeditions (Schuster 1998: 331).

When considered from a settlement perspective, this seasonal round included permanent to semipermanent winter villages that were concentrated in river valleys and numerous warm season camps located at important fisheries, resource patches, and meeting grounds distributed throughout each groups’ respective territory. Within winter villages, related families or families linked by friendship co-resided in shared lodges. These lodges, known as mat lodges, were constructed with a light pole framework covered with woven tule reed mats and were erected over shallow excavated depressions. Similar structures, although not dug into the ground, were erected at warm season camps. Each village held recognized settlement sites and maintained usufruct rights over particular resource areas. Warm season field camps were located near these important resource areas. To the extent that formal territorial boundaries can be said to have been maintained among the peoples, they were best defined near population centers and rivers. These boundaries tended to weaken or fade with distance from these main areas, such that the more distant hunting or root gathering areas became common access areas, often accessible to multiple villages (Ray 1936: 116-7).

Ray (1936: 144-148) lists 44 ethnographically known Yakama villages and camps, most of which were located along rivers and streams, although a few were situated at important resources gathering grounds or along important trails. None of the listed villages are located in or adjacent to the Study Area.

Prior to the arrival of Euro-American fur trappers, traders, missionaries, and settlers, the people of the Plateau experienced both beneficial and deleterious effects of colonial expansion. The first harbinger of the coming colonial wave was the introduction of the horse in the mid-1700s. The horse was originally introduced into North America by Spanish explorers in the American southwest. From there, horses were traded through native social networks north, where it reached the Columbia Plateau around 1730 Current Era (CE). Plateau peoples, including the Yakama and the Wanapum, readily adopted the horse, which permitted them a much greater degree of mobility and the ability to transport larger, heavier loads. This meant an increase in the overall volume of trade occurring between groups as well as direct intergroup contact over larger areas, including frequent contact with Plains groups.

Following the introduction of the horse, a series of disease epidemics swept across the Plateau, devastating native populations. The first such epidemic occurred in 1775, when smallpox was introduced by Spanish traders visiting the coast of Washington. From then and continuing throughout the early and mid-1800s, smallpox and a number of other diseases to which native peoples had no immunity, including measles, influenza, whooping cough, and malaria (Boyd 1985: 473), periodically flared up among native communities, resulting in a precipitous decline in population that disrupted native social networks and the spiritual underpinnings of their lives.

6.5 Historical/Cultural Context

The first British and American explorers and traders passed through what is now south-central Washington in the early 1800s. Among the explorers to pass through the Study Area were Lewis and Clark, who traveled down the Columbia River in 1805, and David Thompson, an employee of the North West Company, who traversed the length of the Columbia River in 1811. In the wake of these early explorers, and in part due to the efforts of Thompson, the land-based fur trade expanded into the Columbia Basin. This expansion was marked by the construction of numerous trading posts, including Spokane House in 1810, Fort Spokane in 1812, Fort Nez Percés in 1818 (later renamed Fort Walla Walla as a U.S. military fort), and Fort Vancouver in 1825, among others. With development of the land-based fur trapping industry, a greater number of Euro-Americans began to travel throughout the region.

The initial effect of this direct Euro-American presence in the region was not immediately deleterious. The trading and trapping activities of the fur company men did not seriously threaten or challenge native ways of life. In fact, fur trade posts such as the Northwest Company's Fort Nez Percés became important multicultural institutions where Indians, Euro-

Americans, and Metis exchanged goods and news (Stern 1998: 413). Despite the efforts of the fur companies and their investment in the construction of numerous forts in the region, the Plateau failed to achieve the status of a major center of the fur trade due in large part to the lack of interest on the part of native communities to engage in trapping on the scale desired by the fur companies.

By 1834, missionaries began trickling into the region, with a Methodist mission established at The Dalles in 1838 (Hunn and French 1998: 389). Shortly thereafter, in the 1840s, the initial waves of pioneers heading west to the Willamette Valley along the Oregon Trail began to pass through the region, heralding the end of the fur trade era and the beginning of the Euro-American colonization. The passage of the Oregon Donation Land Act of 1850 stimulated this migration of settlers and by 1852, nearly 12,000 settlers were passing down the Columbia River, with most heading to the Willamette Valley (Hunn and French 1998: 389). The interior parts of Washington and Oregon were initially passed over by these early settlers. Thus, the earliest American settlers in the region were soldiers, fur traders, former Hudson's Bay Company employees, and people who had previously settled in the Willamette Valley and then returned eastward (Illustrated History 1904).

The influx of Euro-American settlers resulted in increased conflict with the native groups, many of whom resisted the appropriation of their lands. In 1855, Governor Stevens of Washington Territory convened a treaty council at Walla Walla to establish reservations designed to remove native peoples in advance of encroaching Euro-American settlement. The Yakima Treaty was signed June 9, 1855, resulting in the relinquishment of some 11 million acres of Indian lands to Washington Territory. A total of 14 groups, speaking three languages, became the members of the Confederated Tribes and Bands of the Yakama Nation. The treaty allowed the Yakama to retain rights of access and resource use within the Ceded Lands and the Usual and Accustomed Places (Bard and McClintock 1997). The Wanapum were not among the 14 groups.

Hostilities broke out in 1855 following the opening of ceded lands to settlement prior to the agreed upon time and the crossing of Yakama lands by gold miners travelling to northeastern Washington. What came to be known as the Yakima Wars began that same year after the Yakama were joined by other tribes in attempting to drive out the newcomers. The U. S. Army subdued the native forces and built Fort Simcoe to simultaneously keep settlers out of Yakama territory and keep the Indians subdued. The Fort's mission failed, however, when miners crossed the region in 1858, prompting a renewal of the war. Defeated by the Army in that same year, the Yakama and many of their allies (the Wanapum not among them) retreated to the reservation following the ratification of the Yakama treaty in early 1859 (Schuster 1998: 344-345).

Upon the cessation of the Yakima wars, American settlement of the region continued unimpeded. For a while, raising cattle was a primary economic activity of the settler population, supplemented along the Columbia River by a small-scale logging industry that supplied fuel to the steamboats operated by the Oregon Steam and Navigation Company on the river (Illustrated History 1904). Cattle ranching eventually gave way to farming in the 1870s, notably of wheat and fruit trees. Towns in the vicinity of the Study Area began to be platted as early as the 1860s, with Yakima City established in 1861. In 1872, the town of Goldendale was platted. By the 1880s numerous small towns began to be incorporated, including Sunnyside in 1893, Grandview in 1909, and Moxee in 1921. Railways began to be built throughout the region in the late 1800s and early 1900s linking otherwise remote areas of central Washington to urban centers, providing access to larger markets for produce grown locally.

7.0 Potential Project Impacts

During the course of the study, three cultural resources were identified within the Study Area. One previously recorded archaeological site, one historic property site, and one newly recorded archaeological site were identified within the overall Study Area. The recorded sites include one precontact lithic scatter (45YA01587), one segment of the historic Midway-Moxee transmission line (Site 676383), and newly recorded precontact site TRC-Ostrea-001. Previously recorded site 45YA01587and newly recorded site TRC-Ostrea-001 are situated within the Study Area. Both sites are protected by the WHR. To avoid impacts to these sites, a 100-foot buffer has been placed around them and the MPE designed to avoid the sites and their associated 100-foot buffer area.

If new cultural sites are identified, avoidance may be achieved through designing around an identified site (with a recommended buffer of 100 feet) or placing clean fill over the site area so that construction-related disturbance does not extend to the depth of the resource. A DAHP archaeological excavation permit will be required if fill is placed over an identified cultural site in order to cap it. If avoidance is infeasible, DAHP and Yakama Nation should be consulted to develop appropriate mitigation, such as data recovery and curation of artifacts. Disturbance of pre-contact archaeological resources would require a DAHP archaeological excavation permit (RCW 27.44). It is recommended that archaeological monitoring be conducted in the area of 45YA01587 and site Ostrea-MW-001 during construction to prevent impacting the sites, and during all ground disturbing activities within the Study Area.

Implementation of Mitigation Measures CUL-1 through CUL-6, detailed below, would reduce Project impacts to cultural resources to a less than significant level. Therefore, construction of the Project would not cause a substantial adverse change in the significance of a cultural, historical, or archaeological resource, and would not disturb any human remains. Project-related impacts to cultural, archaeological, and historical resources would be less than significant with implementation of the following mitigation measures.

8.0 Mitigation Measures

The following avoidance and mitigation measures have been developed to ensure that significant impacts to cultural resources are avoided during Project implementation:

- **CUL-1: Discovery of archaeological resources and Inadvertent Discovery Plan**: If, during the course of construction, cultural resources (i.e., precontact sites, historic sites, or shell or bone, isolated artifacts, or other features) are discovered, work shall be halted immediately within 100 ft of the discovery. The Lead Agency, and a professional archaeologist that meets the Secretary of the Interior's Professional Qualifications Standards in prehistoric or historical archaeology shall be retained to determine the significance of the discovery. Determination of impacts, significance, and mitigation shall be made by qualified archaeological professionals (in consultation with recognized Yakama Nation designees). These protocols shall be outlined within the Inadvertent Discovery Plan. This plan will include protocols for notification, evaluation, and treatment of any archaeological or human remains that might be discovered during construction.
- **CUL-2: Preconstruction Survey and Cultural Resources Avoidance Plan.** If required, the Project shall perform surveys prior to construction for any portions of the final Project footprint not yet surveyed (e.g., new or modified staging areas, or other work areas). Where operationally feasible, all NRHP and WHR eligible resources shall be

protected from direct Project impacts by Project redesign (i.e., ancillary facilities, or temporary facilities or work areas). Avoidance mechanisms shall include fencing off such areas as Environmentally Sensitive Areas for the duration of the Proposed Project, if identified. If avoidance of NRHP or WHR eligible resources is not feasible, The Project will prepare and submit a Treatment Plan to outline the treatment of cultural resources that cannot be avoided. The Treatment Plan shall be submitted to DAHP for review and approval. All treatment measures outlined in the Treatment Plan shall be implemented at least 30 days before the start of construction.

- **CUL-3: Worker Environmental Training Program.** Prior to the initiation of construction, all construction personnel shall be trained regarding the recognition of possible buried cultural resources (i.e., precontact and/or historical artifacts, objects, or features) and protection of all archaeological resources during construction. Training shall inform all construction personnel of the procedures to be followed upon the discovery of cultural materials. All personnel shall be instructed that unauthorized removal or collection of artifacts is a violation of Federal and State laws. Any excavation contract (or contracts for other activities that may have subsurface soil impacts) shall include clauses that require construction personnel to attend the Worker Environmental Training Program so that they are aware of the potential for inadvertently exposing buried archaeological deposits. A background briefing will be given for supervisory construction personnel describing the potential for exposing cultural resources, the location of any potential Environmentally Sensitive Areas, if identified, and anticipated procedures to treat unexpected discoveries.
- **CUL-4: Conduct construction monitoring.** Archaeological monitoring shall be conducted by a qualified archaeologist familiar with the types of historic and precontact resources during all ground-disturbing activities in the MPE. Archaeological monitoring is required in the areas of sites 45YA01587 and TRC-Ostrea-001 to avoid potential impacts. A Native American monitor may be required at culturally sensitive locations specified by the Lead Agency following government-to-government consultation with Native American tribes. CCR shall retain and schedule any required Native American monitors.
- **CUL-5: Discovery of Human Remains**. In the event that any ground-disturbing or other construction activities result in the unanticipated discovery of archaeological resources, work should be halted in the immediate area, and contact made with county officials, the technical staff at DAHP, and tribal representatives. Work should be stopped until further investigation and appropriate consultation have concluded. In the unlikely event of the inadvertent discovery of human remains, work should be immediately halted in the area, the discovery covered and secured against further disturbance, and contact made with law enforcement personnel, consistent with the provisions set forth in RCW 27.44.055 and RCW 68.60.055.
- **CUL-6: Final reporting.** At the conclusion of construction and laboratory work (if needed), a final report will be prepared describing the results of the cultural resources monitoring efforts associated with the Project. The report will include a summary of the field and laboratory methods, daily field logs, correspondence, emails, an overview of the Proposed Study Area, a list of artifacts recovered (if any), an analysis of artifacts recovered (if any) and their scientific significance, and recommendations. The report will be submitted to DAHP, the CTWSRO, and Yakama Nation.

9.0 Summary of Effects and Significant Unavoidable Impacts After Mitigation

Proposed mitigation measures would avoid or reduce all potentially significant impacts to a level of non-significance. Such measures include avoidance by relocation of Project facilities in specific locations or implementing approved data recovery programs. With the identified mitigation, no significant unavoidable adverse impacts would occur.

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Appendix A. Native American Outreach Documentation

Confidential – Not for Public Distribution

Appendix B. Resumes of Preparers

Position and Project Role

TRC Cultural Resource Senior Staff conducted the survey effort. These individuals meet the professional qualification standards in Archaeology, Historic Preservation, and Architectural History, as set forth by the Secretary of the Interior (Standards and Guidelines*, Federal Register* Vol. 48, No. 190, September 28, 1983).

Person and Position

Matthew Wetherbee, MSc. Paleoecology of Human Societies, Register of Professional Archaeologists (RPA)
Position and Project Role: Senior Archaeologist, Report author

Mr. Wetherbee is an archaeologist with 19 years of cultural resources management experience focused on prehistory throughout the Pacific Northwest and California. He has managed multiple small and large-scale residential and commercial projects and high-profile capital projects and operations and maintenance environmental compliance programs. His work includes pre-field research, cultural resources surveys, significant assessments for the Washington Heritage Register and the California Register of Historical Resources/National Register of Historical Places (NRHP), developing and reviewing mitigation recommendations, preparing technical reports and agreement documents, and reviewing consultants work according to state and federal heritage laws and regulations such as SEPA, California Environmental Quality Act, Executive Order 05-05, and Section 106 and 110 of the NHPA. He has worked on projects for such federal and state agencies as the Bureau of Land Management, the U.S. Army Corps of Engineers, Bureau of Reclamation, the Federal Energy Regulatory Commission, U.S. Department of Defense, U.S. Navy, Air Force, and Army, Washington Department of Transportation, and U.S. Department of Agriculture Forest Service, as well as numerous local agencies.

Mr. Wetherbee has also prepared and reviewed Environmental Impact Reports and Environmental Impact Statements for state and federal projects and developed mitigation measures for cultural resources. By working on both large-scale capital projects and operations and maintenance programs, Mr. Wetherbee has provided invaluable in-depth analysis and recommendations for complex resource/regulatory compliance issues regarding the protection of cultural resources and maintaining environmental compliance.

Ms. Corinne Blair, B.A.
Position and Project Role: Archaeologist

Ms. Blair has been practicing archaeology and cultural resource management since 2020 in the state of Washington. She has completed projects including pedestrian surveys, excavation, and construction monitoring for a variety of clients within the state of Washington. Ms. Blair has excellent artifact identification skills, as she is familiar with the types of materials and kinds of artifacts found in these areas and she has recorded many precontact archaeological sites in the Pacific Northwest.

Appendix C. Washington Archaeological Site Inventory Forms:
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Appendix D. Shovel Test Probe Results Table

STP No.	Easting	Northing	Result	Depth	Description
1	[redacted]	[redacted]	Positive	50cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; modern non diagnostic glass shards below surface.
2	[redacted]	[redacted]	Negative	32cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom.
3	[redacted]	[redacted]	Negative	30cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; calcium carbonates inclusions.
4	[redacted]	[redacted]	Negative	45cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
5	[redacted]	[redacted]	Negative	35cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
6	[redacted]	[redacted]	Negative	35cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
7	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels.
8	[redacted]	[redacted]	Negative	50cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; calcium carbonates inclusions.
9	[redacted]	[redacted]	Positive	55cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; one chalcedony flake found near surface.
10	[redacted]	[redacted]	Negative	45cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; no large rocks.
11	[redacted]	[redacted]	Positive	40cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; one chert northern side notched point identified near surface; STP adjacent to wash.
12	[redacted]	[redacted]	Negative	40cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom.
13	[redacted]	[redacted]	Negative	45cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels.

STP No.	Easting	Northing	Result	Depth	Description
14	[redacted]	[redacted]	Negative	33cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels.
15	[redacted]	[redacted]	Negative	60cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; East radial STP-10m east of point.
16	[redacted]	[redacted]	Positive	50cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; adjacent to wash; soil mixed with wash sediments; 1 CCS debitage; 1 fragment of petrified wood; very rocky; North radial STP north of point.
17	[redacted]	[redacted]	Negative	45cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; adjacent to wash; soil mixed with wash sediments; radial STP north of STP 16.
18	[redacted]	[redacted]	Negative	55cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; adjacent to wash; soil mixed with wash sediments; radial STP south of point.
19	[redacted]	[redacted]	Negative	60cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks at bottom; adjacent to wash; soil mixed with wash sediments; radial STP west of point.
20	[redacted]	[redacted]	Negative	50cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels.
21	[redacted]	[redacted]	Negative	50cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels.
22	[redacted]	[redacted]	Negative	40cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; calcium carbonates inclusions.
23	[redacted]	[redacted]	Negative	43cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; calcium carbonates inclusions.
24	[redacted]	[redacted]	Negative	45cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; large rocks throughout; calcium carbonates inclusions.
25	[redacted]	[redacted]	Negative	35cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
26	[redacted]	[redacted]	Negative	40cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded

STP No.	Easting	Northing	Result	Depth	Description
					to sub-angular pebbles and gravels; calcium carbonates inclusions.
27	[redacted]	[redacted]	Negative	45cmbs	10 YR 5/3 Yellowish brown; silt loam; friable; moderate to loose compaction; <10% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
28	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
29	[redacted]	[redacted]	Negative	40cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
30	[redacted]	[redacted]	Negative	60cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
31	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
32	[redacted]	[redacted]	Negative	40cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
33	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
34	[redacted]	[redacted]	Negative	40cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
35	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions; large rock at bottom.
36	[redacted]	[redacted]	Negative	55cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
37	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
38	[redacted]	[redacted]	Negative	50cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; South radial of STP 9.
39	[redacted]	[redacted]	Negative	50cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-

STP No.	Easting	Northing	Result	Depth	Description
					rounded to sub-angular pebbles and gravels; North radial of STP 9
40	[redacted]	[redacted]	Negative	50cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; West radial of STP 9.
41	[redacted]	[redacted]	Negative	50cmbs	10 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; East radial of STP 9.
42	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
43	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
44	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
45	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
46	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
47	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
48	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
49	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
50	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
51	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
52	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-

STP No.	Easting	Northing	Result	Depth	Description
					rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
53	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
54	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
55	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
56	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
57	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
58	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
59	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
60	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
61	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.
62	[redacted]	[redacted]	Negative	50cmbs	5 YR 4/3 Yellowish light brown; soft fine silt loam; friable; moderate to loose compaction; <5% sub-rounded to sub-angular pebbles and gravels; calcium carbonates inclusions.

*All UTMs based in Zone 10

January 15, 2020

Marcus Graefenhain
Project Developer
Cypress Creek Renewables
3402 Pico Blvd.
Santa Monica, California 90405

Cypress Creek Renewables – Ostrea Solar Project
Draft Geotechnical Report

ANS Geo, Inc. is pleased to provide this Draft Geotechnical Report (Report) to Cypress Creek Renewables (CCR) to summarize the results of our geotechnical field investigation in support of the proposed Ostrea Solar project located in Moxee, Washington. To guide the design and construction of the proposed solar facility, ANS Geo developed and implemented a geotechnical investigation program which encompassed a brief desktop study of local geologic conditions, soil borings, test pit excavations, field electrical resistivity testing, preliminary environmental due diligence sampling, laboratory thermal resistivity testing, and laboratory soil material testing.

It is expected that the successful EPC selected to perform final design and construction will perform supplemental investigations and studies, including pile load testing, to confirm the information presented and develop more detailed information which may be required for the final design.

1. Methodology

1.1 Soil Borings

ANS Geo retained Elite Drilling Services (EDS) of Denver, Colorado to advance 16 soil borings completed at select locations across the project site between December 2 and 7, 2020. The soil boring locations are depicted in the Investigation Location Plan, provided as **Attachment A**. It should be noted that the original scope of work included 29 soil borings; however, shallow rock was encountered throughout the site. Therefore, during our investigation program it was agreed, between ANS Geo and CCR, that test pit excavations would be better suited to observe geologic conditions in replacement of soil borings at several locations. As such, soil boring and test pit IDs may appear interchanged and/or missing (ie. B-01, TP-02, B-03, TP-04, etc.).

Each soil boring was advanced to practical refusal, generally encountered between 1.4 and 9.8 feet below ground surface (BGS). A track-mounted Mobile B-57 drill rig was used to collect soil samples using the Standard Penetration Test (SPT) Method through hollow-stem augers in accordance with ASTM Standard D1586. Soil samples were collected continuously to the termination depth in each boring. Soil borings, proposed by ANS Geo and confirmed by Cypress Creek review, were distributed throughout the project's array area to provide coverage across development areas. One boring, B-SS-1, was situated within the proposed substation footprint. At the substation location (B-SS-1), rock coring was conducted using a wireline setup in accordance with ASTM D2113 to confirm the presence and quality of bedrock. All soil borings were overseen and logged by an ANS Geo representative under the direction of a Professional Engineer licensed in the State of Washington. Typed soil boring logs are presented within **Attachment B**.

At select soil boring locations, auger cuttings were collected within four (4) feet of grade with the purpose of obtaining bulk soil samples for laboratory California Bearing Ratio (CBR), thermal resistivity testing (TRT), and corrosivity testing. Upon completion, each borehole was backfilled to its existing grade with soil cuttings.

1.2 Test Pits

As discussed in the previous section, 13 test pits were excavated by EDS at select locations across the project site between December 4 and 5, 2020. The test pit locations are depicted in the Investigation Location Plan, provided as **Attachment A**.

All test pits were excavated using a John Deere 26G excavator and were overseen and documented by a ANS Geo geotechnical representative under the direction of a Professional Engineer licensed in the State of Washington. Soil strata changes, soil classification, and excavation depths were documented during each test pit excavation and are presented within the test pit logs provided as **Attachment C**. Test pits were all excavated to bedrock which was encountered between 1.0 and 4.3 feet below grade. Similar to soil boring locations, bulk samples were collected from select test pits for laboratory testing. Upon completion, each test pit excavation was backfilled with native soil cuttings, bucket-tamped, and tracked over with the excavator to minimize any post-excavation settlement.

1.3 Electrical Resistivity Testing

As part of our field investigation program, ANS Geo performed field Electrical Resistivity Tomography (ERT) testing on October 29 and 30, 2020. Testing was conducted at 14 locations within the proposed array area(s) and one (1) location within the proposed substation footprint. In-situ soil resistivity measurements were obtained by utilizing the Wenner 4-Pin Method in accordance with ASTM G57 and IEEE Standard 80.

Two (2) mutually perpendicular traverses were collected at each location utilizing “a”-spacings of 1, 1.5, 2, 3, 4.5, 7, 10, 15, 22.5, 35, 50, and 75 feet within the array areas, with additional 100 and 150-foot spacings at the substation location. Test results are presented as **Attachment D**.

2. Geology and Subsurface Conditions

ANS Geo conducted a brief, desktop review of surficial and bedrock geology maps and reports made available by the United States Geological Survey (USGS) prior to conducting our field investigation. The available mapping indicates that the site lies within Quaternary nonmarine deposits. This particular surficial unit includes eolian deposits consisting of light brown, homogenous loessial silt with minor gravel, boulders, and sand inclusions.

Bedrock geology of the area consists of Miocene volcanic rocks Unit from the Middle Miocene age. The unit is generally known as Yakima ballast, and locally interchanged with Columbia River Basalts. The bedrock is described as dark-gray to black, dense, aphanitic basalt flows; commonly columnar jointed Dark-gray to black, dense aphanitic basalt flows; commonly columnar jointed, less commonly irregularly and platy jointed; some flows vesicular, grading to scoriaceous; includes minor pillow lava, palagonite beds, and interbedded soil profiles and sedimentary beds; contains diatomite beds locally. Maximum thickness in south-central Washington may be in excess of 10,000 feet; much thinner in western Washington, where flows are mostly associated with marine sedimentary rocks. Includes acidic and intermediate volcanic rocks in northern Cascade Mountains.The mapped surficial unit is mostly consistent with the findings of our field investigations.

ANS Geo has provided the generalized subsurface conditions within Table 1 based upon the observations made during our geotechnical investigation for the Ostrea Solar project. Soil boring and test pit logs have been provided as **Attachments B** and **C**, respectively, and should be reviewed for specific soil condition observations.

Table 1 – Generalized Subsurface Profile

Average Depth (ft)	Material	Average Consistency	Description
0' – 0.5'	Topsoil	-	Approximately three (3) to nine (9) inches of topsoil existed at the surface throughout most of the project area.
0.5 – 3'	Silt (ML)	Medium Stiff	Light brown silt with varying amounts of sand, gravel, and clay were encountered beneath the topsoil layer in most locations. This material was noted to be very dry and predominantly nonplastic. Gravels and rock fragments were frequently encountered near the bottom of this stratum.
3' – 4'	Gravel / Cobbles (GM)	Dense	Dense silty gravel and/or cobbles were frequently encountered beneath the silt layer.
4' +	Basalt	-	Strong, generally moderately weathered basalt bedrock was encountered or inferred at all investigation locations beginning between one (1) and 9.8 feet below grade.

3. Laboratory Results

3.1 Soil Index Testing

Representative soil samples were collected during our investigation and submitted to ANS's accredited materials testing laboratory. A summary of the index laboratory test results is provided within Table 2. As-received laboratory test results are included within **Attachment E**.

Table 2 – Soil Index Testing Summary

Boring ID	Sample ID	Depth (feet)	% Gravel	% Sand	% Fines		% Moisture
					% Silt	% Clay	
B-01	S-3	4 – 6	5.6	29.5	57.8	7.1	6.5
B-07	S-2	2 – 4	58.7	24.1	17.2		2.9
B-10	S-2	2 – 4	28.3	50.8	20.9		8.8
B-18	S-3	4 – 6	32.4	53.1	14.5		8.4
B-20	S-1	0 – 2	0	33.6	60.5	5.9	6.7
B-21	S-2	2 – 4	25.9	28.6	45.5		7.1
B-24	S-1	0 – 2	4.9	27.0	68.1		5.8
B-26	S-2	2 – 4	24.1	37.9	38.0		5.6
B-SS-1	S-2	2 – 4	32.1	53.4	14.5		5.5
Boring ID	**Sample ID**	**Depth (feet)**	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**		**% Moisture**
B-13	S-2	2 – 4	28.0	19.6	8.4		4.8
B-27	S-1	0 – 2	28.3	19.7	8.6		6.1

3.2 Thermal Resistivity Testing

ANS Geo collected bulk samples from eight (8) investigation locations generally between one (1) and four (4) feet below grade for laboratory testing of Thermal Resistivity. Soils were collected in a five-gallon bucket and delivered to ANS Consultants' accredited laboratory for testing. The soil was compacted to 85 percent of its Standard Proctor Density in accordance with ASTM D698, and Thermal Resistivity Testing was conducted in accordance with IEEE Standard 442-2017. Results of the thermal testing are summarized within Table 3. Complete, as-received results have been provided within **Attachment E**.

Table 3 – Thermal Resistivity Testing Summary

Boring ID	Material Type	Thermal Resistivity Values at Various Moisture Contents					Received Moisture Content (%)	Re-Molded Dry Density (lb/ft^3)
		% water	% water	% water	% water	% water		
		(°C-cm/W)	(°C-cm/W)	(°C-cm/W)	(°C-cm/W)	(°C-cm/W)		
TP-02	Silt, little Sand (ML)	0	4	8	12	16.2	3.9	90.7
		779	**315**	**178**	**145**	**135**		
TP-05	Silt, little Gravel (ML)	0	3.5	7.2	11.1	14.9	4.1	87.2
		754	**314**	**181**	**142**	**126**		
TP-09	Silt, little Sand (ML)	0	5	10	15	19.1	6.7	87.0
		773	**322**	**152**	**98**	**86**		
TP-16	Silt, little Sand (ML)	0	4	8	12	16.1	4.03	85.5
		740	**308**	**178**	**139**	**125**		
TP-17	Silt, little Sand (ML)	0	4	8	12	15.7	4.07	90.7
		615	**247**	**126**	**79**	**70**		
B-23	Silt, some Sand (ML)	0	4	8	12	15.4	4.06	89.5
		762	**325**	**192**	**149**	**132**		
TP-28	Silt, little Sand (ML)	0	3.5	7.8	12	15.6	4.76	88.3
		768	**328**	**194**	**150**	**133**		
B-SS-01	Gravelly Sand (SM)	0	4	8	12	15.4	4.81	89.1
		588	**228**	**132**	**109**	**99**		

3.3 Corrosivity Testing

ANS Geo collected additional samples from one (1) to three (3) feet below grade for corrosivity testing. The results of the testing, completed by ANS Consultants, have been summarized within Table 4 and are detailed within **Attachment E**.

Table 4 – Corrosivity Testing Summary

Boring/Test pit ID	pH	Sulfate (mg/kg)	Chloride (mg/kg)	Soil Box (Calculated Resistivity) (Ω/cm)	Redox Potential (average) (mV)
B-01	6.38	14	30	9,000	193
TP-02	6.27	0	15	11,000	236
TP-05	6.44	15	25	9,000	215
B-07	6.59	17	90	8,000	190
B-10	6.76	9	50	6,000	183
B-13	6.88	6	25	7,000	177
TP-16	6.47	16	45	6,000	187
TP-17	5.10	27	40	8,500	186
B-18	6.76	14	35	7,000	172
TP-19	6.74	22	35	9,000	221
TP-22	6.52	20	55	10,000	203
TP-23	6.72	11	30	9,000	211
TP-25	5.91	15	35	10,500	197
TP-28	5.72	18	60	13,000	195

3.4 California Bearing Ratio

ANS Geo collected an additional sample at three (3) locations from one (1) to three (3) feet below grade for testing of California Bearing Ratio (CBR) in accordance with ASTM D1883. The results of the testing, completed by ANS Consultants, have been summarized within Table 5 and are detailed within **Attachment E**.

Table 5 – California Bearing Ratio Summary

Location ID	CBR Ratio (%)
TP-09	6.2
B-23	3.3
B-SS-01	4.2

4. Environmental Sampling

Although no "recognized environmental considerations" ("RECs") were observed during the Phase I Environmental Site Assessment (ESA) conducted for the Ostrea project site, ANS Geo collected three grab soil samples to evaluate for background soil characteristics.

ANS Geo proposed and conducted a sampling and evaluation methodology during our investigation program as follows:

1. Advance excavation to a shallow depth (0 – 2 foot interval), and utilize a MiniRae 3000 photo-ionization detector (PID) to screen the sample and bottom of excavation for any indications of volatile organic content readings.
2. Visually screen soil samples for staining, discoloration, foreign debris (man-made fill), as well as note any odors. Preserve each sample in glass jars.
3. Using the PID equipment and observations, target the highest reading for environmental testing. If none of the samples were observed to have a reading or visual/odor marker, take a near-surface sample (1- 2 foot depth) and perform a full environmental test suite for volatile organics, semi-volatile organics (BTEX, MTBE, typical gas/diesel range organics), and metals.

Using this evaluation method and procedure, ANS Geo collected three surficial grab samples to determine baseline/background soil environmental characteristics. Samples were collected within TP-04, TP-11, and TP-19 and submitted for laboratory testing to evaluate the presence of specific compounds and their concentrations within the project area. These select samples were submitted to Cascade Analytical, a USEPA-accredited environmental laboratory, for testing in accordance with their respective methods and standards. A summary of the compounds detected, and their concentration, is presented within Table 6. Complete environmental sampling results are provided within **Attachment F**.

Table 6 – Summary of Environmental Exceedances

Compounds	TP-04 (1'-2')	TP-11 (1'-2')	TP-19 (1'-2')
Arsenic	**5.2**	**3.3**	-
Cadmium	0.083 J	0.091 J	-
Chromium	**16**	**15**	-
Lead	**8.5**	**6.4**	-
Mercury	0.018 J	0.020 J	-
Motor Oil	33 J	31 J	36 J
Naphthalene	-	6.7 J B	-

Table Notes:
- Only concentrations above their respective method detection limits are summarized.
- Concentrations in bold text are greater than or equal to their respective reporting limits.
- All concentrations are reported in mg/Kg (parts per billion).
- J = approximate value
- B = compound detected in both blank and sample

5. Seismic Site Classification

Based on the observations recorded within our subsurface investigation program and utilizing the N-Value method as prescribed in Chapter 20 of ASCE 7-16, Site Class C, at minimum, can be assumed as the average condition across the project site.

The following Site Class C seismic ground motion values were obtained from the USGS Seismic Hazard Maps, referenced in ASCE 7-16 Standard, for this site:

- 0.2 second spectral response acceleration, S_S= 0.422 g
- 1 second spectral response acceleration, S_1= 0.172 g
- Maximum spectral acceleration for short periods, S_{MS}= 0.549 g
- Maximum spectral acceleration for a 1-second period, S_{M1}= 0.257 g
- 5% damped design spectral acceleration at short periods, S_{DS}= 0.366 g
- 5% damped design spectral acceleration at 1-second period, S_{D1}= 0.172 g

5.1 Preliminary Seismic Evaluation

The designated seismic site class is anticipated based on results from our limited investigation program and using select areas of the site which have been investigated by ANS Geo. Backup data for the site class determination is provided as **Attachment G**. Based on our observation of subsurface conditions, estimated Site Class rating, and review of USGS's 2018 National Seismic Hazard Map, ANS Geo concludes that there is a low to moderate risk of significant seismic activity which may impact the proposed solar facility.

6. Foundation Considerations

ANS Geo anticipates that, as typical with solar farm construction, embedded posts, such as W6x9 H-piles, will be used to support the proposed solar panels. Conventional shallow foundations such as sonotubes, spread footings, or similar systems may also be utilized for equipment pads and associated support structures.

6.1 Corrosion Considerations

Given the soil's measured acidity, sulfate and chloride concentrations, resistivity, and redox potential summarized in **Section 3.3** (Table 4), in consideration with the soil and moisture conditions observed, the influence of corrosion attack on embedded steel piles is considered to be generally mild.

6.2 Frost & Adfreeze Considerations

Within Yakima County, Washington, frost depth is mapped to exist at approximately 18 inches below grade. As such, ANS Geo recommends that all structural foundations be founded at 18 inches (1.5 feet) below grade or deeper to ensure adequate protection from frost conditions which may jeopardize the integrity of subgrade soils and associated substructure.

Given the location of the project and soils encountered, the potential for frost heave against post foundations should be considered. Fine-grained soils, or granular soils with greater than 10 percent fine-grained content are frost-susceptible due to the inability of entrapped moisture from infiltrating or evaporating prior to freezing. Trapped moisture will begin to create ice lenses, which will grip the steel posts or embedded structures, followed by ice-jacking due to frost heave. The phenomenon is more commonly referred to as "adfreeze stress", which can be considered as an external, upward force applied to the post. The magnitude of the upward force will depend on the depth/thickness of the frost zone, the interface bond stress between embedded structure/material and the surrounding area, and the surface area of the structure/material in contact with this bond stress. As predominantly silty soils were observed near grade, ANS Geo recommends that an unfactored adfreeze (uplift) stress of 1,500 pounds per square foot (10.4 psi) be considered for the upper 1.5 feet of overburden soil during panel foundation sizing and design.

6.3 Recommended Soil Parameters

Based on our interpretation of the subsurface conditions observed within our limited investigation program, and the laboratory testing results, ANS Geo recommends that the soil parameters, as depicted within Table 7, be considered for preliminary design purposes.

Table 7 – Recommended Preliminary Soil Parameters

Depth	Material	Total Unit Weight	Internal Friction Angle	Cohesion	Soil Modulus (k)	Soil Strain (E_{50})	Allowable Bearing Capacity	Allowable Side Resistance
0' – 1.5'	Topsoil / Upper Silt	95 lb/ft^3	20°	0 lb/ft^2	20 lb/in^3	-	300 lb/ft^2	0 lb/ft^2
1.5' – 3'	Silt (ML)	105 lb/ft^3	31°	0 lb/ft^2	100 lb/in^3	-	2,000 lb/ft^2	50 lb/ft^2
3' – 4'	Gravel (GM)	120 lb/ft^3	35°	0 lb/ft^2	250 lb/in^3	-	4,000 lb/ft^2	100 lb/ft^2
4' +	Basalt (bedrock)	140 lb/ft^3	37°	0 lb/ft^2	500 lb/in^3	0.001	6,000 lb/ft^2	400 lb/ft^2

ANS Geo recommends that allowable side resistance within the upper 1.5 feet be neglected due to anticipated surficial disturbance, and adfreeze stresses as noted in **Section 6.2** should be considered. These allowable capacities and resistances provided are based on a serviceability limit of one-inch of maximum deflection/settlement. It should also be noted that these parameters have been established based on our engineering judgment. A detailed investigation program, including pile load testing, should be performed to confirm and calibrate these values prior to construction.

7. Construction Recommendations

7.1 Excavation

Based on the encountered subsurface conditions and anticipated foundation configurations, some excavations may extend deeper than four feet below grade. As such, excavations deeper than four feet should be shored or sloped and benched, in accordance with OSHA regulations, to ensure safe working conditions within the excavations. For benching purposes, overburden soils may be considered as "Type C" material and should be sloped no steeper than 1.5H:1V (horizontal to vertical). Intact basalt bedrock, if deemed stable, may be vertically cut within shallow temporary excavations and trenches. OSHA soil classifications should be field-determined by the contractor's "competent person" prior to excavation. Any proposed shoring systems should be designed by the contractor's "competent person", be certified by a Professional Engineer licensed in the State of Washington, and should be submitted to the engineer for review.

The contractor should expect cobbles, boulders, and bedrock within shallow excavations and earthwork activities. ANS Geo notes that pre-drilling for post locations to clear cobbles, boulders, and bedrock should be anticipated and is further discussed in **Section 7.6**.

7.2 Dewatering

ANS Geo did not encounter groundwater at the time of our investigation program. Notwithstanding, the contractor should be prepared to manage any perched water and/or infiltrated stormwater as needed using localized pump-and-sump or similar techniques to allow for concrete foundation construction in-the-dry. Water discharge should be managed in compliance with applicable state and local regulations. The contractor should be sure to grade the surface as necessary to divert stormwater away from open excavation to the extent possible.

7.3 Subgrade Preparation

Prior to the installation of shallow concrete foundations, ANS Geo recommends overexcavating the subgrade by at least four (4) inches, lining the exposed material with a geotextile separation fabric, and bringing the subgrade back up to the design foundation elevation with compacted structural fill as specified within Table 8. Native material beneath the separation fabric should be inspected for unsatisfactory conditions such as standing water, frozen soil, organics, or deleterious materials. Should any unsatisfactory conditions exist within the native subgrade, the excavation should be undercut an additional four inches (8 total inches beneath proposed foundation depth) prior to placement of the geotextile separation fabric.

Table 8 – Recommended Gradation of Structural Fill

Sieve Size	Percent Passing
3-inch	100
1 ½-inch	60 – 100
No. 4	30 – 60
No. 200	0 – 10

Structural fill material should be placed in loose lifts not exceeding eight (8) inches in height and be compacted to at least 95 percent of its Modified Proctor Density in accordance with ASTM D1557.

7.4 Backfilling and Re-use of Native Soils

ANS Geo notes that native fine-grained soils (silts) on site will likely be difficult to handle, place, and compact without proper moisture conditioning and protection. ANS Geo recommends the following measures be considered to reduce the adverse impacts of moisture-sensitive soils:

- Positive measure should be implemented and maintained to intercept and direct surface water away from moisture-sensitive subgrade surfaces.
- Subgrade surfaces should be sloped and, as appropriate, seal-rolled to facilitate proper drainage. Surfaces should be properly prepared in anticipation of inclement weather. Moisture should not be allowed to collect on subgrade surfaces.
- To the extent practical, the limits of exposed subgrade soils should be minimized.
- Construction traffic should be limited to properly constructed haul roads.
- Disturbed soils should be removed and replaced with compacted controlled fill material.
- In place moisture contents should be maintained with two percent wet/dry of the optimum moisture content as determined by the Modified Proctor Test (ASTM D1557).

These soils may be re-used across the project area for fill in landscaped areas; however, it should not be used under or above foundations or load-bearing structures where typically imported structural fill is used. Native material used as backfill for cable trenches should be handled and placed at a moisture content at or above its optimum value to ensure representative thermal properties are maintained.

In areas around and above installed foundations, large utilities, and other buried site features, ANS Geo recommends importing a clean granular material with less than 15 percent fine-grained content for use as general backfill. General backfill material should not be used beneath any load-bearing structures and should be placed in loose lift thicknesses not exceeding 12 inches and be compacted to at least 95 percent of its Modified Proctor Density (ASTM D1557). Soil used as backfill should not be handled when frozen and should be free of excessive moisture, organics, and deleterious material.

In fill areas beneath foundations, access roads, and load-bearing structures, ANS Geo recommends structural fill as described in **Section 7.3** and Table 8.

7.5 Access Roads

ANS Geo understands that an access road will likely be required to enter and exit the project site as well as provide access to the equipment pad locations. It is also our understanding that this access road will likely be unpaved, to accommodate occasional light vehicular traffic such as utility pickup truck or similar vehicle. As such, ANS Geo recommends that access roads be constructed with at least six (6) inches of crushed stone as specified within Table 9.

Table 9 – Recommended Gradation of Crushed Stone

Sieve Size	Percent Passing
1 ½-inch	100
¾-inch	55 – 90
No. 4	25 – 50
No. 50	5 – 20
No. 200	3 – 10

Prior to roadway construction, the subgrade should be stripped of vegetation and topsoil, and be proof-rolled with at least four (4) roundtrip passes of a smooth-drum roller with a minimum operating weight of eight (8) tons. The prepared subgrade should be confirmed to maintain a minimum CBR value of 10. Although not anticipated, if required, additional stabilization may be obtained through chemical treatment of the subgrade including introduction of lime or cement. Crushed stone should be placed in loose lifts not exceeding eight (8) inches in height and be compacted to at least 95 percent of its Modified Proctor Density (ASTM D1557).

7.6 Pile Drivability

ANS Geo anticipates that, as typical with solar farm construction, solar panels will be supported by steel H-Piles (wide-flanged sections) driven to approximately 8 to 10 feet below grade. It is ANS Geo's professional opinion that the parameters provided in **Section 6.3** may be used to preliminarily size the proposed piles, however, piles should be axially and laterally load tested to confirm their capacities at representative locations prior to final design and construction. These steel piles are typically installed via direct-push, vibration, and/or percussive hammer methods.

Based on our observations within our investigation program, Based on our observations within our investigation program, **we expect that regular obstructions or refusals associated with bedrock, cobbles, and/or boulders will be encountered as shallow as two feet below grade.** As such, ANS Geo recommends that the contractor pre-drill all proposed post locations. We recommend that pre-drilled holes be completed to a diameter slightly smaller than the diagonal dimension of the proposed pile section to ensure a tight fit once the pile is driven to its targeted depth. For example, a six (6)-inch diameter hole may be drilled and utilized for W6x9 section (approx. 7.1-inch diagonal measurement). The contractor should be aware, however, that heavier sections (ie. W6x12 or W6x15) may have limiting "bending" capacity in its flanges, and therefore require a hole of a slightly larger proportion.

8. Limitations

ANS Geo notes that the findings and recommendations presented within this Draft Geotechnical Report are based on our limited investigation program conducted in October through December 2020 and our engineering judgment. A load testing program should be completed prior to conducting a detailed post foundation design. Should the scope of the project or proposed site layout change, ANS Geo should be given the opportunity to review the applicability of the collected information and modify our recommendations, as needed.

We sincerely appreciate the opportunity to support this project, and please feel free to contact us should you have any questions regarding the findings of this Report.

Yours Truly,

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Attachments

Attachment A – Investigation Location Plan

Attachment B – Soil Boring Logs

Attachment C – Test Pit Photo Logs

Attachment D – Electrical Resistivity Results

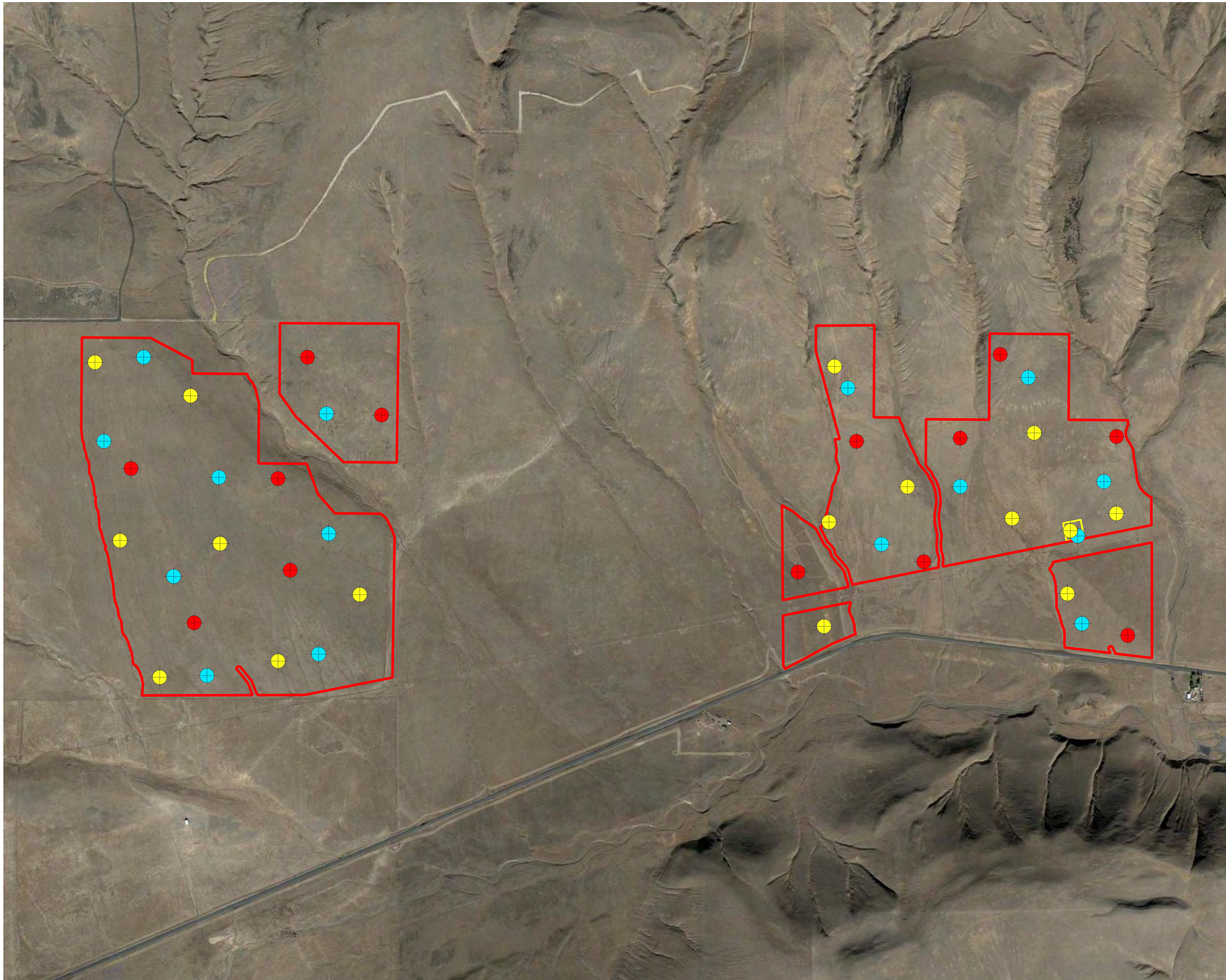
Attachment E – Geotechnical Laboratory Test Results

Attachment F – Environmental Sampling Results

Attachment G – Seismic Support Data

Attachment A

Investigation Location Plan



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

INVESTIGATION LOCATION PLAN OVERVIEW

CYPRESS CREEK RENEWABLES OSTREA SOLAR PROJECT MOXEE, WASHINGTON

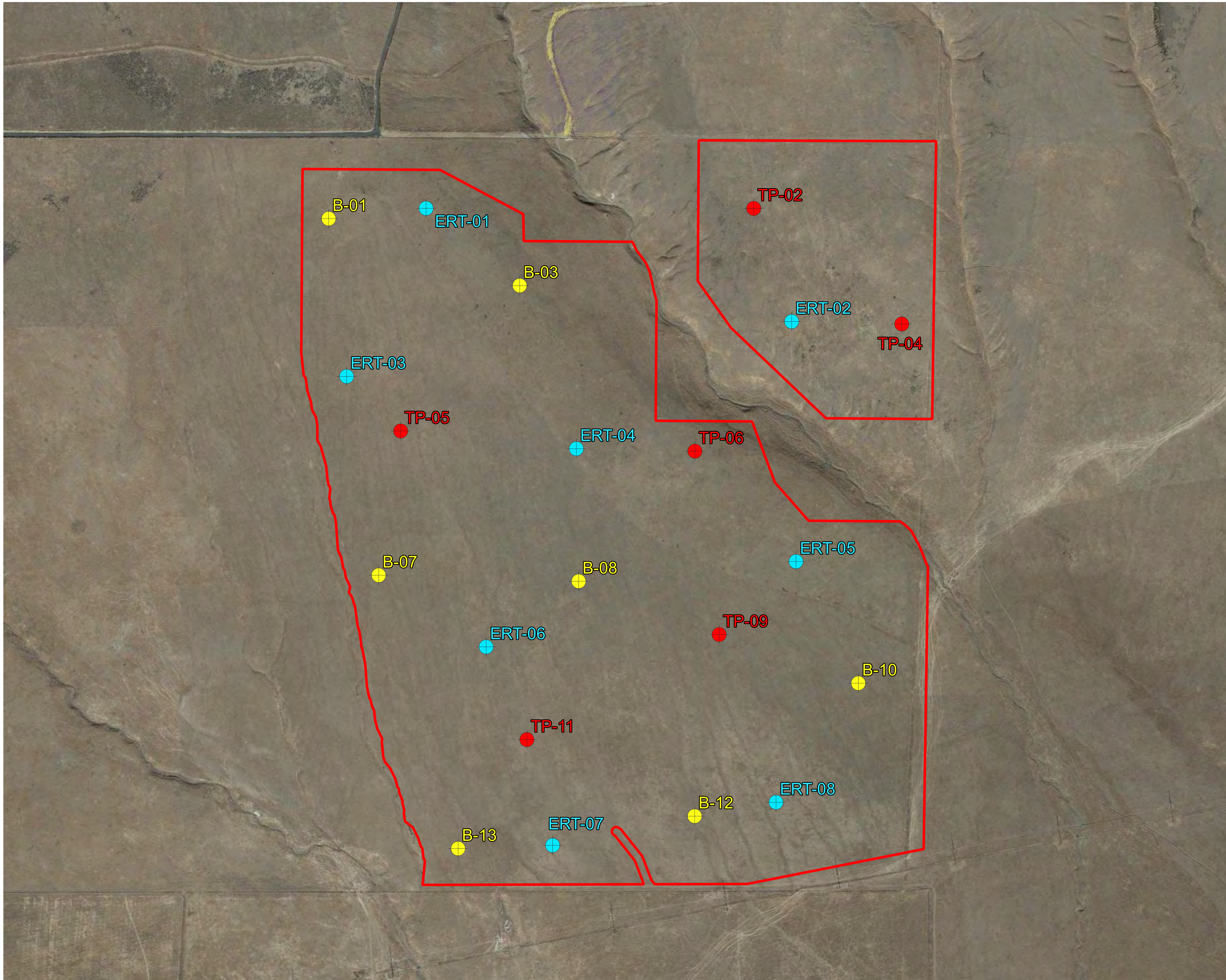
Legend

- Project Boundary
- Substation Boundary
- Soil Boring Location
- Test Pit Location
- Electrical Resistivity Location

0 1,000 2,000 3,000 4,000 ft

Reference Scale: 1:24,000
Absolute Scale: 1 inch = 2000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Kyle Hansen
Date: January 14, 2021
Drawing Number: ILP-1 Rev.0



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

INVESTIGATION LOCATION PLAN
WEST REGION

CYPRESS CREEK RENEWABLES
OSTREA SOLAR PROJECT
MOXEE, WASHINGTON

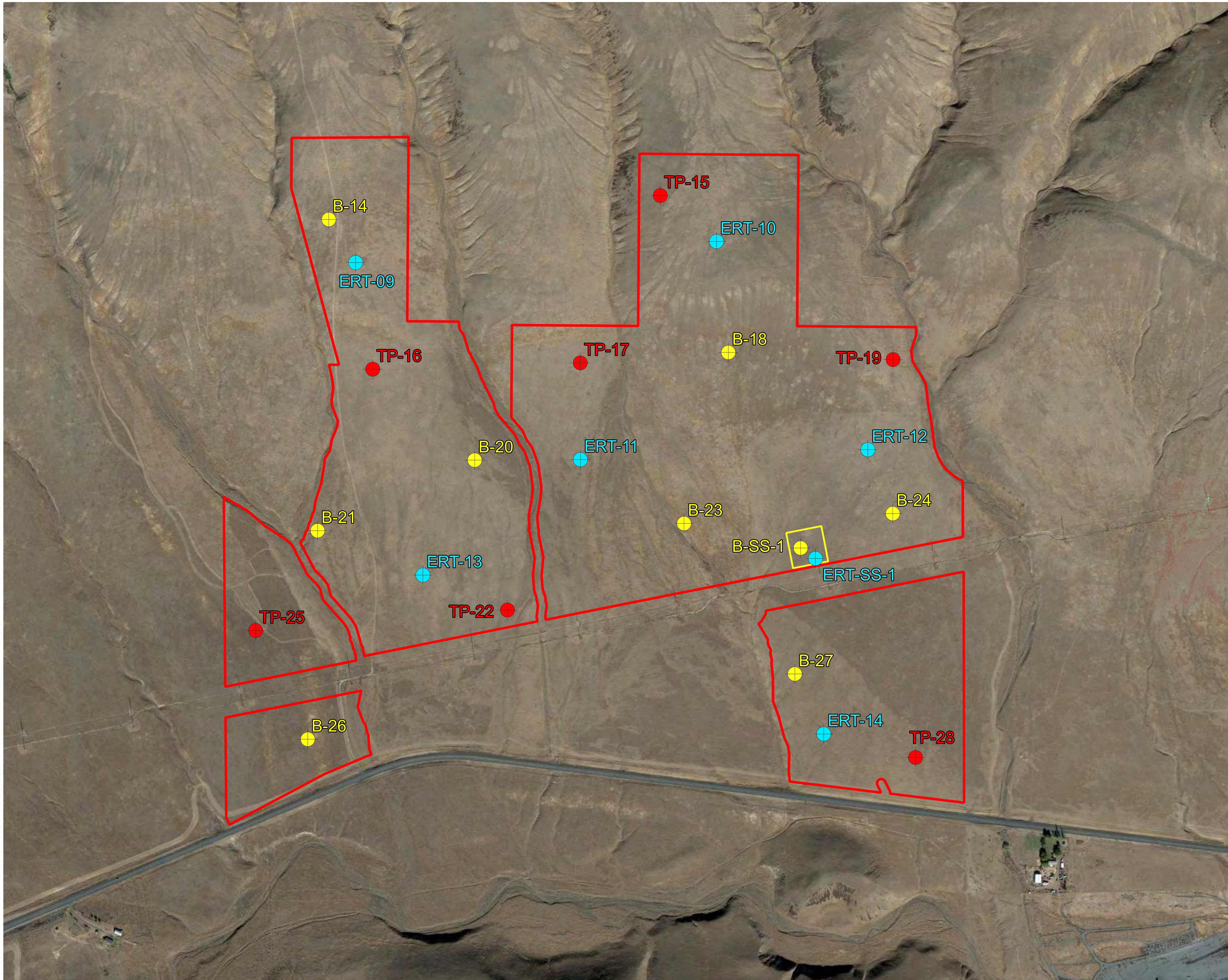
Legend

Project Boundary
Soil Boring Location
Test Pit Location
Electrical Resistivity Location

0 500 1,000 1,500 2,000 ft

Reference Scale: 1:12,000
Absolute Scale: 1 inch = 1000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Kyle Hansen
Date: January 14, 2021
Drawing Number: ILP-W-1 Rev.0



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

INVESTIGATION LOCATION PLAN
EAST REGION

CYPRESS CREEK RENEWABLES
OSTREA SOLAR PROJECT
MOXEE, WASHINGTON

Legend

- Project Boundary
- Substation Boundary
- Soil Boring Location
- Test Pit Location
- Electrical Resistivity Location

0 500 1,000 1,500 2,000 ft

Reference Scale: 1:12,000
Absolute Scale: 1 inch = 1000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Kyle Hansen
Date: January 14, 2021
Drawing Number: ILP-E-1 Rev.0

Attachment B

Soil Boring Logs

SOIL BORING LOG

BORING NO.: **B-01**
Page **1** of **1**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 12:05 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 12:35 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.546888° **Long:** -119.954184°

Horizontal Datum: NAD 1983

Item	**Casing**	**Sampler**	**Core Barrel**
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	**Drilling Fluid**
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
0.4	S-1 0.0'- 2.0'	10	1 1 1 2			(5") - TOPSOIL	-	-	-	-	PID = 0
2.0					ML	Soft, light brown SILT, little medium to fine Sand, dry (ML)					
4.0	S-2 2.0'- 4.0'	6	5 14 20 9		GP	Dense, gray coarse to fine GRAVEL, little medium to fine Sand, trace Silt, dry (GP)	-	-	-	-	Gravel is Basalt.
6.0	S-3 4.0'- 6.0'	10	20 23 24 28		ML	Very stiff, light brown SILT, some medium to fine Sand, trace Clay, trace fine Gravel, dry (ML)	-	-	-	-	
6.8	S-4 6.0'- 6.8'	4	7 50/4"		GM	Very dense, gray coarse to fine GRAVEL, little medium to fine Sand, little Silt, dry (GM)	-	-	-	-	Gravel is Basalt.

Spoon Refusal at 6.8 feet BGS.
Auger Refusal at 7 feet BGS.
End of Boring at 6.8 feet BGS.
Borehole backfilled with soil cuttings.

Depth scale: 5, 10, 15

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-01**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

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SOIL BORING LOG

BORING NO.: **B-03**

Page **1** of **1**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 12:45 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 1:10 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.: Lat:** 46.545611° **Long:** -119.948883°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.5'-'	14	4 4 12 2			(6") - TOPSOIL	-	-	-	-	PID = 0
0.5					ML	Very stiff, light brown Sandy SILT, trace fine Gravel, dry (ML)	-	-	NP	-	
	S-2 2.0'- 4.0'	12	10 18 21 50/5"		ML	Hard, light brown Sandy SILT, little coarse to fine Gravel, dry (ML)	-	-	NP	-	Gravel is Basalt.
4.1	S-3 4.0'- 6.0'	0	50/1"			Spoon Refusal at 4.1 feet BGS. Auger Refusal at 4.1 feet BGS. End of Boring at 4.1 feet BGS. Borehole backfilled with soil cuttings.	-	-	-	-	
5											
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-03**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-07**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 11:30 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 11:50 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.540085° **Long:** -119.952795°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid	Drill Rod Size:
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite	**Casing Advance**
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer	Hollow Stem Auger
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water	
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None	

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0'	24	3 4 20 24			0.5 (6") - TOPSOIL	-	-	-	-	PID = 0
					ML	1.0 (6") - Light brown SILT, dry (ML)					
					GM	(12") - Gray to brown coarse to fine GRAVEL, little Silt, trace fine Sand, dry (GM)					
	S-2 2.0'- 3.0'	7	36 50/3"		GM	Very dense, gray coarse to fine GRAVEL, some coarse to fine Sand, little Silt, dry (GM) 3.0	-	-	-	-	Gravel is Basalt. Auger grinding from 1 to 2 feet BGS. Gravel is thin round Basalt fragments.
5						Spoon Refusal at 2.75 feet BGS. Auger Refusal at 3 feet BGS. Offset Auger Refusal at 2 feet BGS. End of Boring at 3 feet BGS. Borehole backfilled with soil cuttings.					
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-07**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-08**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 1:45 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 2:00 pm

Elevation: Grade ft. **Vertical Datum:**
Boring Location: See Boring Location Plan
Coord.: Lat: 46.539970° **Long:** -119.947247°
Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐	☑ Cutting Head	☐	☑ None

Drill Rod Size:
Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 1.6'	14	3 4			(9") - TOPSOIL	-	-	-	-	PID = 0 Gravel is Basalt. Auger grinding from 1 to 1.6 feet BGS.
0.8			43 50/1"		GM	Light brown to gray coarse to fine GRAVEL, some Silt, little medium to fine Sand, dry (GM)					
1.6						Spoon Refusal at 1.6 feet BGS. Auger Refusal at 1.75 feet BGS. Offset Auger Refusal at 1.5 feet BGS.					
5											
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-08**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

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SOIL BORING LOG

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 2:10 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 2:50 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.538025° **Long:** -119.939489°

Horizontal Datum: NAD 1983

Item	**Casing**	**Sampler**	**Core Barrel**
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	**Drilling Fluid**
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
0.6	S-1 0.0'- 2.0'	16	2 3 5 11			(8") - TOPSOIL	-	-	-	-	PID = 0
2.0					ML	Medium stiff, light brown to gray Gravelly SILT, little medium to fine Sand, dry (ML)					
4.0	S-2 2.0'- 4.0'	7	9 50/5"		SM	Very dense, gray to brown coarse to fine SAND, some coarse to fine Gravel, some Silt, dry (SM)	-	-	-	-	Gravel is Basalt.
5 / 5.9	S-3 4.0'- 5.9'	14	9 26 42 50/5"		GP	Very dense, gray coarse to fine GRAVEL, little medium to fine Sand, trace Silt, dry (GP)	-	-	-	-	Gravel is Basalt. Auger grinding from 2.5 to 5.5 feet BGS.
						Spoon Refusal at 5.9 feet BGS. Auger Refusal at 5.5 feet BGS. End of Boring at 5.9 feet BGS. Borehole backfilled with soil cuttings.					
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-10**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Toughness: L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

ANS GEO

BORING NO.: **B-12**
Page **1** of **1**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 3:15 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 3:30 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.535489° **Long:** -119.944029°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

Rig			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 1.4' 0.6'-'	14	2 9 50/5"			(7") - TOPSOIL 0.6	-	-	-	-	
					GP	Very dense, gray coarse to fine GRAVEL, little medium to fine Sand, dry (GP) 1.4	-	-	-	-	PID = 0 Gravel is Basalt.
						Spoon Refusal at 1.4 feet BGS. Auger Refusal at 2 feet BGS. Offset Auger Refusal at 1.5 feet BGS. End of Boring at 1.4 feet BGS. Borehole backfilled with soil cuttings.					
5											
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-12**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

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SOIL BORING LOG

BORING NO.: **B-13**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 2, 2020 at 10:40 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 2, 2020 at 11:15 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.534871° **Long:** -119.950592°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

Rig			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:
Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0'	18	2 2 3 4			0.5 (6") - TOPSOIL	-	-	-	-	PID = 0
					ML	2.0 Medium stiff, light brown SILT, little medium to fine Sand, dry (ML)					
	S-2 2.0'- 4.0'	19	5 5 5 5		CL	4.0 Stiff, light brown Silty CLAY, little medium to fine Sand, dry (CL)	-	-	L	-	
5	S-3 4.0'- 6.0'	24	8 20 35 40		GM	6.0 Very dense, light brown to gray coarse to fine GRAVEL, little Silt, trace medium to fine Sand, dry (GM)	-	-	-	-	Gravel is Basalt. Auger grinding from 4 to 6 feet BGS.
	S-4 6.0'- 7.2'	11	20 38 50/3"		GP	7.2 Very dense, light brown to gray coarse to fine GRAVEL, little medium to fine Sand, trace Silt, dry (GP)	-	-	-	-	Gravel is Basalt. Auger grinding
						Spoon Refusal at 7.2 feet BGS. Auger Refusal at 7 feet BGS. End of Boring at 7 feet BGS. Borehole backfilled with soil cuttings.					
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-13**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

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SOIL BORING LOG

BORING NO.: **B-14**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 4, 2020 at 12:00 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 4, 2020 at 12:35 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.546730° **Long:** -119.913149°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1	14	4			(7") - TOPSOIL	-	-	-	-	
0.6	0.0'- 2.0'		9		ML	Light brown SILT, little medium to fine Sand, dry (ML)	-	-	-	-	PID = 0 Gravel in tip of spoon is Basalt.
	0.6'-'		17								
2.0			50/1"								
						Spoon Refusal at 1.6 feet BGS. Auger Refusal at 2 feet BGS. Offset, Auger Refusal at 1.5 feet BGS. End of Boring at 2 feet BGS. Borehole backfilled with soil cuttings.					
5											
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-14**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

ANS GEO

BORING NO.: **B-18**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 9:00 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 5, 2020 at 10:00 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.544194° **Long:** -119.902071°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐	☑ Cutting Head	☐	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.6'-'	16	2 3 3 6			(7") - TOPSOIL	-	-	-	-	
0.6					ML	Medium stiff, light brown SILT, some medium to fine Sand, dry (ML)	-	-	-	-	PID = 0
2.0	S-2 2.0'- 4.0'	20	16 35 10 9		GM	Dense, light brown to gray coarse to fine GRAVEL, some Silt, little medium to fine Sand, dry (GM)	-	-	-	-	
4.0	S-3 4.0'- 6.0'	13	4 7 10 5		SM	Medium dense, light brown Gravelly coarse to fine SAND, little Silt, dry (SM)	-	-	-	-	
6.0	S-4 6.0'- 7.7'	16	9 16 32 50/2"		GP	Dense, gray coarse to fine GRAVEL, some medium to fine Sand, trace Silt, dry (GP)	-	-	-	-	Gravel is Basalt.
7.7						Spoon Refusal at 7.7 feet BGS. Auger Refusal at 7 feet BGS. End of Boring at 7.7 feet BGS. Borehole backfilled with soil cuttings.					

Depth scale: 5, 10, 15

Water Level Data

Date	Time	Elapsed Time (hr)	Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-18**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-20**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 4, 2020 at 1:20 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 4, 2020 at 2:20 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.542139° **Long:** -119.909104°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

- ☐ Truck ☐ Tripod ☐ Cat-Head
- ☑ ATV ☐ Geoprobe ☑ Winch
- ☑ Track ☐ Air Track ☐ Roller Bit
- ☐ Skid ☐ ______ ☑ Cutting Head

Hammer Type: ☐ Safety ☐ Doughnut ☑ Automatic ☐ ______

Drilling Fluid: ☐ Bentonite ☐ Polymer ☐ Water ☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.5'-'	18	3 3 3 3			(6") - TOPSOIL	-	-	-	-	
0.5					ML	Medium stiff, light brown Sandy SILT, trace Clay, dry (ML)	-	-	NP	-	PID = 0
	S-2 2.0'- 4.0'	14	7 6 5 7		ML	Stiff, light brown Sandy SILT, dry (ML)	-	-	NP	-	PID = 0
4.0	S-3 4.0'- 6.0'	20	5 7 10 9		SM	Medium dense, light brown Silty medium to fine Sand, dry (SM)	-	-	-	-	PID = 0
5											
6.0	S-4 6.0'- 8.0'	10	16 20 32 22		GP	Very dense, gray to light brown coarse to fine GRAVEL, some medium to fine Sand, trace Silt, dry (GP)	-	-	-	-	Gravel is Basalt. Auger grinding from 6.5 to 11 feet BGS.
	S-5 8.0'- 10.0'	14	16 22 42 50/4"		GP	Very dense, gray to light brown coarse to fine GRAVEL, little medium to fine Sand, dry (GP)	-	-	-	-	
10											
11.0						Spoon Refusal at 9.8 feet BGS. Auger Refusal at 11 feet BGS. End of Boring at 11 feet BGS. Borehole backfilled with soil cuttings.					
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-20**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-21**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 4, 2020 at 10:45 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 4, 2020 at 11:30 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.540793° **Long:** -119.913460°

Horizontal Datum: NAD 1983

Item	**Casing**	**Sampler**	**Core Barrel**
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	**Drilling Fluid**
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	**Visual - Manual Identification & Description** (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
0.5	S-1	18	3			(6") - TOPSOIL	-	-	-	-	
2.0	0.0'- 2.0' 0.5'-'		9 11 10		GM	Light brown to gray Silty coarse to fine GRAVEL, little medium to fine Sand, dry (GM)	-	-	-	-	PID = 0
4.0	S-2 2.0'- 4.0'	19	3 5 10 7		ML	Stiff, light brown to gray SILT, some coarse to fine Gravel, some coarse to fine Sand, dry (ML)	-	-	NP	-	Gravel is Basalt.
5 6.0	S-3 4.0'- 6.0'	14	24 21 19 50/2"		GM	Dense, light brown to gray coarse to fine GRAVEL, some coarse to fine Sand, little Silt, dry (GM)	-	-	-	-	
10 15						Spoon Refusal at 5.8 feet BGS. Auger Refusal at 6 feet BGS. End of Boring at 6 feet BGS. Borehole backfilled with soil cuttings.					

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-21**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Toughness: L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-23**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 11:45 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 5, 2020 at 12:10 pm

Elevation: Grade ft. | **Vertical Datum:** | **Boring Location:** See Boring Location Plan | **Coord.: Lat:** 46.540931° **Long:** -119.903300°

Horizontal Datum: NAD 1983

Item	**Casing**	**Sampler**	**Core Barrel**
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	**Drilling Fluid**
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
0.5	S-1 0.0'- 2.0' 0.5'-'	12	2 3 7 8			(6") - TOPSOIL	-	-	-	-	PID = 0
					ML	Very stiff, light brown SILT, some coarse to fine Sand, little coarse to fine Gravel, dry (ML)	-	-	NP	-	
4.1	S-2 2.0'- 4.0'	10	12 21 31 45		ML	Hard, gray to light brown SILT, some coarse to fine Sand, some coarse to fine Gravel, dry (ML)	-	-	NP	-	Gravel is Basalt.
5	S-3 4.0'- 6.0'	0	50/2"			Spoon Refusal at 4.2 feet BGS. Auger Refusal at 4.2 feet BGS. End of Boring at 4.2 feet BGS. Borehole backfilled with soil cuttings.	-	-	-	-	
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-23**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid; Toughness: L - Low M - Medium H - High; Plasticity: NP - Non-Plastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading. 3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-24**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 10:50 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 5, 2020 at 11:40 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.541120° **Long:** -119.897513°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

☐ Truck ☐ Tripod ☐ Cat-Head
☑ ATV ☐ Geoprobe ☑ Winch
☑ Track ☐ Air Track ☐ Roller Bit
☐ Skid ☐ ______ ☑ Cutting Head

Hammer Type: ☐ Safety ☐ Doughnut ☑ Automatic ☐ ______

Drilling Fluid: ☐ Bentonite ☐ Polymer ☐ Water ☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.6'-'	19	3 4 10 21			(7") - TOPSOIL	-	-	-	-	
0.6					ML	Medium stiff, brown SILT, some coarse to fine Sand, trace fine Gravel, dry (ML)	-	-	-	-	PID = 0
2.0	S-2 2.0'- 3.0'	7	42 50/4"		GM	Very dense, light brown to gray coarse to fine GRAVEL, little medium to fine Sand, little Silt, dry (GM)	-	-	-	-	
3.0						Spoon Refusal at 2.8 feet BGS. Auger Refusal at 3 feet BGS. Offset, Auger Refusal at 2.5 feet BGS. End of Boring at 2.5 feet BGS. Borehole backfilled with soil cuttings.					
5											
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Bot. of Casing	Bottom of Hole	Water

Sample Type

O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-24**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-26**
Page **1** of **1**

ANS GEO

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 4, 2020 at 9:50 am
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 4, 2020 at 10:30 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.: Lat:** 46.536814° **Long:** -119.913732°
Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:
Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.5'-'	24	3 5 5 3			(6") - TOPSOIL	-	-	-	-	
0.5					ML	Light brown SILT, some medium to fine Sand, dry (ML)	-	-	NP	-	PID = 0
	S-2 2.0'- 4.0'	11	4 20 30 34		ML	Hard, light brown to gray Sandy SILT, some coarse to fine Gravel, dry (ML)	-	-	NP	-	Gravel is Basalt.
4.0	S-3 4.0'- 5.5'	7	21 22 50/4"		GM	Very dense, light brown to gray coarse to fine GRAVEL, little medium to fine Sand, little Silt, dry (GM)	-	-	-	-	Gravel is Basalt. Auger grinding from 3 to 5.5 feet BGS.
5.5						Spoon Refusal at 5.3 feet BGS. Auger Refusal at 5.5 feet BGS. Offset, Auger Refusal at 5 feet BGS. End of Boring at 5.5 feet BGS. Borehole backfilled with soil cuttings.					

Depth scale: 5, 10, 15

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type
O Open End Rod
T Thin-Wall Tube
U Undisturbed Sample
S Split Spoon Sample
G Grab Sample

Notes:

Boring No.: **B-26**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-27**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 12:15 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 5, 2020 at 12:45 pm

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.538060° **Long:** -119.900227°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	-
Length	5 ft	2 ft	-
Inside Dia. (in.)	4.25	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1	18	2			0.5 (6") - TOPSOIL	-	-	-	-	
	0.0'- 2.0' 0.5'-'		3 2 2		CL	Medium stiff, light brown Silty CLAY, little medium to fine Sand, dry (CL) 2.0	-	-	L	-	PID = 0
	S-2 2.0'- 3.8'	13	5 16 32 50/4"		GM	Dense, light brown to gray coarse to fine GRAVEL, little medium to fine Sand, little Silt, dry (ML) 3.8	-	-	-	-	Gravel is Basalt.
5						Spoon Refusal at 3.8 feet BGS. Auger Refusal at 3.5 feet BGS. Offset, Auger Refusal at 3 feet BGS. End of Boring at 3.8 feet BGS. Borehole backfilled with soil cuttings.					
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-27**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

SOIL BORING LOG

BORING NO.: **B-SS-1**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 1:00 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 7, 2020 at 9:00 am

Elevation: Grade ft. **Vertical Datum:** **Boring Location:** See Boring Location Plan **Coord.:** **Lat:** 46.540462° **Long:** -119.900067°

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	NQ
Length	5 ft	2 ft	- ft
Inside Dia. (in.)	4.25	1.375	1.875
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Mobile B-57

Rig			Hammer Type	Drilling Fluid
☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite
☑ ATV	☐ Geoprobe	☑ Winch	☐ Doughnut	☐ Polymer
☑ Track	☐ Air Track	☐ Roller Bit	☑ Automatic	☐ Water
☐ Skid	☐ ______	☑ Cutting Head	☐ ______	☑ None

Drill Rod Size:

Casing Advance: Hollow Stem Auger

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec. (in)	Sample Blows per 6"	Stratum Graphic	USCS Group Symbol	Visual - Manual Identification & Description (Density/consistency, color, Group Name, constituents, particle size, structure, moisture, optional descriptions, geologic interpretation, Symbol)	Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
	S-1 0.0'- 2.0' 0.5'-'	24	2 4 4 38			0.5 (6") - TOPSOIL	-	-	-	-	
					ML	1.5 (12") - Brown Sandy SILT, dry (ML)	-	-	-	-	PID = 0
					GM	2.0 (6") - Gray coarse to fine GRAVEL, little Silt, dry (GM)					
	S-2 2.0'- 4.0'	10	15 15 47 50/1"		SM	4.0 Very dense, gray Gravelly coarse to fine SAND, little Silt, dry (SM)	-	-	-	-	Gravel is Basalt.
5						Auger Refusal at 4 feet BGS. See Rock Coring Log.					
10											
15											

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water

Sample Type

- **O** Open End Rod
- **T** Thin-Wall Tube
- **U** Undisturbed Sample
- **S** Split Spoon Sample
- **G** Grab Sample

Notes:

Boring No.: **B-SS-1**

Field Test Legend: Dilatancy: N - None S - Slow R - Rapid Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: 1.) "ppd" denotes soil sample average diametral pocket penetrometer reading. 2.) "ppa" denotes soil sample average axial pocket penetrometer reading.
3.) Maximum Particle Size is determined by direct observation within limitations of sampler size. 4.) Soil identifications and field tests based on visual-manual methods per ASTM D2488.

ANS GEO

CORE BORING LOG

BORING NO.: **B-SS-1**

Project:	Ostrea Solar	**Project No.:**	N/A
Location:	Moxee, Washington	**Project Mgr:**	N/A
Client:	Cypress Creek Renewables	**Field Eng. Staff:**	Mihir Shah
Drilling Co.:	Elite Drilling Services	**Date/Time Started:**	December 5, 2020 at 1:00 pm
Driller/Helper:	Lenny Jecminek /Greg	**Date/Time Finished:**	December 7, 2020 at 9:00 am

Elevation: Grade ft.		**Vertical Datum:**	
Item	**Casing**	**Core Barrel**	**Core Bit**
Type	HSA	NQ	Imp. Diamond
Length	5 ft	5 ft	6 in
Inside Dia. (in.)	4.25	1.875	1.875

Boring Location: See Boring Location Plan

Coord.: **Lat:** 46.540462° **Long:** -119.900067°

Horizontal Datum: NAD 1983

Rig Make & Model: Mobile B-57

Drilling Method: Wireline

Depth/ Elev. (ft)	Avg Core Rate (min /ft)	Depth (ft)	Run/ (Box) No.	Rec (in. / %)	RQD (in / %)	Rock Core Hard.	Rock Core Weath	Stratum Graphic	Visual Identification, Description and Remarks (Rock type, colour, texture, weathering, field strength, discontinuity spacing, optional additional geological observations)	Depth (ft.)	Discontinuities (See Legend for Rock Description System) Type	Dip	Rgh	Wea	Aper	Infill	Remarks
									SEE TEST BORING LOG FOR OVERBURDEN DETAILS								
5	1.50 1.00 0.75	4.0 7.0	R-1	16 44%	0 0%	R4	H		BASALT, gray, fine grained, highly weathered, strong, extremely close spaced discontinuities 4' - 7' Highly Weathered zone								Loss of water at 4.5 feet BGS.
10	1.50 2.00 2.50 2.00	7.0 11.0	R-2	24 50%	0 0%	R4	H		BASALT, gray, fine grained, highly weathered, strong, extremely close spaced discontinuities 7' - 11' Highly Weathered zone								Loss of water at 8 feet BGS. Loss of water at 9.75 feet BGS.
15	1.25 2.00 2.25 1.50	11.0 15.0	R-3	21 44%	0 0%	R4	H		BASALT, gray, fine grained, highly weathered, strong, extremely close spaced discontinuities 11' - 15' Highly Weathered zone								
									15.0 End of Boring at 15 feet BGS. Borehole backfilled with soil cuttings.								
20																	

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet to: Bot. of Casing	Bottom of Hole	Water
		-			

Notes:

Boring No.: **B-SS-1**

Attachment C

Test Pit Photo Logs

TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-02
Site Location	Moxee, Washington	**Date**	12/4/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	40°F / Sunny
Final Test Pit Depth	24 inches (2.0 feet)	**Time Opened**	1:20 PM
Groundwater Depth	Not Encountered	**Time Closed**	1:45 PM

0-6"
Topsoil

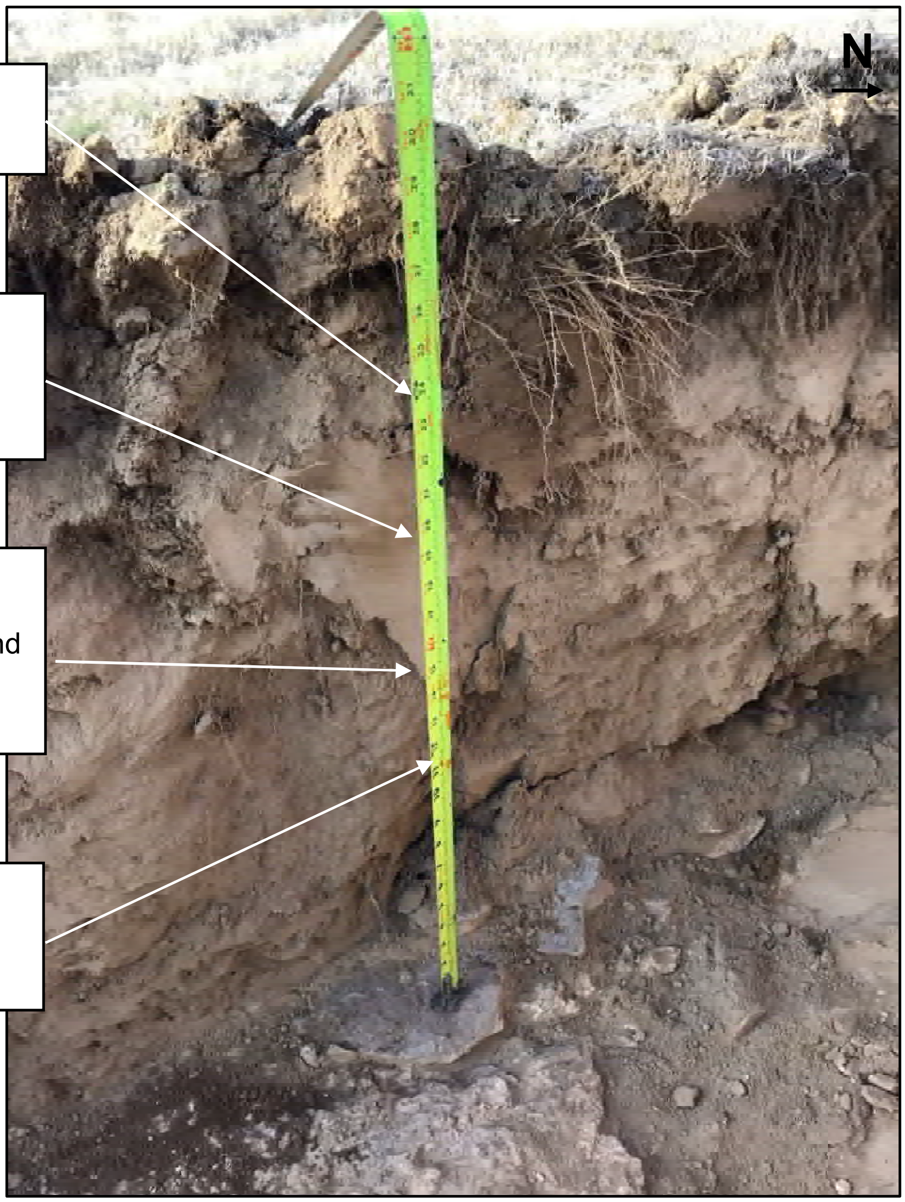
6-20"
Light brown SILT, little medium to fine Sand, dry (ML)

20-24"
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

24"
Gray BASALT

TEST PIT PHOTO LOG

Project Name	Ostrea Solar	Test Pit ID	TP-04
Site Location	Moxee, Washington	Date	12/4/2020
Test Pit Contractor	Elite Drilling Services	ANS Geo Representative	Mihir Shah
Equipment Used	John Deere 26G	Weather/Temp	40°F / Sunny
Final Test Pit Depth	30 inches (2.5 feet)	Time Opened	12:45 PM
Groundwater Depth	Not Encountered	Time Closed	1:10 PM



TEST PIT PHOTO LOG

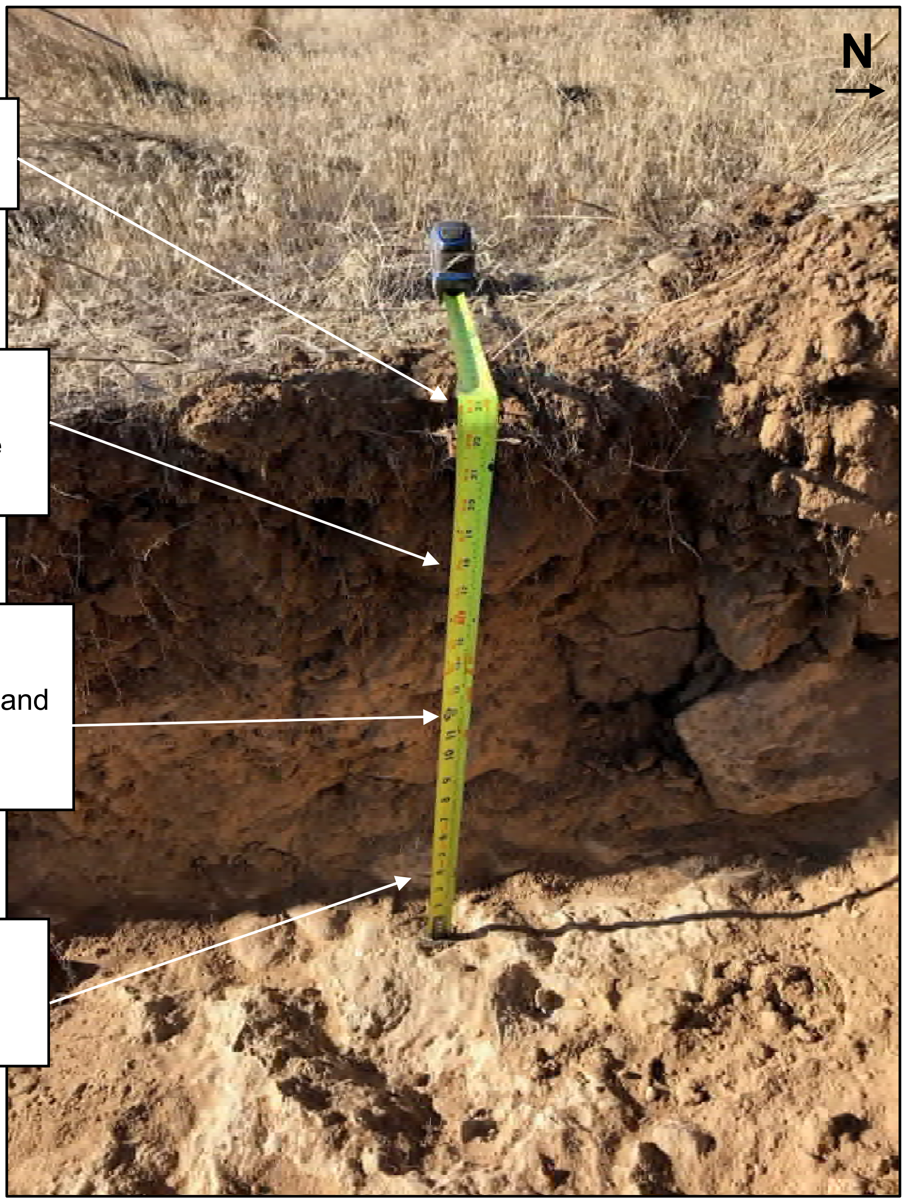
Project Name	Ostrea Solar	Test Pit ID	TP-05
Site Location	Moxee, Washington	Date	12/4/2020
Test Pit Contractor	Elite Drilling Services	ANS Geo Representative	Mihir Shah
Equipment Used	John Deere 26G	Weather/Temp	35°F / Sunny
Final Test Pit Depth	24 inches (2.0 feet)	Time Opened	10:40 AM
Groundwater Depth	Not Encountered	Time Closed	11:05 AM

0-9”
Topsoil

9-16”
Light brown SILT, little medium to fine Sand, dry (ML)

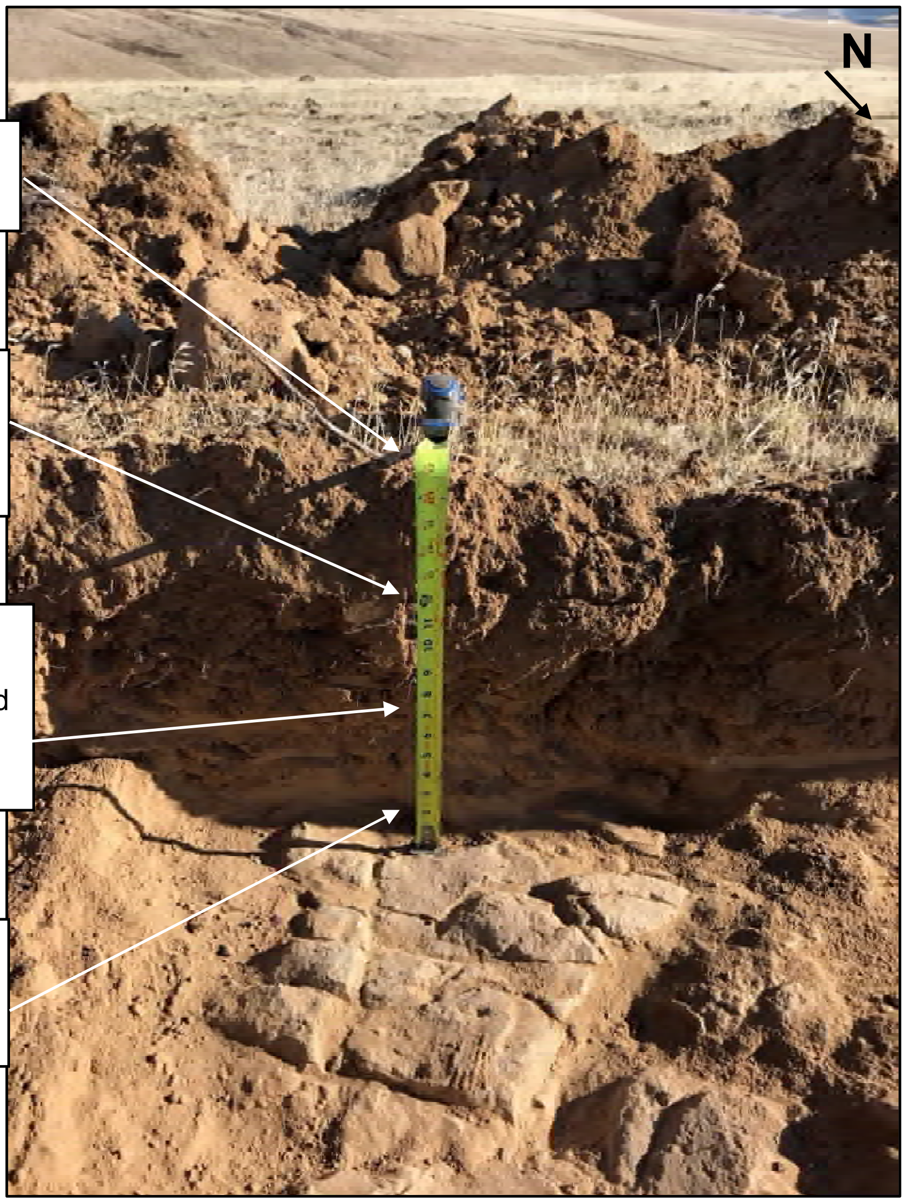
16-24”
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

24”
Gray BASALT



TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-06
Site Location	Moxee, Washington	**Date**	12/4/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	40°F / Sunny
Final Test Pit Depth	14 inches (1.2 feet)	**Time Opened**	11:15 AM
Groundwater Depth	Not Encountered	**Time Closed**	11:40 AM



TEST PIT PHOTO LOG

Project Name	Ostrea Solar	Test Pit ID	TP-09
Site Location	Moxee, Washington	Date	12/4/2020
Test Pit Contractor	Elite Drilling Services	ANS Geo Representative	Mihir Shah
Equipment Used	John Deere 26G	Weather/Temp	40°F / Sunny
Final Test Pit Depth	30 inches (2.5 feet)	Time Opened	11:45 AM
Groundwater Depth	Not Encountered	Time Closed	12:20 PM

0-8"
Topsoil

8-28"
Light brown SILT, little medium to fine Sand, dry (ML)

28-30"
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

30"
Gray BASALT

TEST PIT PHOTO LOG

Project Name	Ostrea Solar	Test Pit ID	TP-11
Site Location	Moxee, Washington	Date	12/4/2020
Test Pit Contractor	Elite Drilling Services	ANS Geo Representative	Mihir Shah
Equipment Used	John Deere 26G	Weather/Temp	35°F / Sunny
Final Test Pit Depth	22 inches (1.8 feet)	Time Opened	10:05 AM
Groundwater Depth	Not Encountered	Time Closed	10:35 AM

0-7"
Topsoil

7-17"
Light brown SILT, little medium to fine Sand, dry (ML)

17-22"
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

22"
Gray BASALT

TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-15
Site Location	Moxee, Washington	**Date**	12/5/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	25°F / Cloudy
Final Test Pit Depth	12 inches (1.0 feet)	**Time Opened**	11:40 AM
Groundwater Depth	Not Encountered	**Time Closed**	12:15 PM

0-3”
Topsoil

3-12”
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

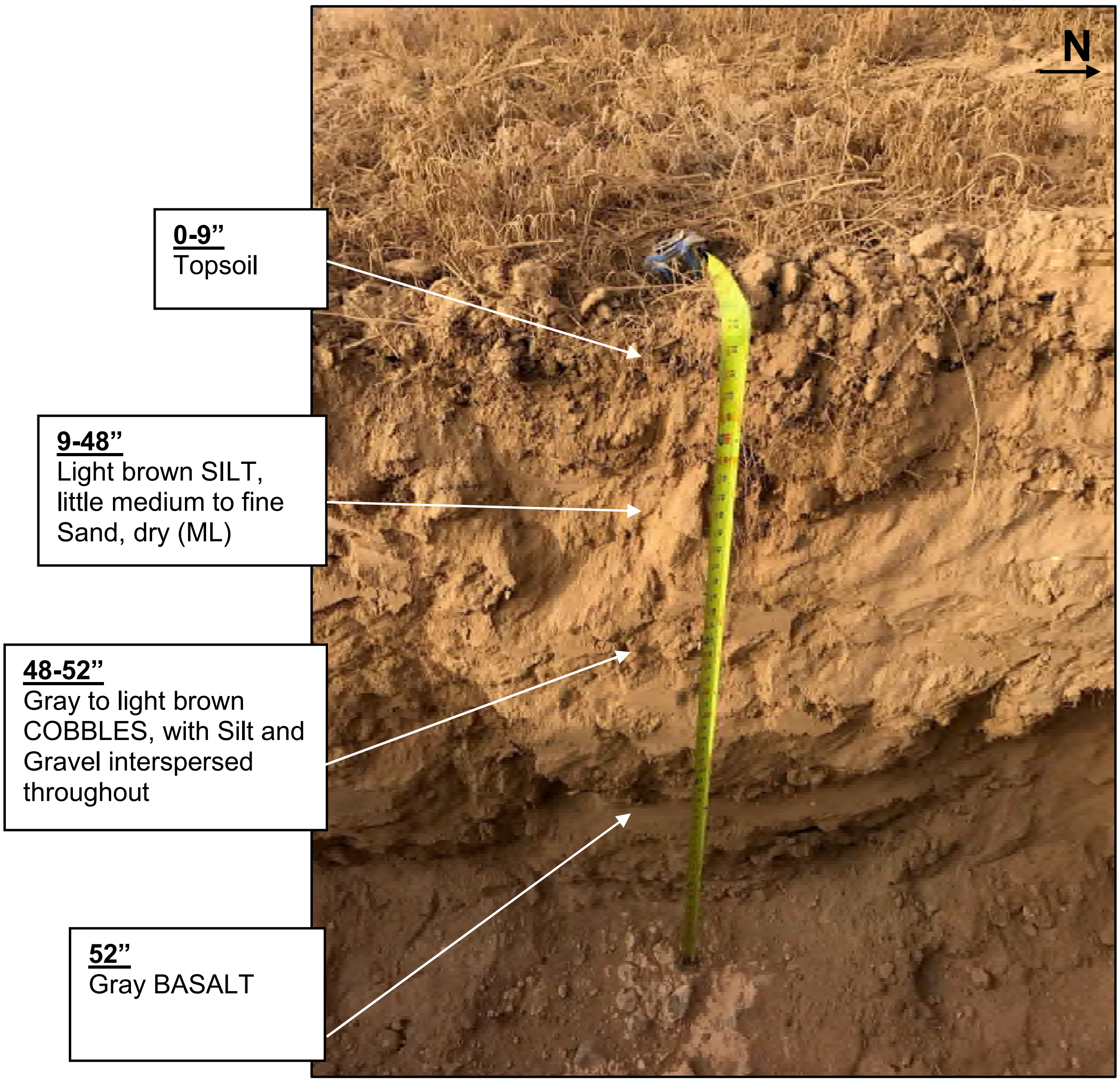
12”
Gray BASALT

TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-16
Site Location	Moxee, Washington	**Date**	12/4/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	40°F / Sunny
Final Test Pit Depth	21 inches (1.8 feet)	**Time Opened**	2:50 PM
Groundwater Depth	Not Encountered	**Time Closed**	3:25 PM

TEST PIT PHOTO LOG

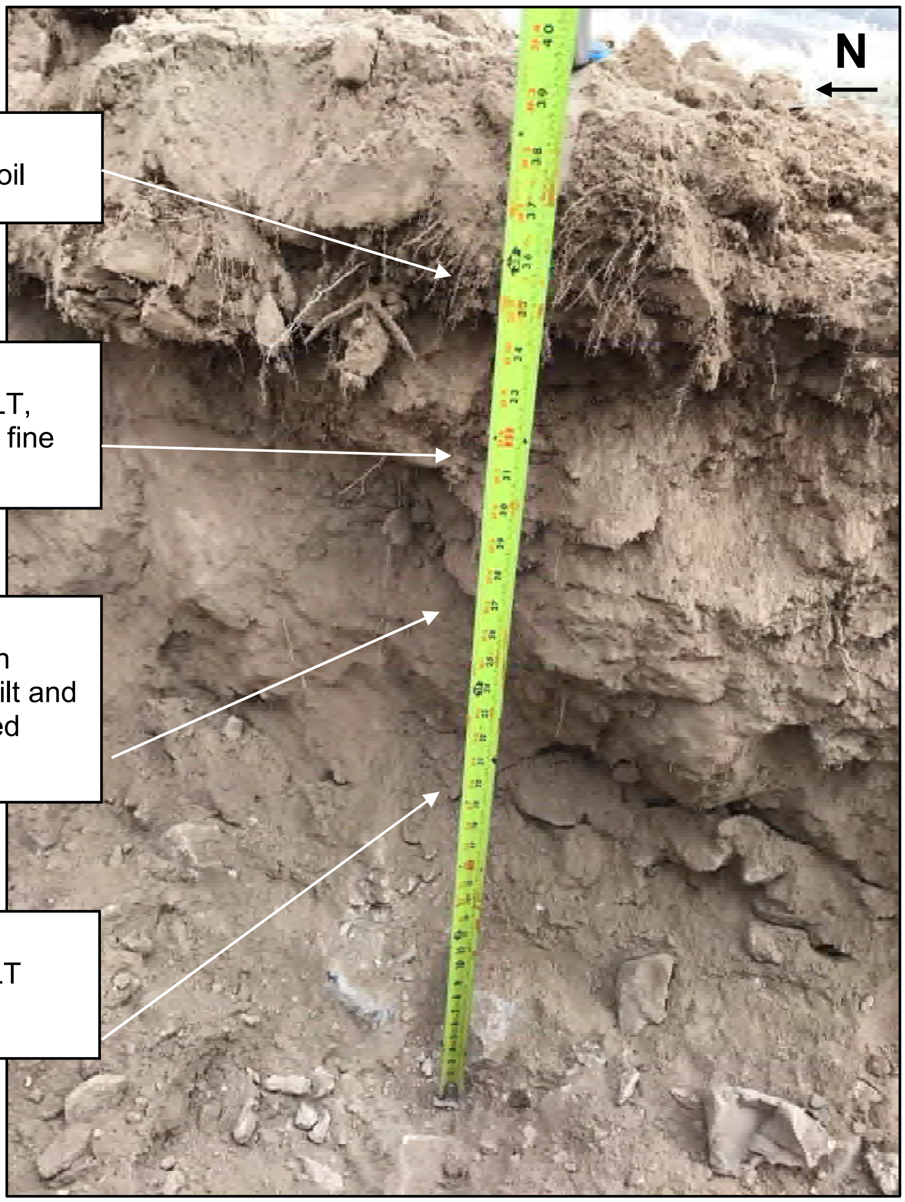
Project Name	Ostrea Solar	**Test Pit ID**	TP-17
Site Location	Moxee, Washington	**Date**	12/5/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	20°F / Cloudy
Final Test Pit Depth	52 inches (4.3 feet)	**Time Opened**	8:55 AM
Groundwater Depth	Not Encountered	**Time Closed**	9:20 AM



TEST PIT PHOTO LOG

ANS GEO

Project Name	Ostrea Solar	**Test Pit ID**	TP-19
Site Location	Moxee, Washington	**Date**	12/5/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	25°F / Cloudy
Final Test Pit Depth	38 inches (3.2 feet)	**Time Opened**	10:45 AM
Groundwater Depth	Not Encountered	**Time Closed**	11:20 AM



TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-22
Site Location	Moxee, Washington	**Date**	12/5/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	15°F / Cloudy
Final Test Pit Depth	22 inches (1.8 feet)	**Time Opened**	7:50 AM
Groundwater Depth	Not Encountered	**Time Closed**	8:30 AM

0-6”
Topsoil

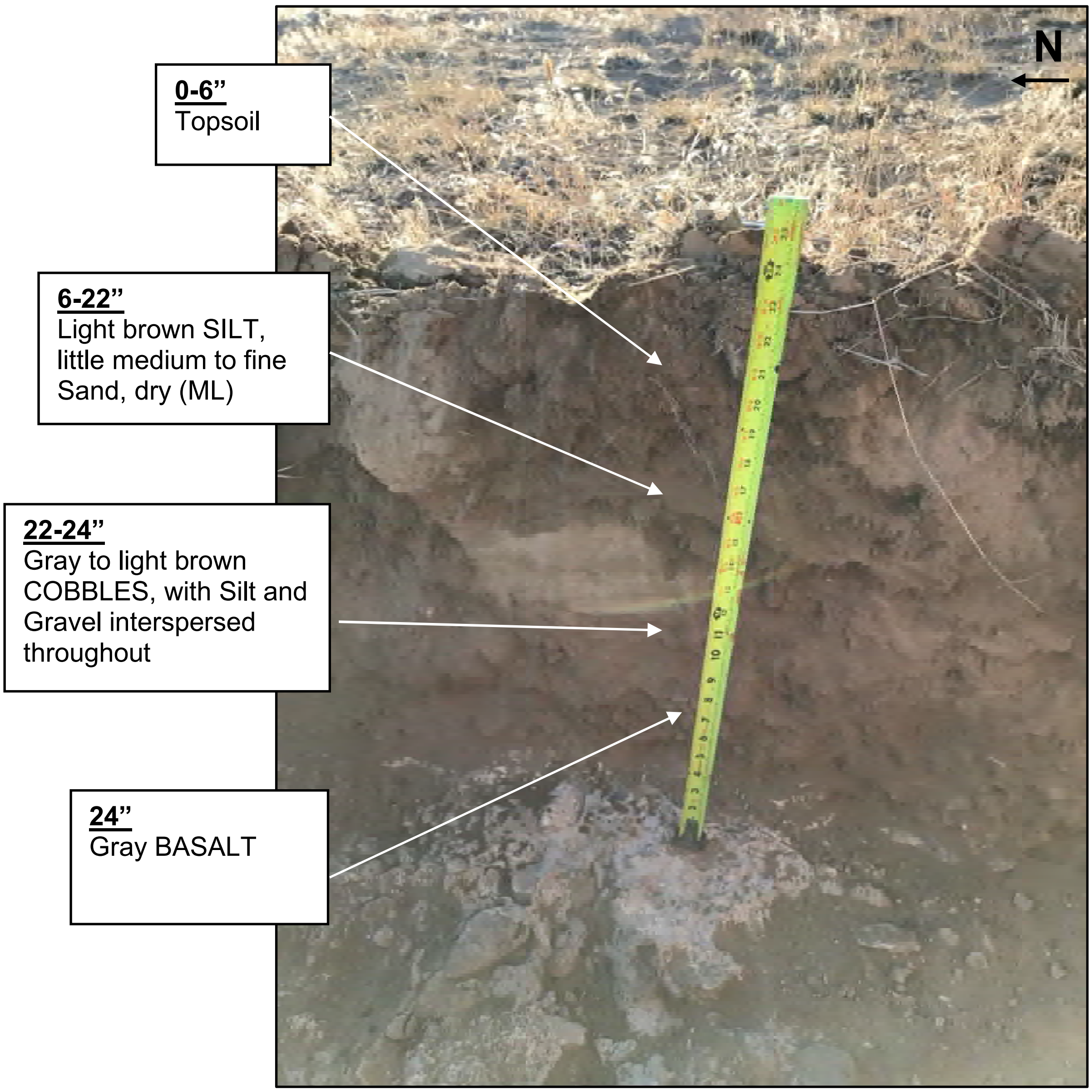
6-17”
Light brown SILT, little medium to fine Sand, dry (ML)

17-22”
Gray to light brown COBBLES, with Silt and Gravel interspersed throughout

22”
Gray BASALT

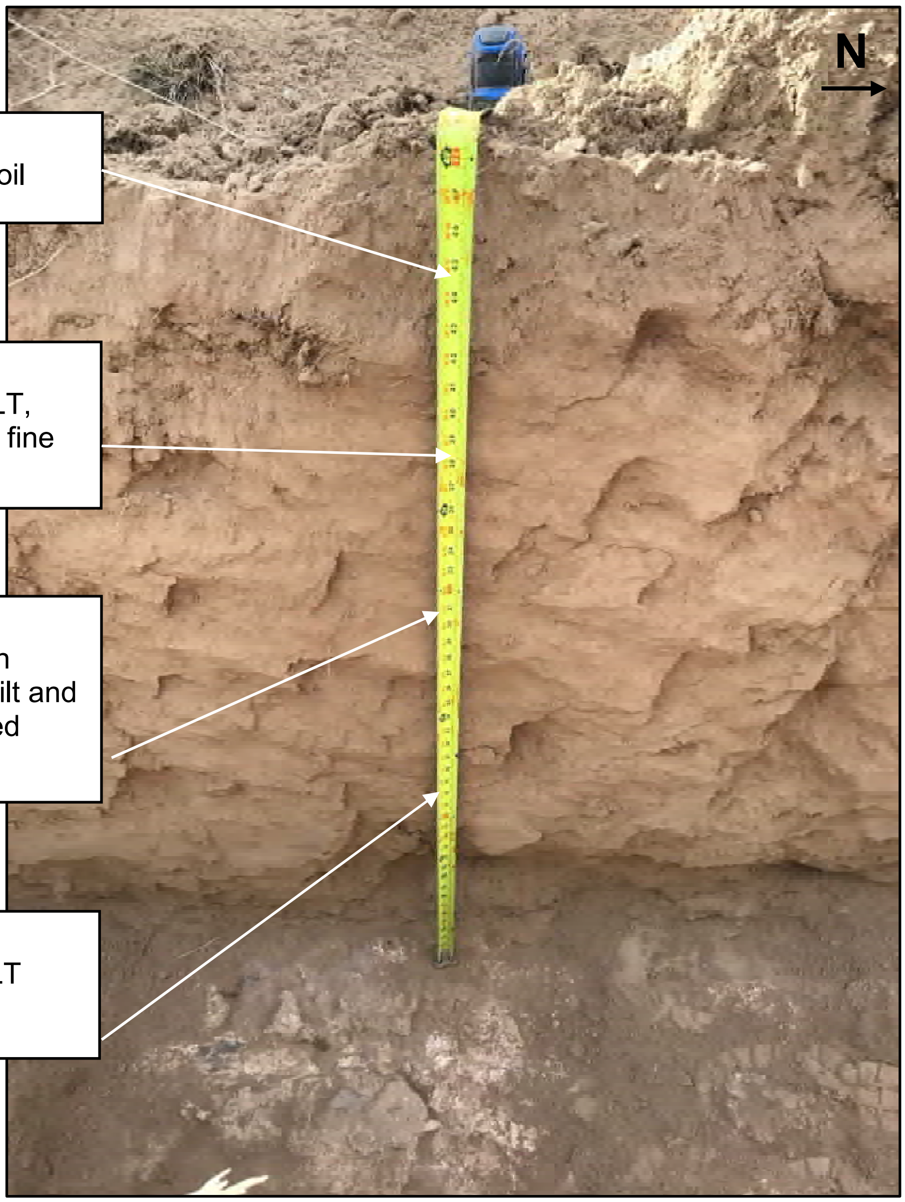
TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-25
Site Location	Moxee, Washington	**Date**	12/4/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	40°F / Sunny
Final Test Pit Depth	24 inches (2.0 feet)	**Time Opened**	2:15 PM
Groundwater Depth	Not Encountered	**Time Closed**	2:40 PM



TEST PIT PHOTO LOG

Project Name	Ostrea Solar	**Test Pit ID**	TP-28
Site Location	Moxee, Washington	**Date**	12/5/2020
Test Pit Contractor	Elite Drilling Services	**ANS Geo Representative**	Mihir Shah
Equipment Used	John Deere 26G	**Weather/Temp**	25°F / Cloudy
Final Test Pit Depth	51 inches (4.3 feet)	**Time Opened**	12:45 PM
Groundwater Depth	Not Encountered	**Time Closed**	1:15 PM



Attachment D

Electrical Resistivity Results

ANS GEO

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	October 29-30, 2020
Project Name:	Ostrea Solar	Weather:	Sunny
Project Location:	Moxee, Washington	Temperature:	60 - 65° F
Equipment:	AGI MiniSting		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)											
			1.0	1.5	2.0	3.0	4.5	7.0	10.0	15.0	22.5	35.0	50.0	75.0
ERT-01	N-S	Measured Resistance (Ω)	344.00	202.00	139.40	68.41	64.07	22.19	13.92	7.30	3.91	2.20	1.42	0.66
		Apparent Resistivity (Ω-m)	658.67	580.34	534.01	393.19	552.30	297.52	266.64	209.76	168.68	147.22	136.25	95.04
	E-W	Measured Resistance (Ω)	321.30	213.70	104.70	56.95	31.96	22.12	13.30	7.24	3.78	1.81	1.39	0.95
		Apparent Resistivity (Ω-m)	615.39	613.87	401.12	327.05	275.42	296.51	254.75	207.93	163.01	121.46	133.17	136.03
ERT-02	N-S	Measured Resistance (Ω)	375.30	220.00	158.30	108.80	64.44	39.96	24.85	17.10	11.50	7.90	4.59	2.60
		Apparent Resistivity (Ω-m)	718.72	631.85	606.25	625.14	555.35	535.53	476.10	491.34	495.60	529.44	439.52	372.77
	E-W	Measured Resistance (Ω)	364.60	307.40	174.40	90.23	55.24	38.26	23.99	16.49	9.99	6.31	4.17	2.68
		Apparent Resistivity (Ω-m)	698.30	883.01	667.82	518.46	476.10	512.98	459.33	473.66	430.99	422.76	398.68	384.35
ERT-03	N-S	Measured Resistance (Ω)	405.10	256.40	169.70	85.18	38.25	18.34	9.75	7.58	5.85	4.36	2.80	1.64
		Apparent Resistivity (Ω-m)	776.02	736.40	649.83	489.51	329.49	245.85	186.72	217.66	253.99	291.97	268.16	235.49
	E-W	Measured Resistance (Ω)	414.80	259.30	151.80	83.06	41.33	16.23	9.79	7.87	5.72	4.00	2.86	1.64
		Apparent Resistivity (Ω-m)	794.31	744.93	581.25	477.32	356.31	217.51	187.48	226.10	246.55	267.80	273.44	236.19
ERT-04	N-S	Measured Resistance (Ω)	193.10	138.10	93.64	59.35	42.02	24.48	16.38	11.68	9.95	8.42	6.90	4.78
		Apparent Resistivity (Ω-m)	369.72	396.54	358.75	341.07	362.10	328.27	313.64	335.58	428.55	564.79	660.81	686.10
	E-W	Measured Resistance (Ω)	258.50	114.90	99.24	62.10	44.98	24.60	16.02	11.86	10.02	9.43	7.61	4.65
		Apparent Resistivity (Ω-m)	495.00	329.79	380.09	356.87	387.71	329.79	306.93	340.77	431.60	632.46	728.78	668.43
		Site Average (Ω)	**375.59**	**198.35**	**129.69**	**65.41**	**36.15**	**19.01**	**12.19**	**8.37**	**6.26**	**4.61**	**3.40**	**2.24**
		Site Average (Ω-m)	**719.30**	**569.77**	**496.73**	**375.84**	**311.58**	**254.83**	**233.28**	**240.68**	**355.18**	**309.24**	**326.58**	**321.95**

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	October 29-30, 2020
Project Name:	Ostrea Solar	Weather:	Sunny
Project Location:	Moxee, Washington	Temperature:	60 - 65° F
Equipment:	AGI MiniSting		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)											
			1.0	1.5	2.0	3.0	4.5	7.0	10.0	15.0	22.5	35.0	50.0	75.0
ERT-05	N-S	Measured Resistance (Ω)	182.40	100.10	67.74	36.85	22.81	12.08	7.50	5.19	3.85	3.05	2.58	2.19
		Apparent Resistivity (Ω-m)	349.30	287.64	259.48	211.71	196.57	162.00	143.53	148.99	165.84	204.43	246.71	314.55
	E-W	Measured Resistance (Ω)	218.90	121.60	87.44	49.77	25.77	12.12	5.97	4.33	4.26	3.71	3.27	2.50
		Apparent Resistivity (Ω-m)	419.40	349.30	334.98	285.93	222.05	162.52	114.36	124.36	183.70	248.78	313.33	359.36
ERT-06	N-S	Measured Resistance (Ω)	399.00	230.10	177.50	108.60	56.62	26.44	15.91	11.20	9.09	6.32	5.15	3.67
		Apparent Resistivity (Ω-m)	764.13	661.11	679.70	623.62	487.98	354.48	304.68	321.56	391.67	423.37	492.86	526.69
	E-W	Measured Resistance (Ω)	367.60	252.30	203.60	111.90	60.91	24.66	16.12	10.82	8.98	6.74	4.77	3.11
		Apparent Resistivity (Ω-m)	704.09	724.81	779.98	643.13	524.87	330.40	308.76	310.90	386.79	451.41	453.85	446.23
ERT-07	N-S	Measured Resistance (Ω)	187.80	105.40	58.33	23.41	11.72	8.28	7.22	5.65	5.06	4.20	3.83	2.92
		Apparent Resistivity (Ω-m)	359.66	302.70	223.42	134.51	101.01	111.04	138.26	162.28	218.15	281.54	366.67	419.40
	E-W	Measured Resistance (Ω)	170.90	106.40	57.72	25.27	14.13	8.11	6.49	5.99	5.41	4.29	3.22	2.29
		Apparent Resistivity (Ω-m)	327.05	305.71	221.07	145.18	121.77	108.75	124.21	172.12	233.26	287.40	308.15	329.18
ERT-08	N-S	Measured Resistance (Ω)	289.70	176.30	118.40	56.40	24.83	13.45	9.27	7.42	6.58	5.38	4.66	3.66
		Apparent Resistivity (Ω-m)	554.74	506.27	453.54	324.00	214.00	180.17	171.51	213.18	283.71	360.88	445.92	525.78
	E-W	Measured Resistance (Ω)	283.00	173.20	104.70	50.57	23.23	12.37	9.22	7.31	6.61	6.21	5.02	4.01
		Apparent Resistivity (Ω-m)	541.93	497.43	400.81	290.57	200.19	165.87	176.48	209.98	2849.58	416.36	480.06	575.16
		Site Average (Ω)	**262.41**	**158.18**	**109.43**	**57.85**	**30.00**	**14.69**	**9.71**	**7.24**	**6.23**	**4.99**	**4.06**	**3.04**
		Site Average (Ω-m)	**524.43**	**478.19**	**430.35**	**341.82**	**266.42**	**203.12**	**191.85**	**209.55**	**586.30**	**327.34**	**378.34**	**423.28**

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	October 29-30, 2020
Project Name:	Ostrea Solar	Weather:	Sunny
Project Location:	Moxee, Washington	Temperature:	60 - 65° F
Equipment:	AGI MiniSting		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)											
			1.0	1.5	2.0	3.0	4.5	7.0	10.0	15.0	22.5	35.0	50.0	75.0
ERT-09	N-S	Measured Resistance (Ω)	497.70	259.70	158.20	60.05	24.05	15.87	10.15	7.15	6.03	5.62	5.02	3.88
		Apparent Resistivity (Ω-m)	953.11	746.15	605.94	345.03	207.29	212.72	194.43	205.25	251.70	376.43	480.97	556.87
	E-W	Measured Resistance (Ω)	455.70	207.20	157.10	62.33	31.38	15.57	10.62	7.26	6.08	5.56	4.60	3.63
		Apparent Resistivity (Ω-m)	872.64	595.27	601.68	358.14	270.45	208.73	203.39	208.57	261.95	373.68	440.44	520.60
ERT-10	N-S	Measured Resistance (Ω)	824.60	343.90	210.50	115.60	73.25	41.25	27.34	19.42	15.35	11.45	8.01	4.24
		Apparent Resistivity (Ω-m)	1579.17	987.86	806.20	664.16	631.24	552.91	523.65	557.78	661.42	767.49	766.88	608.38
	E-W	Measured Resistance (Ω)	840.60	335.60	207.70	120.40	69.31	42.42	29.72	21.30	16.93	12.90	8.28	4.98
		Apparent Resistivity (Ω-m)	1609.95	964.08	795.53	691.90	597.41	568.76	569.37	611.43	729.39	864.41	816.86	715.06
ERT-11	N-S	Measured Resistance (Ω)	661.50	250.00	149.30	95.58	52.18	23.84	11.75	5.44	3.25	1.32	0.60	0.42
		Apparent Resistivity (Ω-m)	1266.75	718.11	571.80	549.25	449.58	319.74	225.06	156.15	139.87	88.54	57.73	59.68
	E-W	Measured Resistance (Ω)	656.40	287.90	201.60	85.81	55.35	25.27	11.70	5.50	3.08	1.32	0.57	0.38
		Apparent Resistivity (Ω-m)	1257.30	827.23	772.36	492.86	477.01	338.63	224.12	158.04	132.80	88.15	54.96	55.05
ERT-12	N-S	Measured Resistance (Ω)	256.60	149.70	99.46	35.73	15.46	7.11	4.00	1.97	0.99	0.64	0.52	0.32
		Apparent Resistivity (Ω-m)	491.34	430.07	381.00	205.28	133.23	95.25	76.69	56.66	42.85	42.67	50.11	46.57
	E-W	Measured Resistance (Ω)	254.10	141.40	100.40	36.55	15.64	6.90	4.04	1.96	1.11	0.65	0.52	0.32
		Apparent Resistivity (Ω-m)	486.46	405.99	384.35	210.01	134.78	92.45	77.33	56.42	47.61	43.28	49.50	45.42
		Site Average (Ω)	**555.90**	**246.93**	**160.53**	**76.51**	**42.08**	**22.28**	**13.67**	**8.75**	**6.60**	**4.93**	**3.52**	**2.27**
		Site Average (Ω-m)	**1080.52**	**704.09**	**658.25**	**489.72**	**412.46**	**315.19**	**263.36**	**252.22**	**276.29**	**309.19**	**311.02**	**303.40**

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	October 29-30, 2020
Project Name:	Ostrea Solar	Weather:	Sunny
Project Location:	Moxee, Washington	Temperature:	60 - 65° F
Equipment:	AGI MiniSting		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)											
			1.0	1.5	2.0	3.0	4.5	7.0	10.0	15.0	22.5	35.0	50.0	75.0
ERT-13	N-S	Measured Resistance (Ω)	507.20	173.50	115.80	58.26	26.15	8.29	4.15	2.35	1.68	1.07	0.76	0.52
		Apparent Resistivity (Ω-m)	971.40	498.35	443.48	334.67	225.34	111.16	79.40	67.51	72.45	71.90	72.42	74.68
	E-W	Measured Resistance (Ω)	377.90	171.60	151.60	71.54	24.65	7.68	4.60	2.66	1.58	0.89	0.72	0.49
		Apparent Resistivity (Ω-m)	723.90	493.17	580.64	410.87	212.38	102.90	88.09	76.47	68.06	59.77	68.55	70.10
ERT-14	N-S	Measured Resistance (Ω)	362.70	214.10	126.40	31.45	14.82	10.06	8.79	6.88	5.44	4.05	2.72	1.31
		Apparent Resistivity (Ω-m)	694.64	614.78	484.33	180.69	127.68	134.78	168.25	197.75	234.24	271.39	260.36	188.43
	E-W	Measured Resistance (Ω)	307.80	176.90	92.20	43.10	18.45	10.72	9.10	8.01	5.39	3.17	2.33	1.29
		Apparent Resistivity (Ω-m)	589.48	508.10	353.26	247.65	159.01	143.65	174.19	230.06	232.20	212.72	223.33	185.07
		Site Average (Ω)	**349.47**	**187.53**	**219.35**	**79.90**	**43.43**	**21.68**	**12.16**	**6.46**	**4.14**	**2.62**	**1.86**	**1.04**
		Site Average (Ω-m)	**669.34**	**538.68**	**597.41**	**334.39**	**235.64**	**179.00**	**163.97**	**153.86**	**153.47**	**152.85**	**156.17**	**128.88**

Soil Resistivity Results

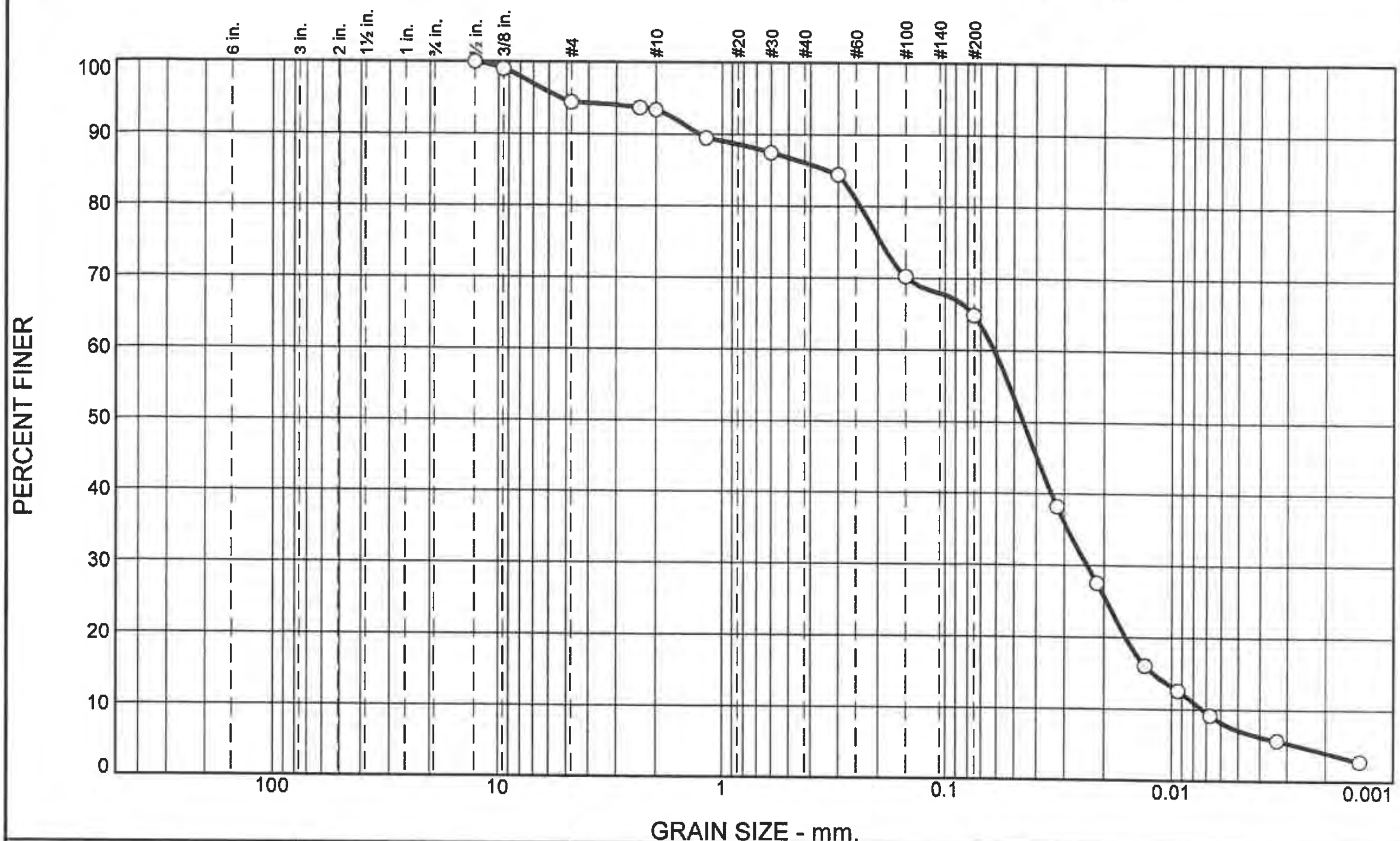
Client:	Cypress Creek Renewables	Date:	October 29-30, 2020
Project Name:	Ostrea Solar	Weather:	Sunny
Project Location:	Moxee, Washington	Temperature:	60 - 65° F
Equipment:	AGI MiniSting		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)													
			1.0	1.5	2.0	3.0	4.5	7.0	10.0	15.0	22.5	35.0	50.0	75.0	100.0	150.0
ERT-SS-1	N-S	Measured Resistance (Ω)	237.60	129.50	76.87	33.76	19.43	16.06	11.75	7.95	5.13	2.70	1.61	0.77	0.36	0.13
		Apparent Resistivity (Ω-m)	455.07	372.16	294.44	193.94	167.46	215.28	225.03	228.36	221.13	180.84	153.77	110.55	68.85	38.56
	E-W	Measured Resistance (Ω)	251.40	132.30	76.98	35.41	22.19	15.57	12.33	8.08	5.29	2.74	1.62	0.77	0.37	0.16
		Apparent Resistivity (Ω-m)	481.28	380.09	294.83	203.42	191.26	208.73	236.07	243.72	228.14	183.79	155.05	111.13	70.50	45.87
		Site Average (Ω)	**244.50**	**130.90**	**76.93**	**34.59**	**20.81**	**15.82**	**12.04**	**8.02**	**5.21**	**2.72**	**1.61**	**0.77**	**0.36**	**0.15**
		Site Average (Ω-m)	**468.17**	**376.12**	**294.63**	**198.68**	**179.36**	**212.00**	**230.55**	**236.04**	**224.64**	**182.32**	**154.41**	**110.84**	**69.68**	**42.21**

Attachment E

Geotechnical Laboratory Test Results

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.6	1.0	7.3	21.2	57.8	7.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	99.0		
#4	94.4		
#8	93.7		
#10	93.4		
#16	89.5		
#30	87.5		
#50	84.4		
#100	70.3		
#200	64.9		

* (no specification provided)

Material Description

Grayish brown in color. sandy silt. Silt Loam.

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.2657 D_{85}= 0.3352 D_{60}= 0.0611
D_{50}= 0.0455 D_{30}= 0.0238 D_{15}= 0.0121
D_{10}= 0.0073 C_u= 8.34 C_c= 1.27

Classification

USCS= ML AASHTO= A-4(0)

Remarks

In-Situ %MC=6.5
F.M.=0.81

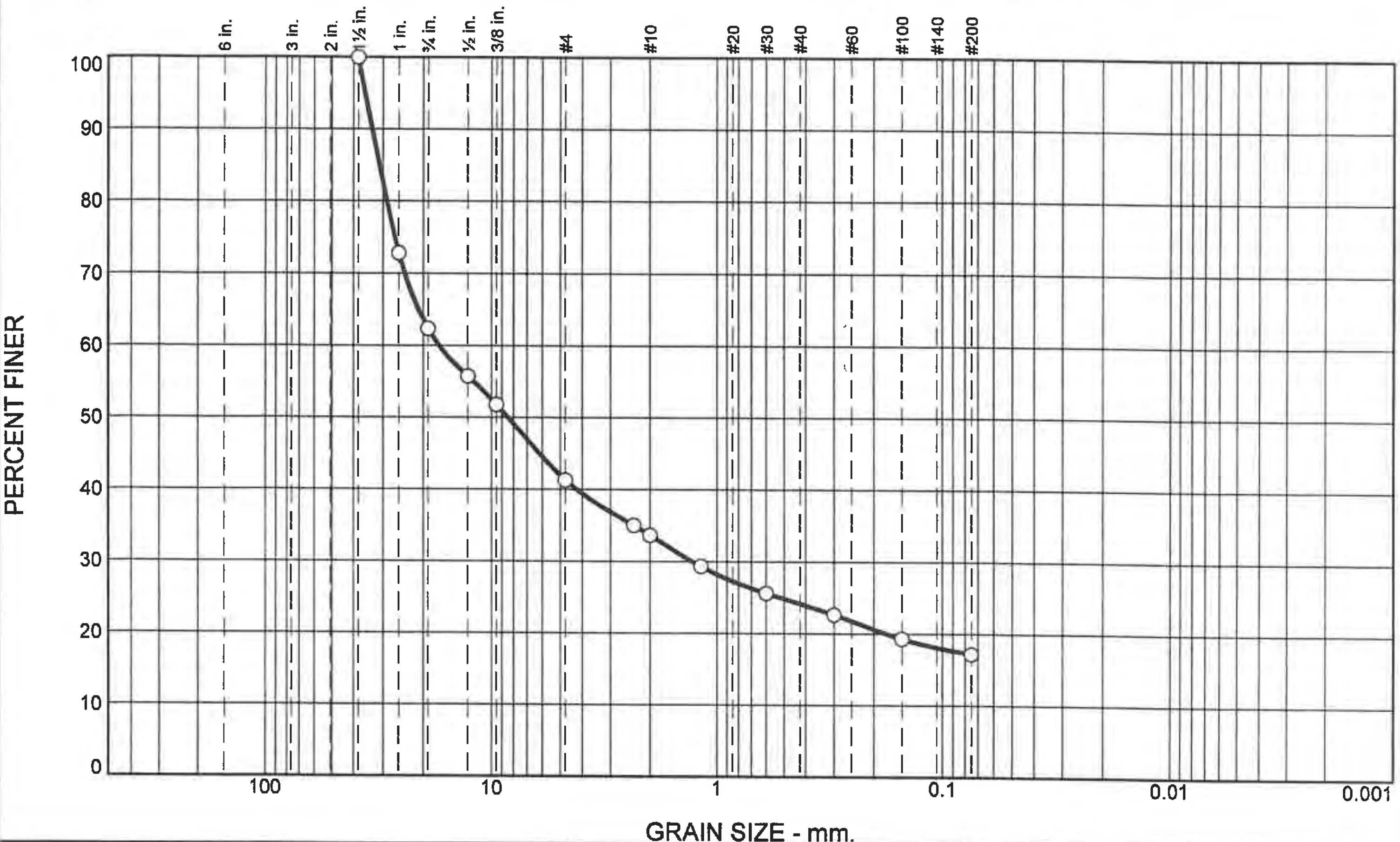
Location: B-1, S-3, 4'-6'
Sample Number: S-18 **Depth:** 4'-6' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure 18 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	37.7	21.0	7.6	9.5	7.0	17.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	72.8		
3/4	62.3		
1/2	55.7		
3/8	51.8		
#4	41.3		
#8	35.0		
#10	33.7		
#16	29.3		
#30	25.6		
#50	22.6		
#100	19.3		
#200	17.2		

* (no specification provided)

Material Description

silty gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 33.3005 D_{85}= 31.0311 D_{60}= 17.0801
D_{50}= 8.4783 D_{30}= 1.2908 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-b

Remarks

In-Situ %MC=2.9
F.M.=5.13

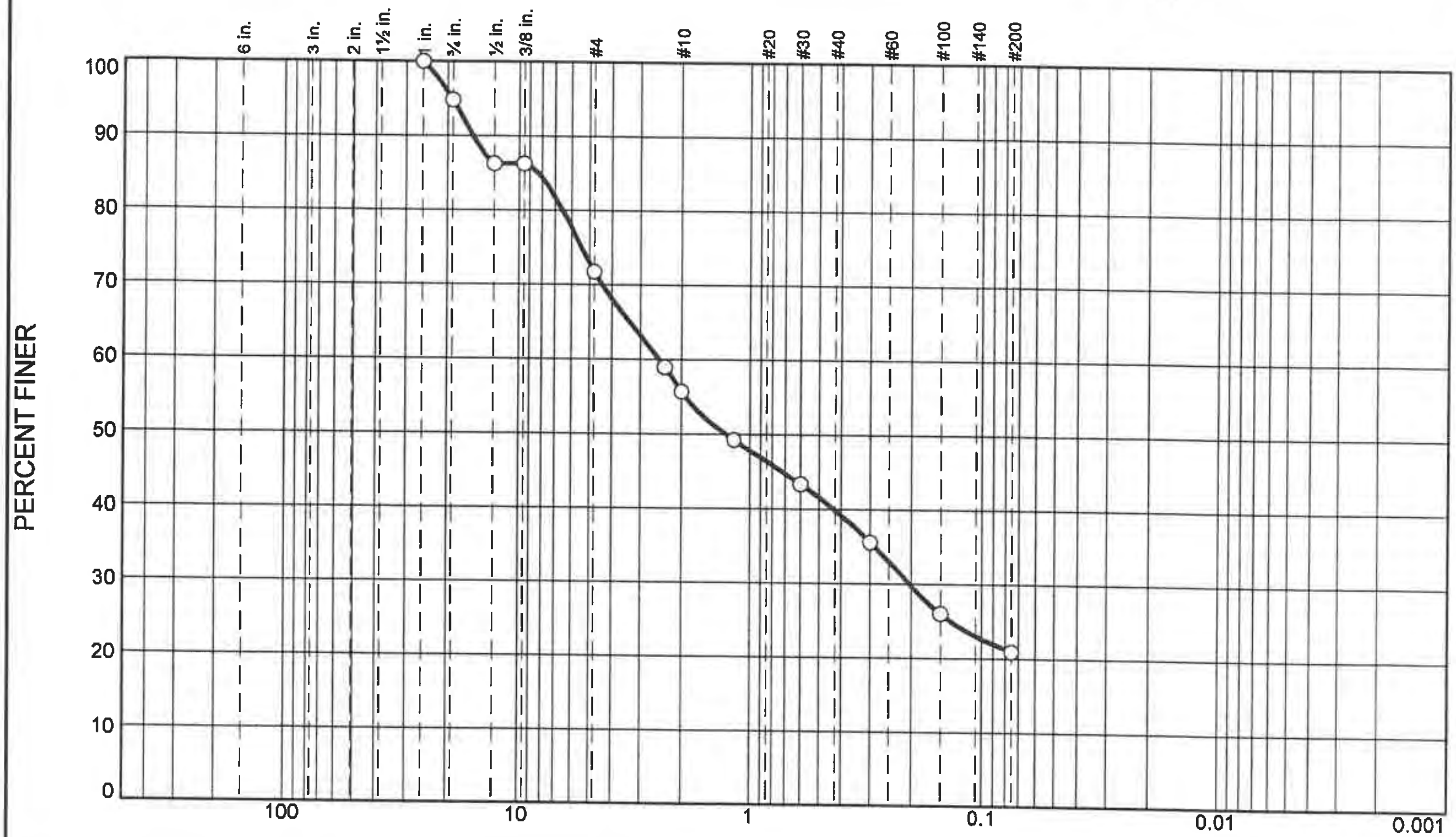
Location: B-7, S-2, 2'-4'
Sample Number: S-19 **Depth:** 2'-4' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure 19 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	23.1	16.0	15.8	19.0	20.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	94.8		
1/2	86.3		
3/8	86.3		
#4	71.7		
#8	59.0		
#10	55.7		
#16	49.2		
#30	43.4		
#50	35.6		
#100	26.0		
#200	20.9		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 15.6966 D_{85}= 8.2809 D_{60}= 2.4913
D_{50}= 1.2848 D_{30}= 0.2036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

In-Situ %MC=8.8
F.M.=3.34

Location: B-10, S-2, 2'-4'
Sample Number: S-20 **Depth:** 2'-4'

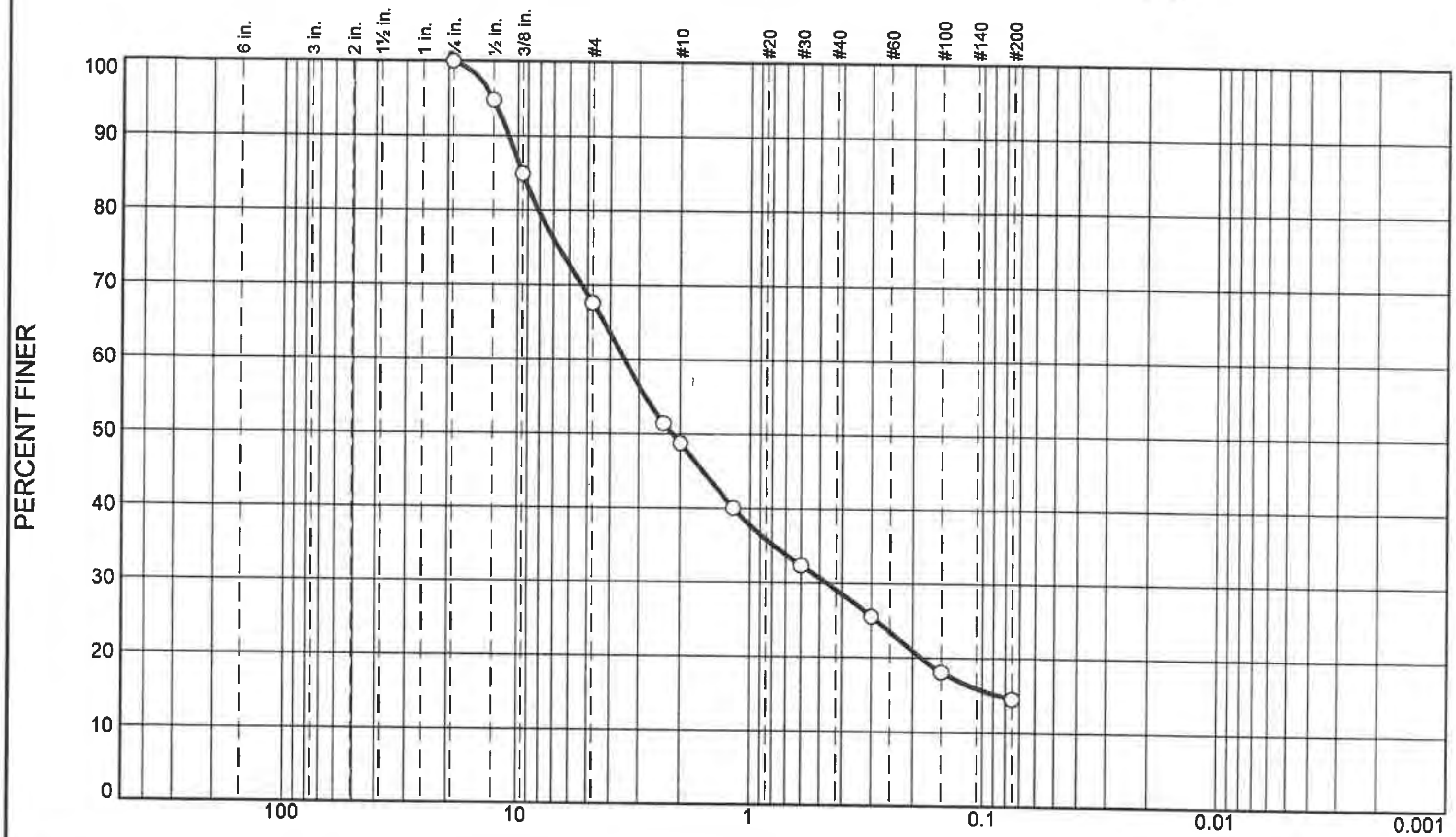
Date:

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure** 20 F 1

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	32.4	18.9	19.6	14.6	14.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	94.8		
3/8	84.9		
#4	67.6		
#8	51.4		
#10	48.7		
#16	40.0		
#30	32.4		
#50	25.5		
#100	18.1		
#200	14.5		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 10.9640 D_{85}= 9.5481 D_{60}= 3.4759
D_{50}= 2.1658 D_{30}= 0.4673 D_{15}= 0.0852
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-a

Remarks

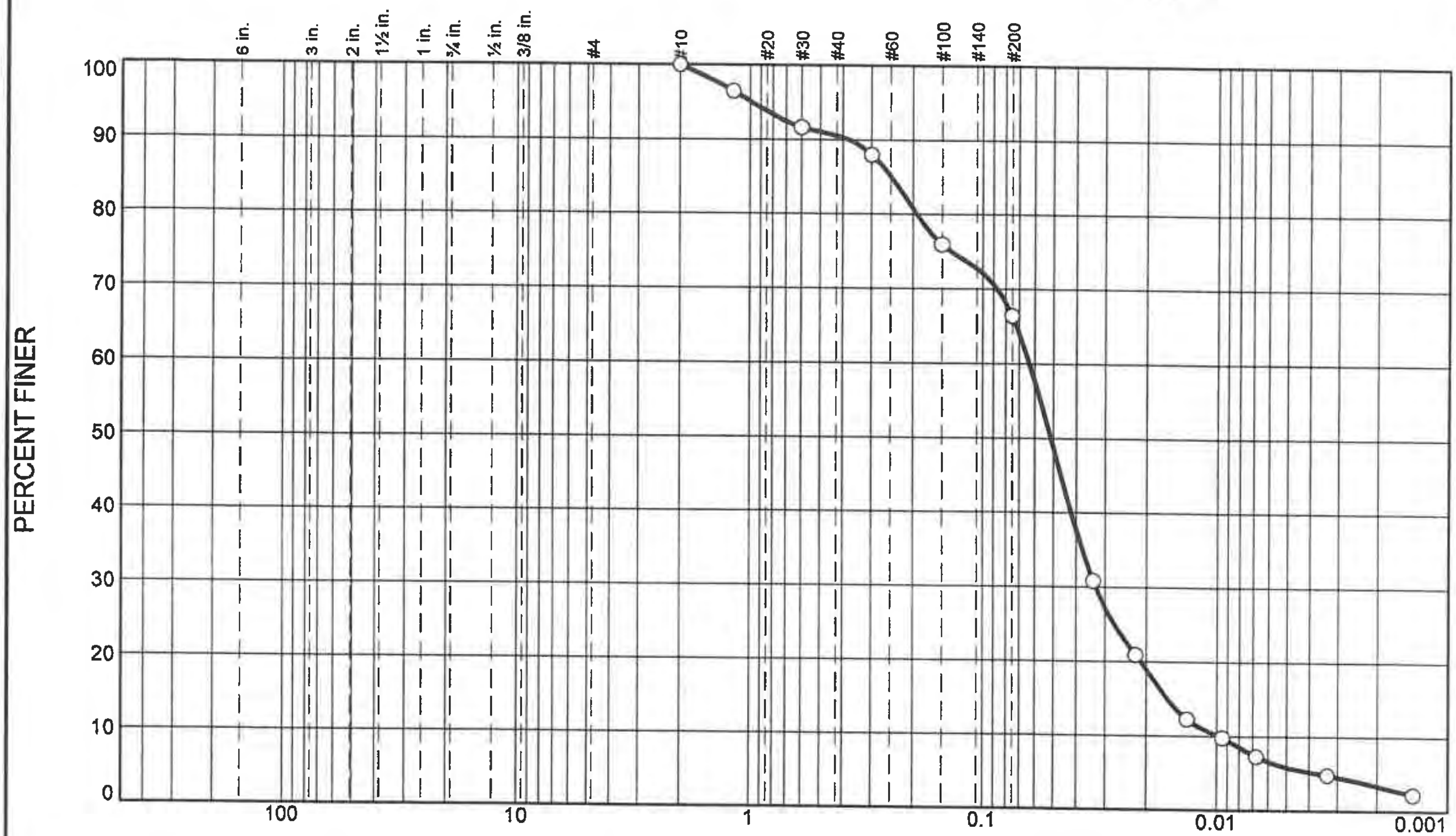
In-Situ %MC=8.4
F.M.=3.80

Location: B-18, S-3, 4'-6'
Sample Number: S-22 **Depth:** 4'-6'

Date:

ANS CONSULTANTS, INC. South Plainfield, New Jersey	**Client:** ANS GEO Inc. **Project:** CypressCreek-Ostrea Solar, Moxee, WA **Project No:** AOB-5632 **Figure** 22 F 1

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	9.4	24.2	60.5	5.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	96.5		
#30	91.6		
#50	88.0		
#100	75.9		
#200	66.4		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3759 D_{85}= 0.2485 D_{60}= 0.0633
D_{50}= 0.0513 D_{30}= 0.0330 D_{15}= 0.0161
D_{10}= 0.0098 C_u= 6.45 C_c= 1.75

Classification

USCS= ML AASHTO= A-4(0)

Remarks

In-Situ %MC=6.7
F.M.=0.48

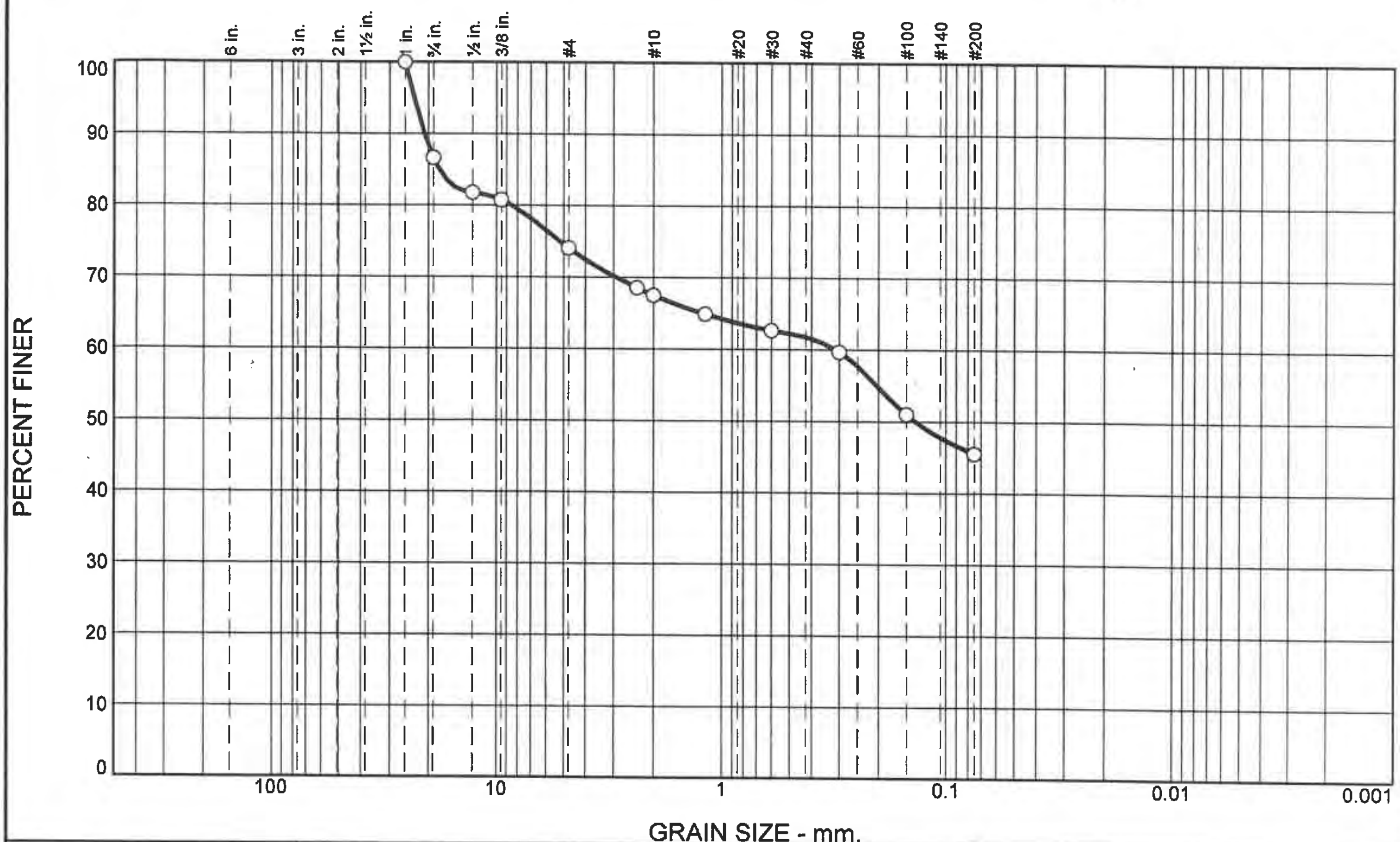
Location: B-20, S-1, 0'-2'
Sample Number: S-23 **Depth:** 0'-2' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure** 23 F 1

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.4	12.5	6.6	5.8	16.2	45.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	86.6		
1/2	81.8		
3/8	80.8		
#4	74.1		
#8	68.6		
#10	67.5		
#16	64.9		
#30	62.6		
#50	59.7		
#100	51.0		
#200	45.5		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 20.8195 D_{85}= 17.9775 D_{60}= 0.3119
D_{50}= 0.1364 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

In-Situ %MC=7.1
F.M.=2.52

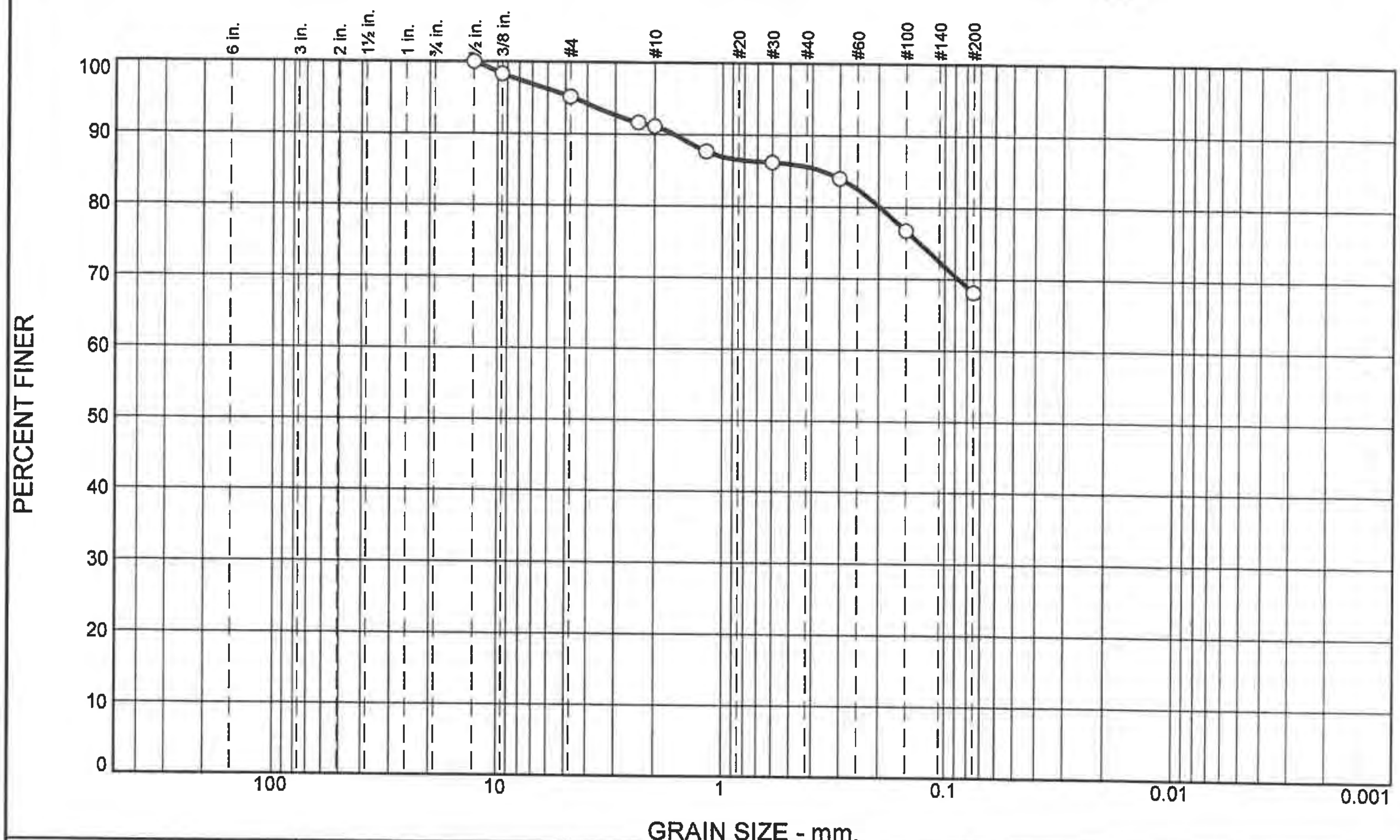
Location: B-21, S-2, 2'-4'
Sample Number: S-24 **Depth:** 2'-4' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure** 24 F 1

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	4.0	5.5	17.5	68.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	98.3		
#4	95.1		
#8	91.6		
#10	91.1		
#16	87.6		
#30	86.2		
#50	84.0		
#100	76.8		
#200	68.1		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.6396 D_{85}= 0.3594 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

IN-Situ %MC=5.8
F.M.=0.80

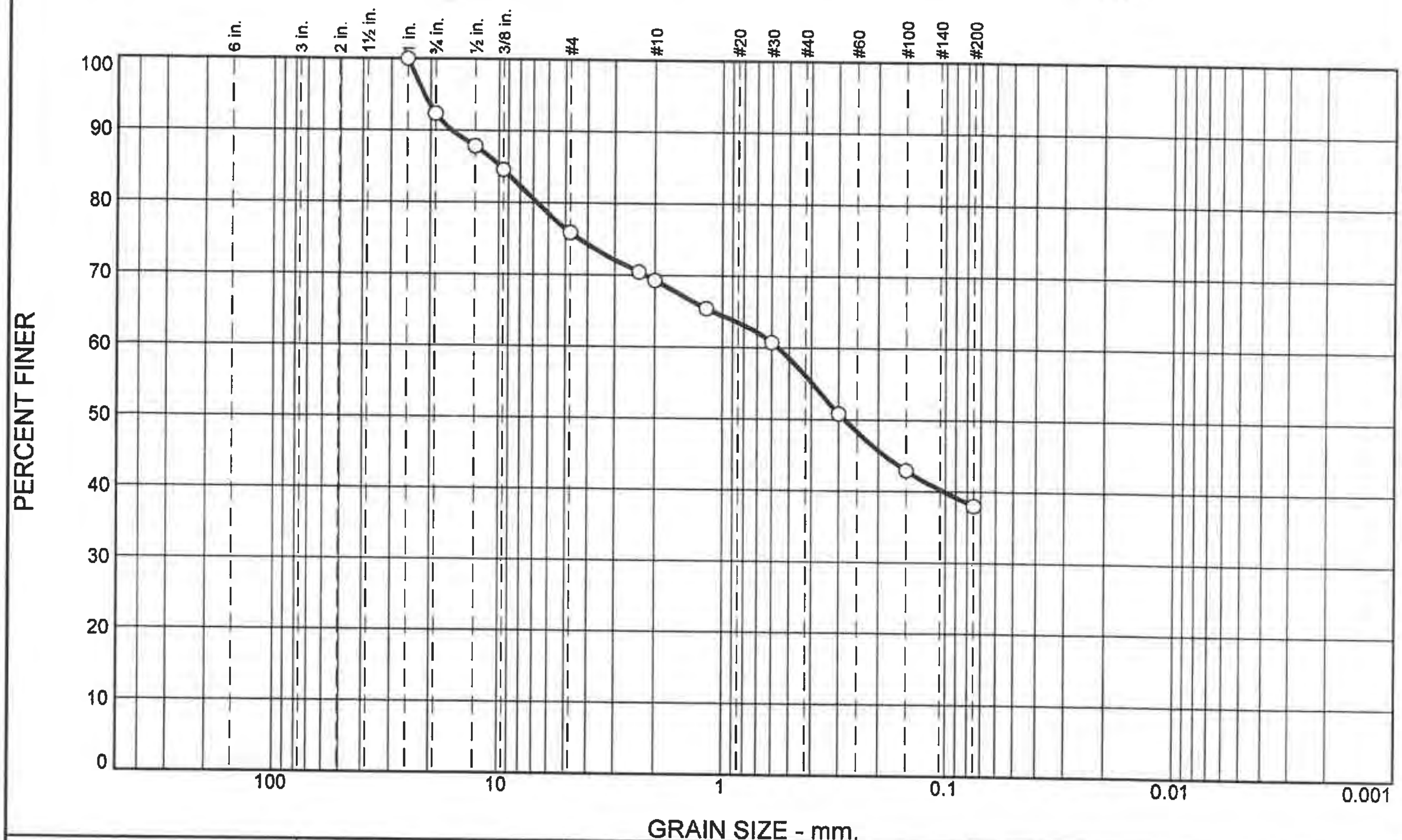
Location: B-24, S-1, 0'-2'
Sample Number: S-25 **Depth:** 0'-2' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure 25 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.7	16.4	6.6	13.2	18.1	38.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	92.3		
1/2	87.8		
3/8	84.6		
#4	75.9		
#8	70.5		
#10	69.3		
#16	65.4		
#30	60.7		
#50	50.8		
#100	42.9		
#200	38.0		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 16.2607 D_{85}= 9.8590 D_{60}= 0.5623
D_{50}= 0.2834 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

In-Situ %MC=5.6
F.M.=2.57

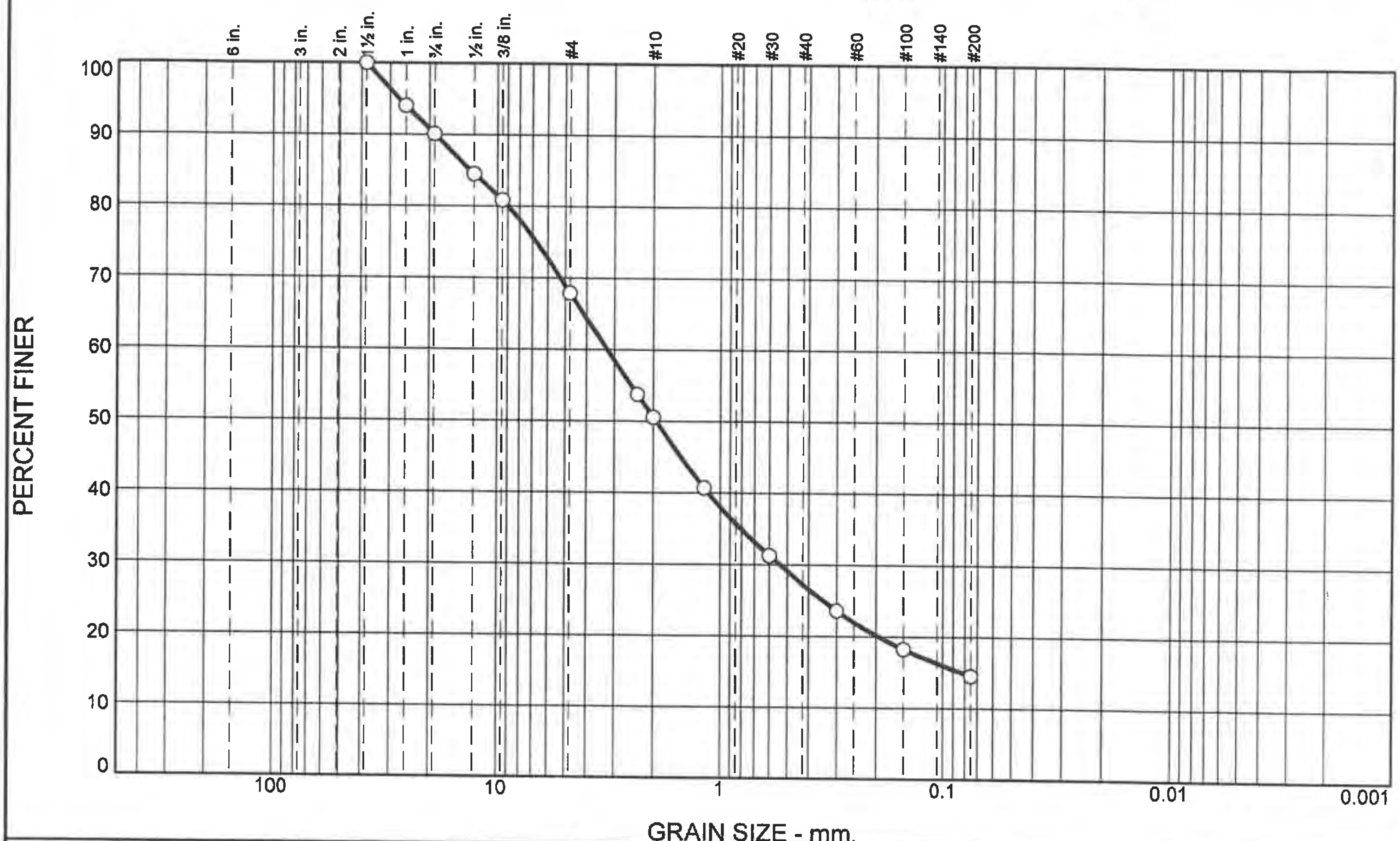
Location: B-26, S-2, 2'-4'
Sample Number: S-26 **Depth:** 2'-4' **Date:**

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure** 26 F 1

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.9	22.2	17.3	23.4	12.7	14.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.0		
3/4	90.1		
1/2	84.5		
3/8	80.9		
#4	67.9		
#8	53.7		
#10	50.6		
#16	40.7		
#30	31.3		
#50	23.6		
#100	18.3		
#200	14.5		

* (no specification provided)

Material Description

Grayish brown in color. silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 18.9057 D_{85}= 13.1761 D_{60}= 3.2362
D_{50}= 1.9415 D_{30}= 0.5384 D_{15}= 0.0822
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

In-Situ %MC=5.5
F.M.=3.93

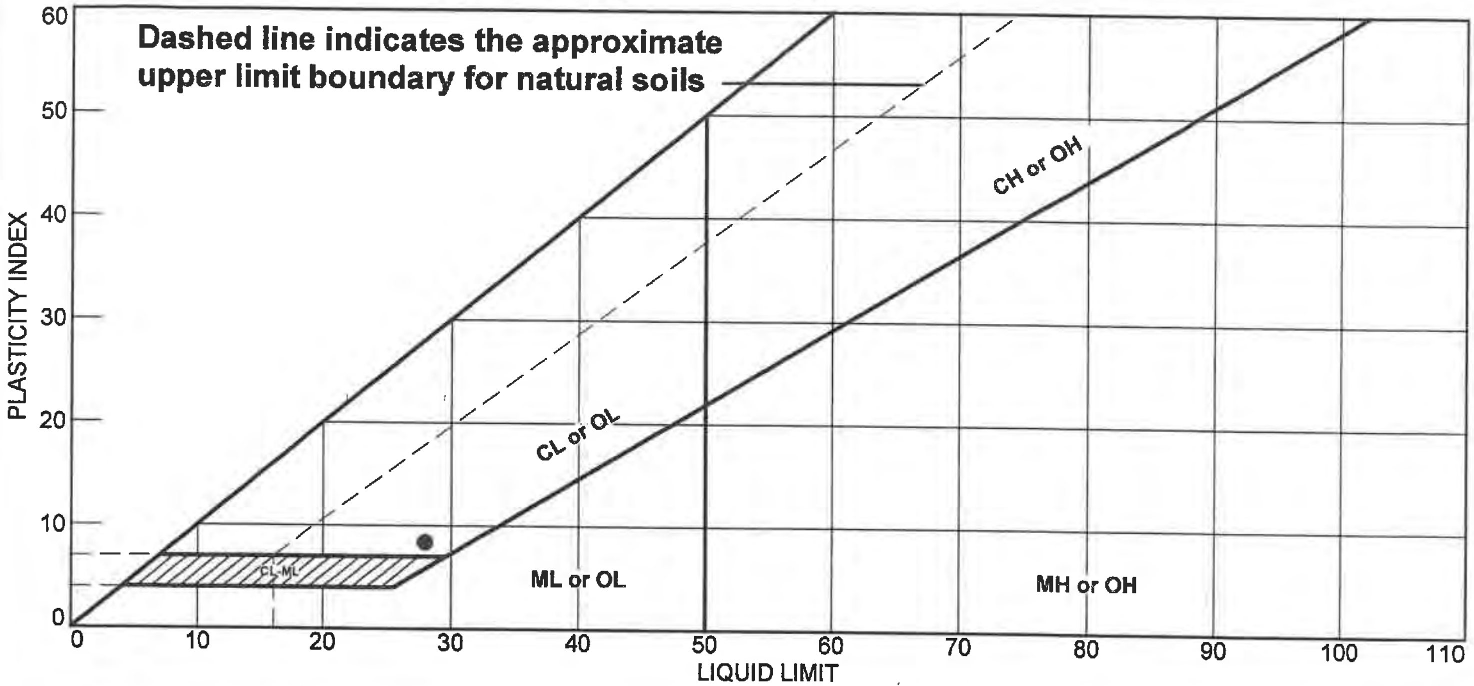
Location: B-SS-1, S-2, 2'-4'
Sample Number: S-17 **Depth:** 2'-4' **Date:**

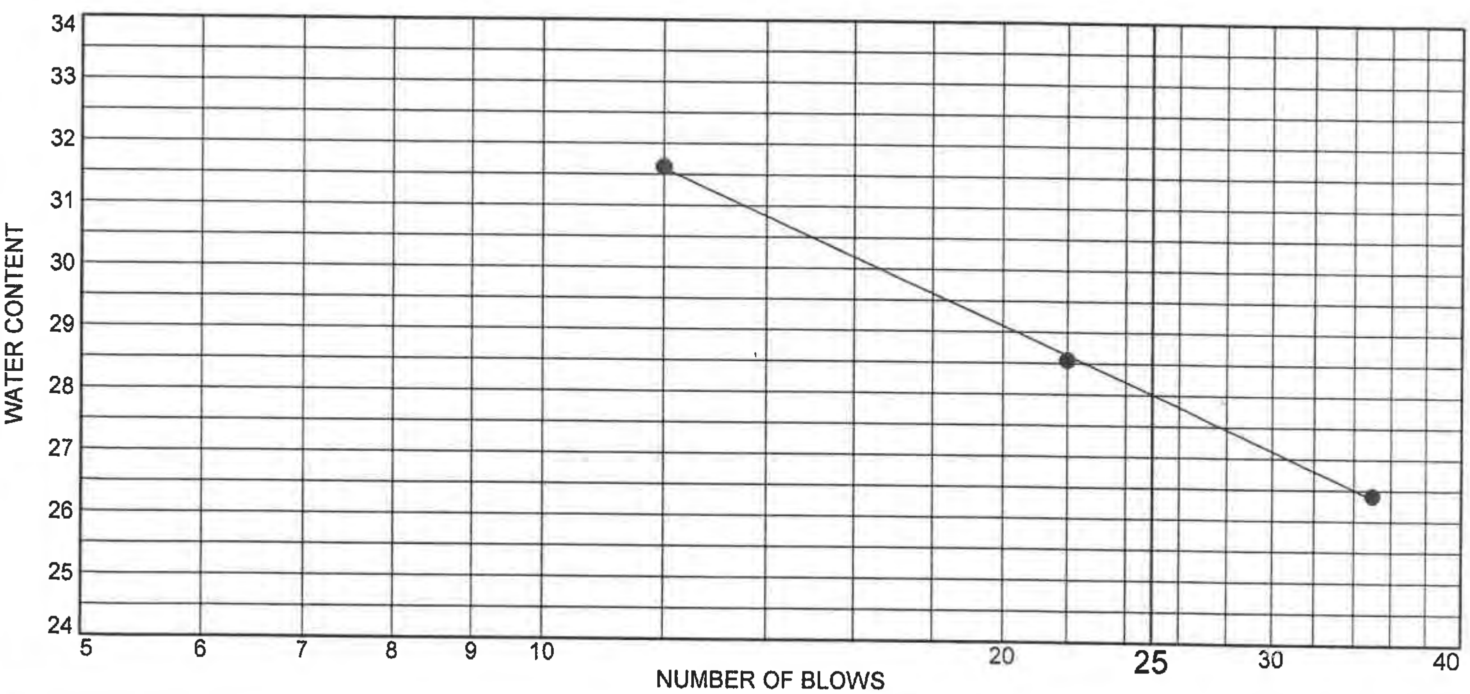
ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA
Project No: AOB-5632 **Figure** 17 F 1

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		28.0	19.6	8.4			

Project No. AOB-5632 **Client:** ANS GEO Inc.

Project: CypressCreek-Ostrea Solar, Moxee, WA

Location: B-13, S-2, 2'-4'
Sample Number: S-21 **Depth:** 2'-4'

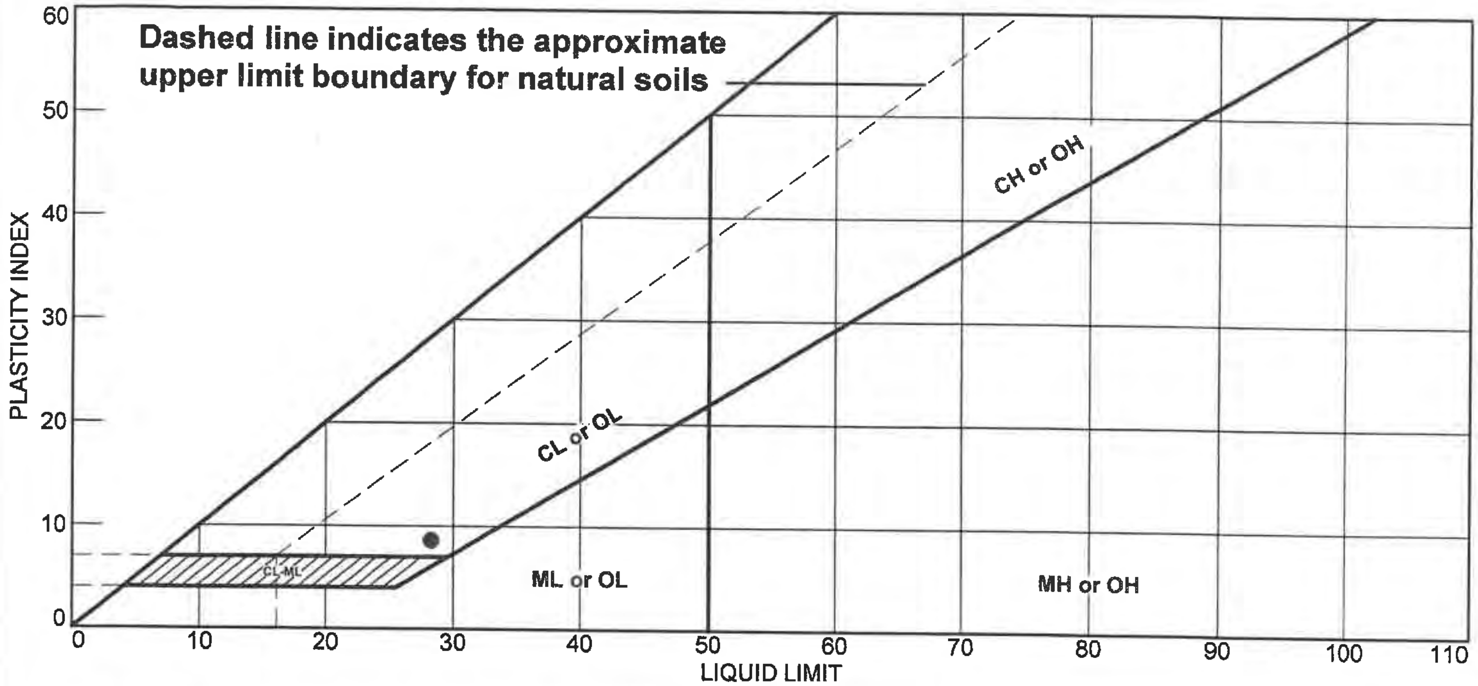
ANS CONSULTANTS, INC.

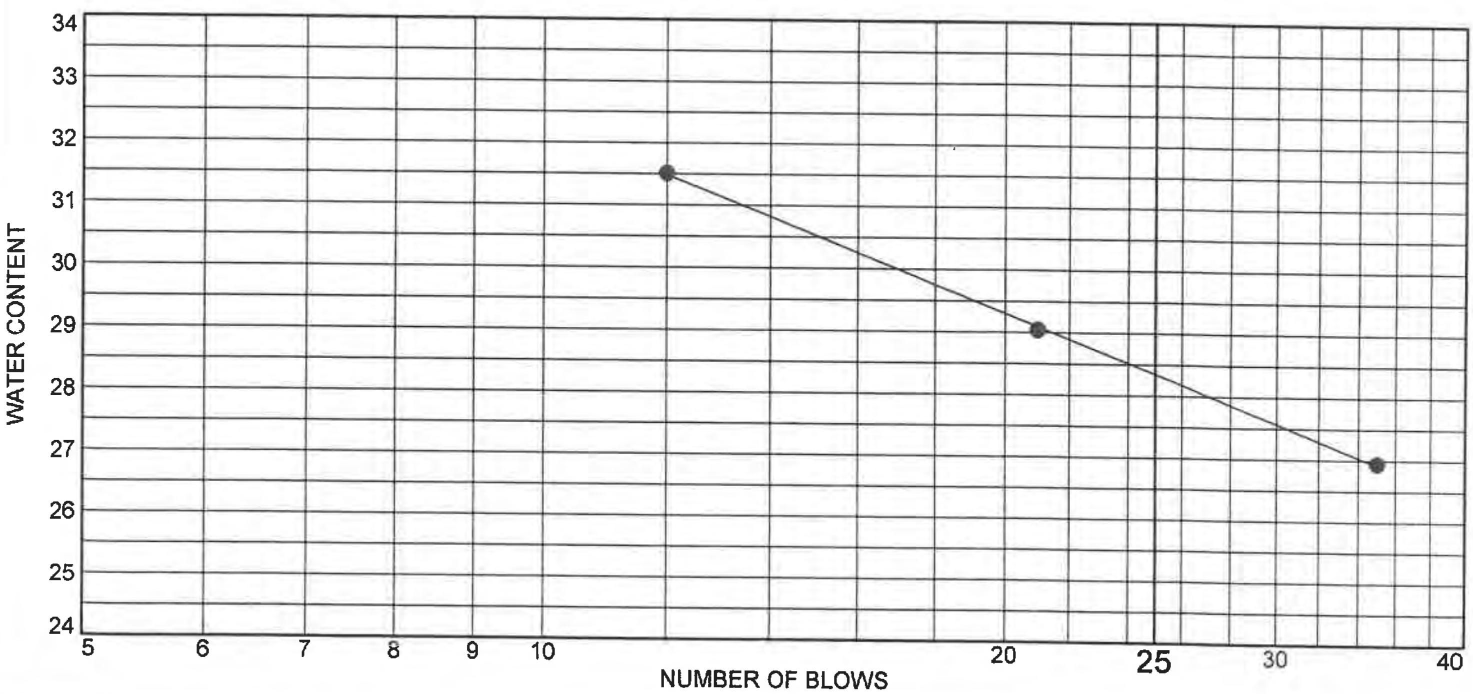
South Plainfield, New Jersey

Remarks:
● In-Situ %MC=4.8

Figure 21 F 3

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		28.3	19.7	8.6			

Project No. AOB-5632 **Client:** ANS GEO Inc.

Project: CypressCreek-Ostrea Solar, Moxee, WA

Location: B-27, S-1, 0'-2'
Sample Number: S-27 **Depth:** 0'-2'

Remarks:
● In-Situ %Mc=6.1

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Figure 27 F 3

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CERTIFICATE OF TEST ANALYSIS

CLIENT : ANS GEO Inc.
4405 South Clinton Avenue
South Plainfield, NJ 07080

DATE : 12/21/2020

FILE NO.: AOB-5632

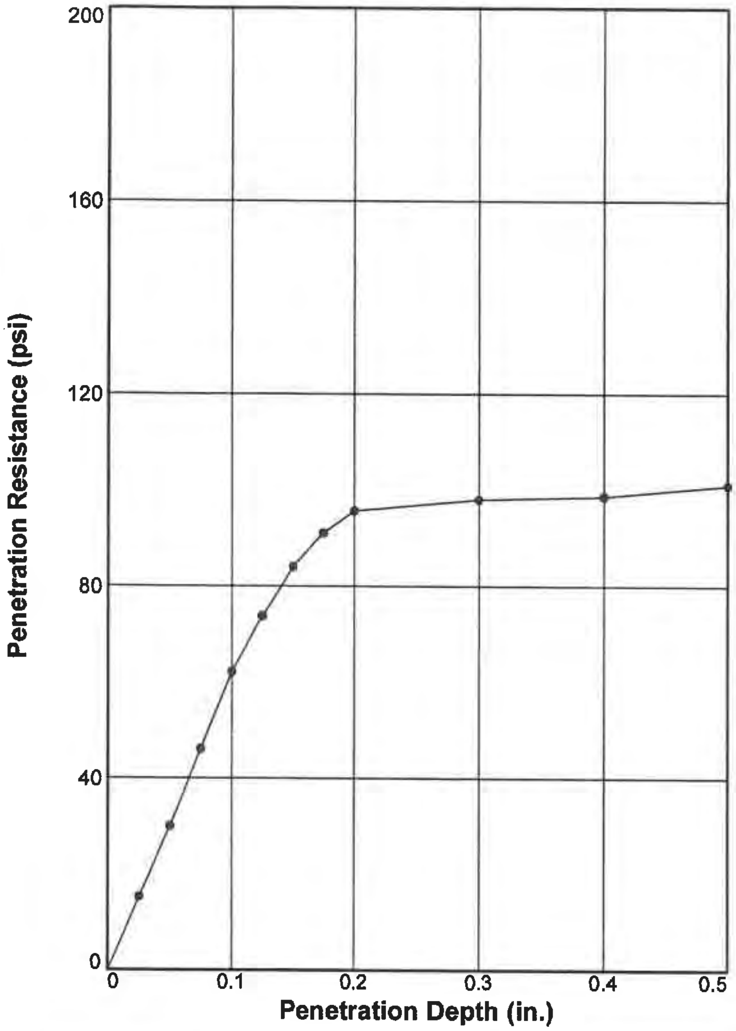
PROJECT : Cypress Creek
Ostrea Solar
Moxee, WA

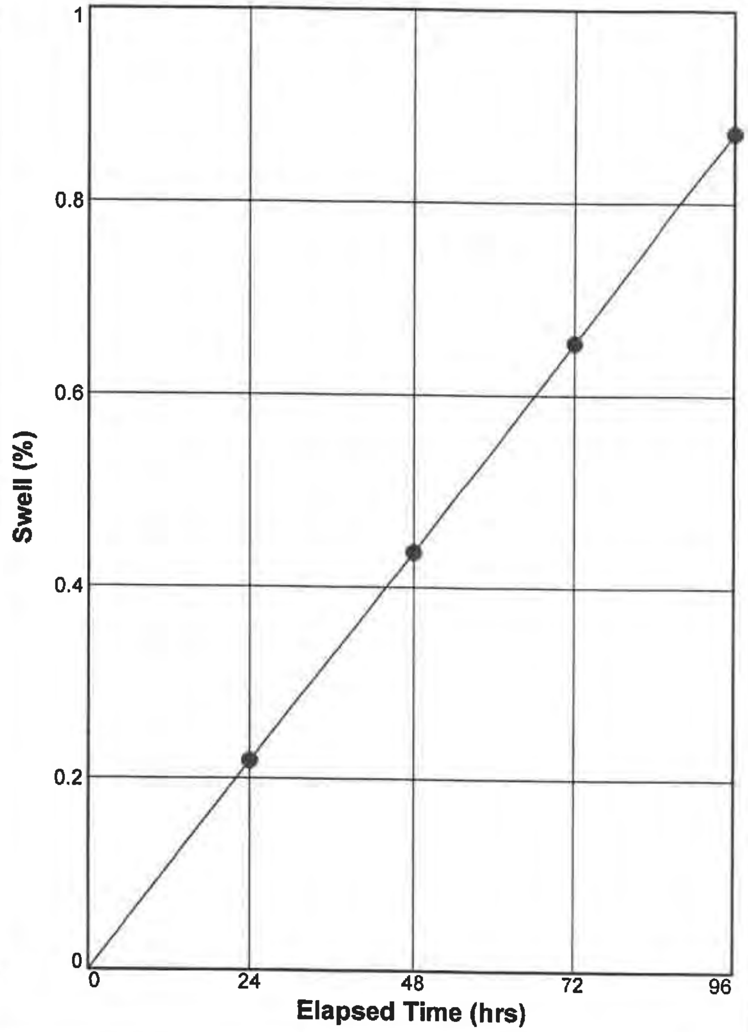
REPORT NO. : S, 6-9,12-27

TEST PERFORMED : Standard Test Method for Moisture Content as per **ASTM-D 2216**

Report No.	Sample ID	Moisture Content %
S - 6	TP-1, Bulk, 1'-2.5'	7.6
S - 7	TP-19, bulk, 05'-2.5'	5.8
S - 9	TP-25, Bulk, 1'-2'	7.9
S - 12	B-1, Bag, 1'-3'	4.4
S - 13	B-7, Bag, 1'-3'	4.7
S -14	B-10, Bag 1'-3'	3.1
S - 15	B-13, Bag, 1'-3'	7.0
S -16	B-16, Bulk, 1'-3'	5.3
S -17	B-SS-01,S-2, Bag, 2'-4'	5.5
S - 18	B-1,S-3 Bag, 1-'3'	6.5
S - 19	B-7, S-2,, 0'-2', bag	2.9
S -20	B-10, S-2, 2'-4', bag	8.8
S -21	B-13, S-2, 2'-4', bag	4.8
S - 22	B-18, S-3, 4'- 5', bag	8.4
S - 23	B-20, S-1, 0'-2'bag	6.7
S - 24	B-21, S-2, 2'-4' bag	7.1
S -25	B-24, S-1, 0'-2', bag	5.8
S - 26	B-26, S-2, 2'-4', bag	5.6
S - 27	B-27, S-1, 0'-2', bag	6.1

BEARING RATIO TEST REPORT
ASTM D 1883-07





	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	87.6	85.5	19.1	86.8	84.8	24.0	6.2	6.4	0.000	10	0.9
2 △											
3 □											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
		102.4	19.1		

Project No: AOB-5632

Project: CypressCreek-Ostrea Solar, Moxee, WA

Location: TP-09, Bulk, 1'-2.5'

Sample Number: S-3 **Depth:** 1'-2.5'

Date:

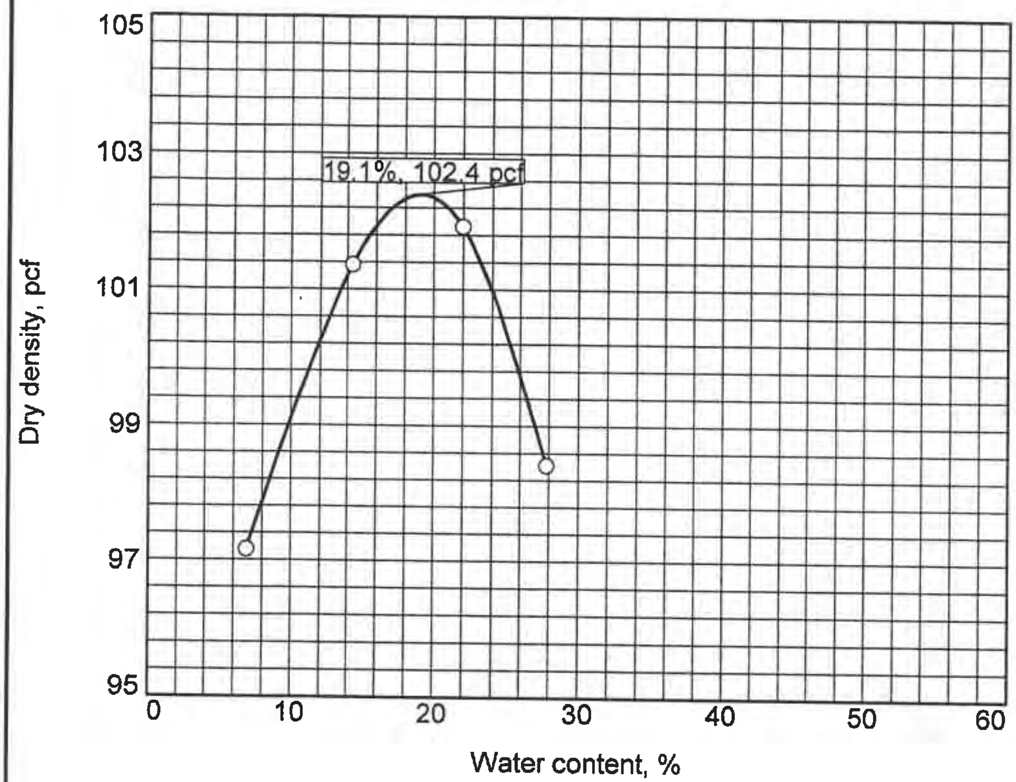
BEARING RATIO TEST REPORT

ANS CONSULTANTS, INC.

Test Description/Remarks:

Figure 3 F 4

COMPACTION TEST REPORT



Curve No.
S-3

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ______
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ______ **LL** ______ **PI** ______
Sp.G. (ASTM D 854) ______
%>3/4 in. ______ **%<No.200** ______
USCS ______ **AASHTO** ______
Date Sampled ______
Date Tested ______
Tested By ______

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.54	22.44	23.07	23.18		
WM	13.75	13.75	13.75	13.75		
WW + T #1	708.6	655.1	877.4	872.9		
WD + T #1	662.8	572.8	719.3	682.9		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.9	14.4	22.0	27.8		
DRY DENSITY	97.2	101.4	101.9	98.4		

TEST RESULTS

Maximum dry density = 102.4 pcf

Optimum moisture = 19.1 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-09, Bulk, 1'-2.5' **Depth:** 1'-2.5' **Sample Number:** S-3

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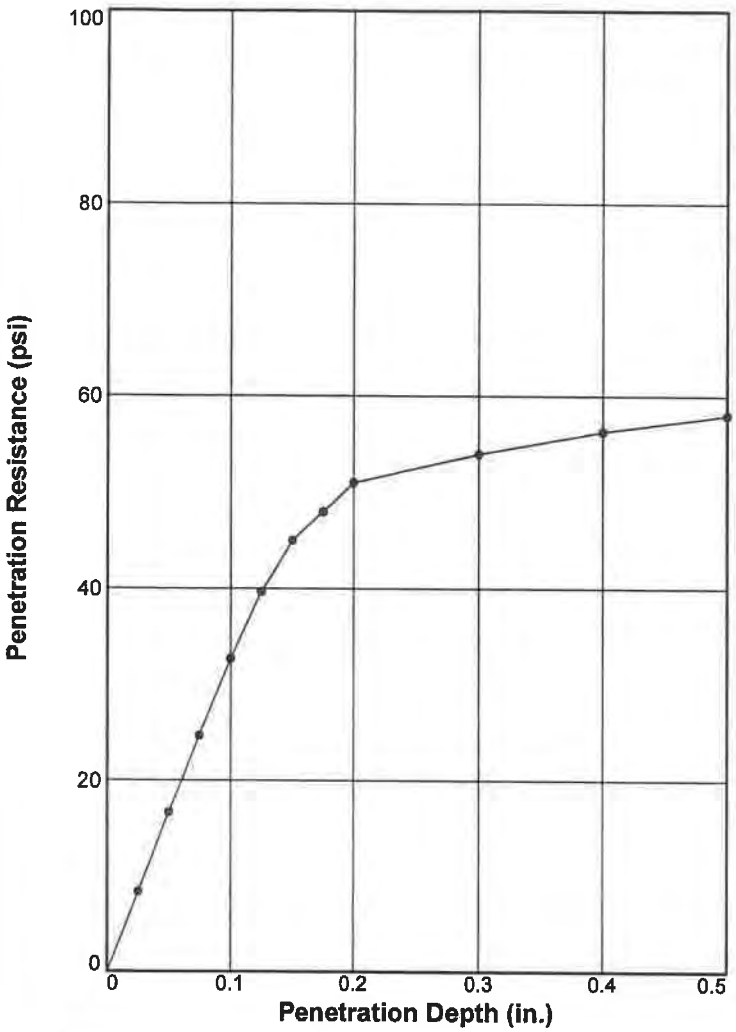
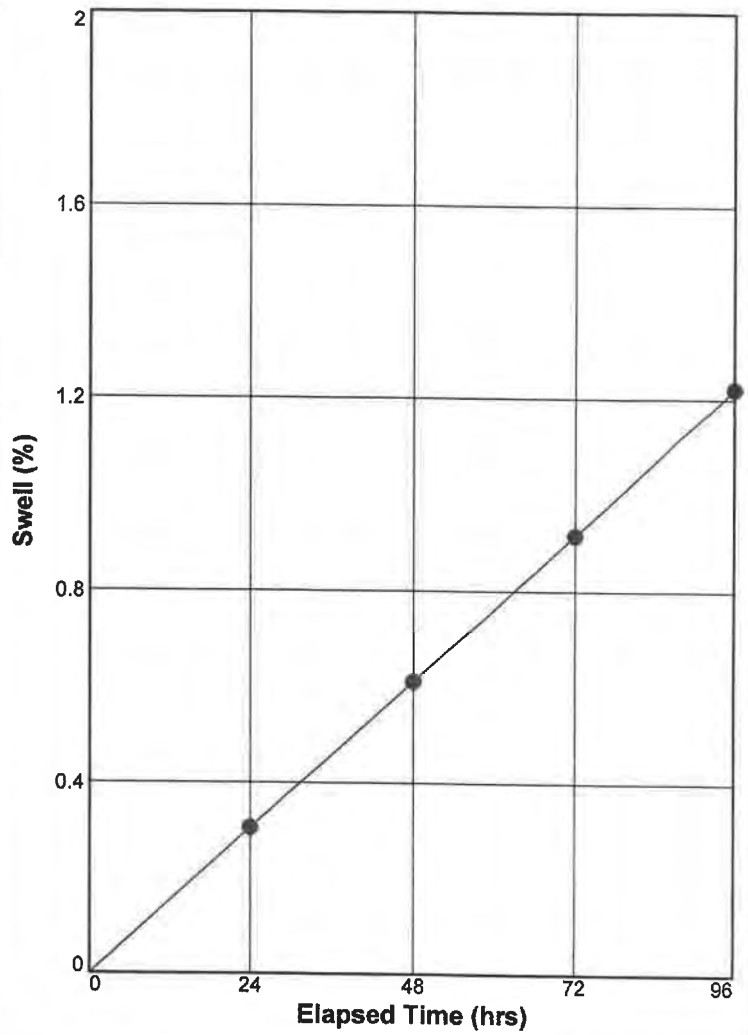
Figure 3 F 2

BEARING RATIO TEST REPORT
ASTM D 1883-07





	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	89.8	85.3	15.4	88.7	84.3	23.9	3.3	3.4	0.000	10	1.2
2 △											
3 □											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
		105.3	15.4		

Project No: AOB-5632

Project: CypressCreek-Ostrea Solar, Moxee, WA

Location: B-23, Bulk, 1'-3'

Sample Number: S-8 **Depth:** 1'-3'

Date:

Test Description/Remarks:

BEARING RATIO TEST REPORT

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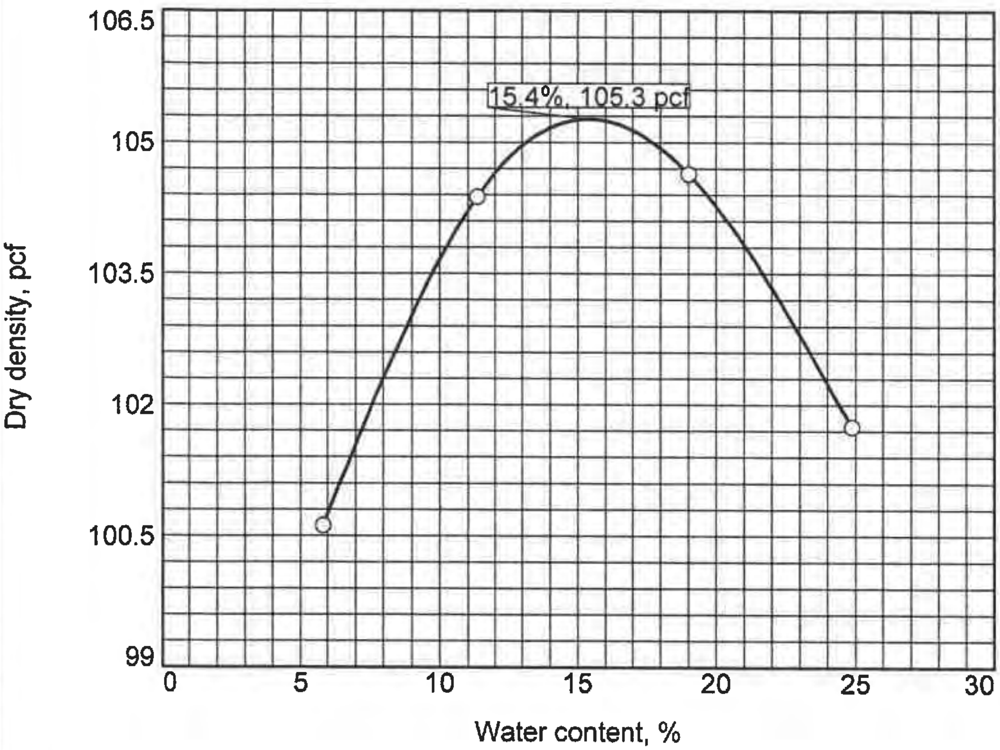
Figure 8 F 4

COMPACTION TEST REPORT

Curve No.
S-8



Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ____
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ____ **LL** ____ **PI** ____
Sp.G. (ASTM D 854) ____
%>3/4 in. ____ **%<No.200** ____
USCS ____ **AASHTO** ____
Date Sampled ____
Date Tested ____
Tested By ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.73	22.46	23.09	23.28		
WM	13.75	13.75	13.75	13.75		
WW + T #1	705.5	582.2	852.9	792.3		
WD + T #1	666.6	522.9	716.6	634.5		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	5.8	11.3	19.0	24.9		
DRY DENSITY	100.6	104.4	104.6	101.7		

TEST RESULTS

Maximum dry density = 105.3 pcf

Optimum moisture = 15.4 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** B-23, Bulk, 1'-3' **Depth:** 1'-3' **Sample Number:** S-8

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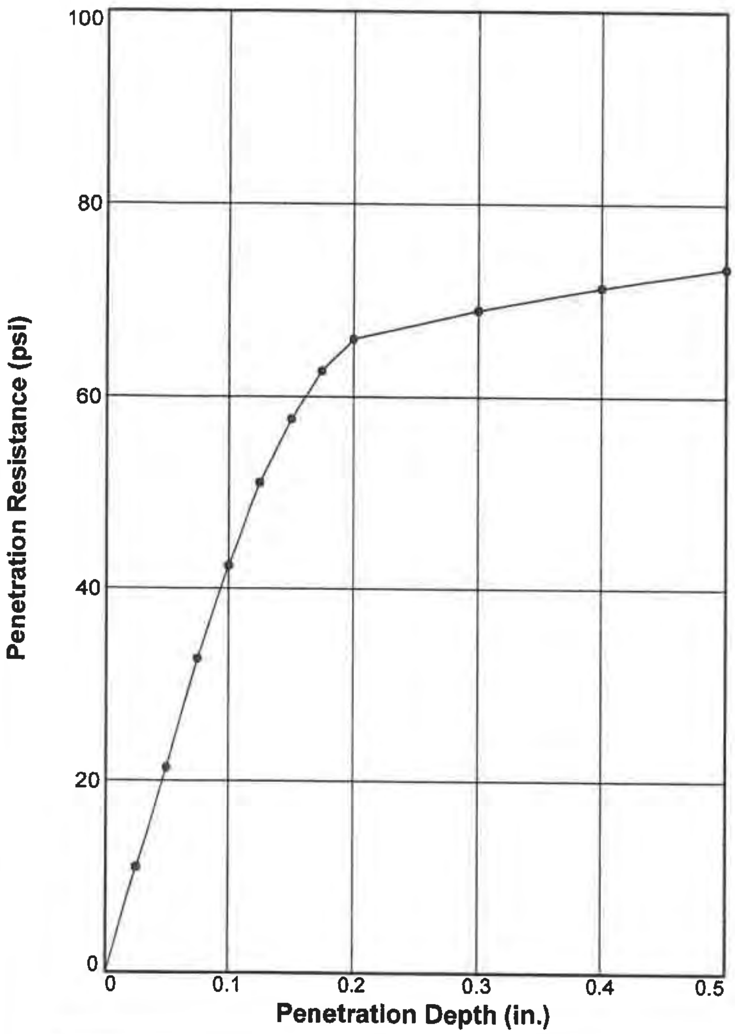
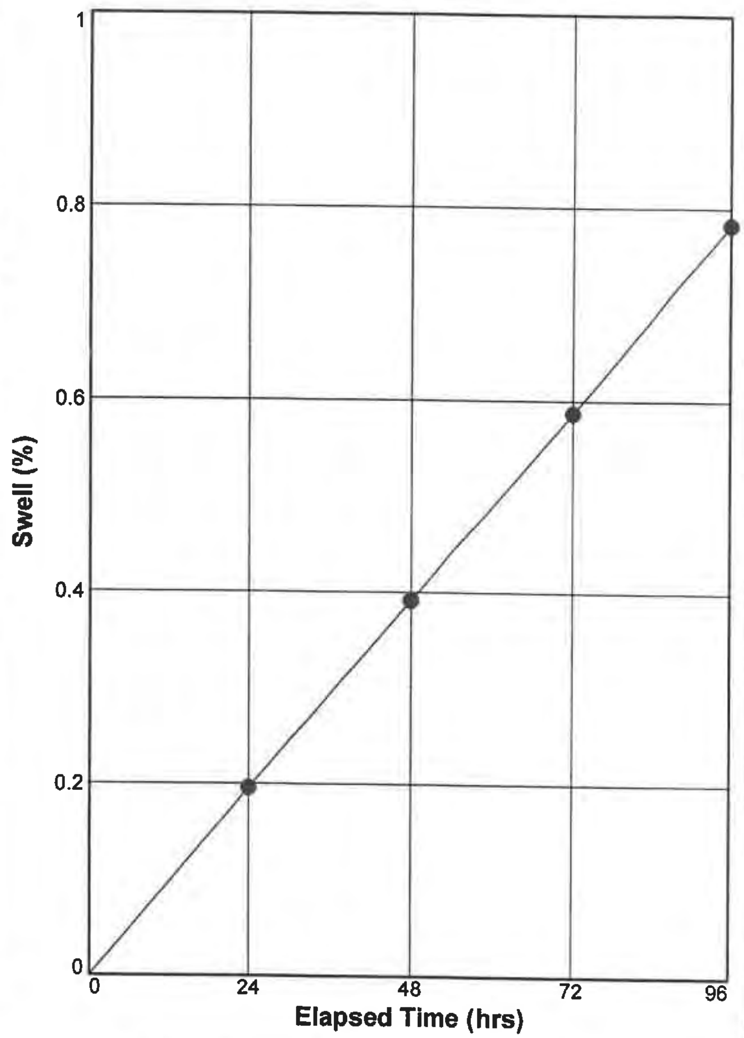
Figure 8 F 2

BEARING RATIO TEST REPORT
ASTM D 1883-07





	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	89.4	85.7	15.4	88.7	85.1	23.4	4.2	4.4	0.000	10	0.8
2 △											
3 □											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
		104.3	15.4		

Project No: AOB-5632

Project: CypressCreek-Ostrea Solar, Moxee, WA

Location: B-SS-01, Bulk, 1'-4'

Sample Number: S-11 **Depth:** 1'-4'

Date:

Test Description/Remarks:

BEARING RATIO TEST REPORT

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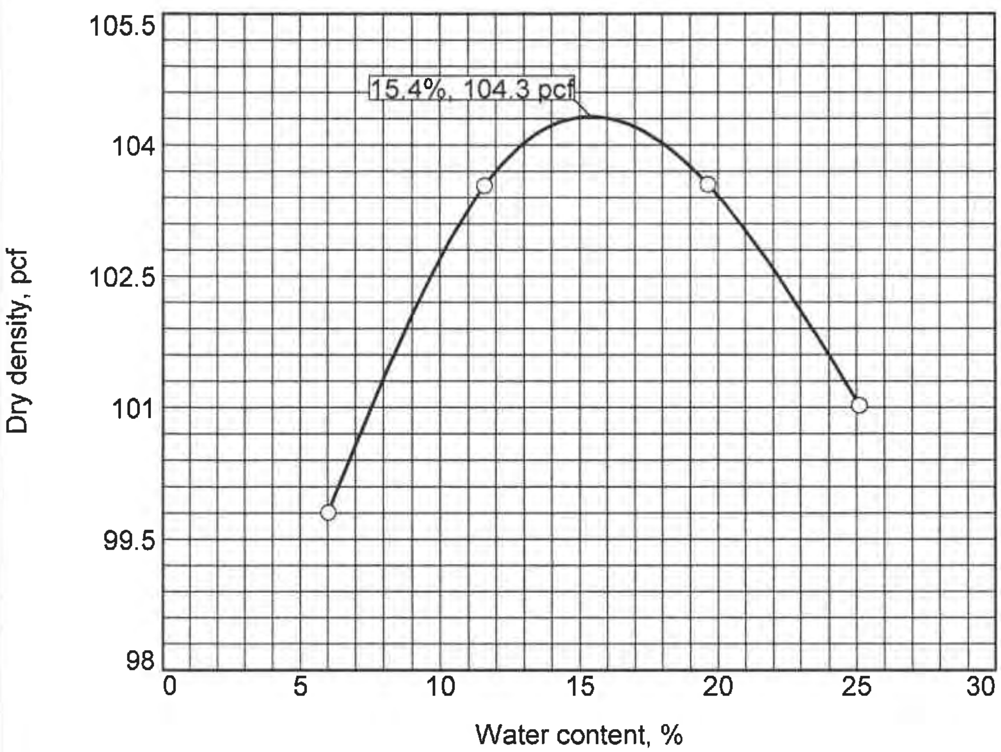
Figure 11 F 4

COMPACTION TEST REPORT



Curve No.
S-11

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ______
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ______ **LL** ______ **PI** ______
Sp.G. (ASTM D 854) ______
%>3/4 in. ______ **%<No.200** ______
USCS ______ **AASHTO** ______
Date Sampled ______
Date Tested ______
Tested By ______

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.68	22.41	23.04	23.23		
WM	13.75	13.75	13.75	13.75		
WW + T #1	705.5	582.2	855.9	792.3		
WD + T #1	665.4	521.7	715.4	633.3		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.0	11.6	19.6	25.1		
DRY DENSITY	99.8	103.5	103.5	101.0		

TEST RESULTS

Maximum dry density = 104.3 pcf

Optimum moisture = 15.4 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** B-SS-01, Bulk, 1'-4' **Depth:** 1'-4' **Sample Number:** S-11

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Figure 11 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

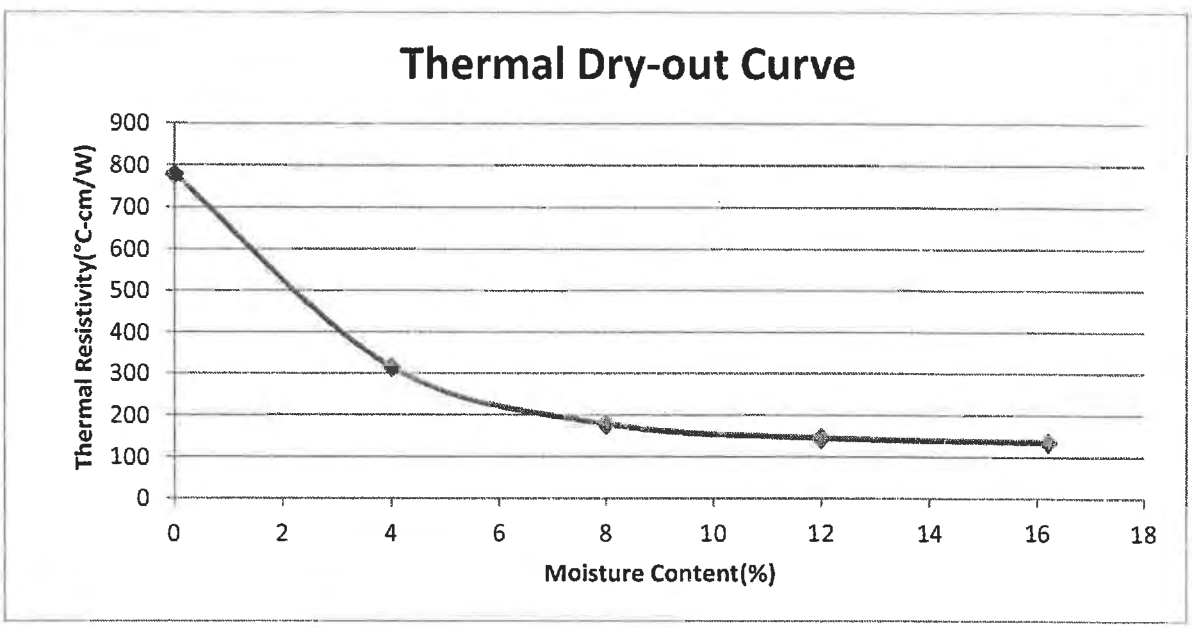
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-1

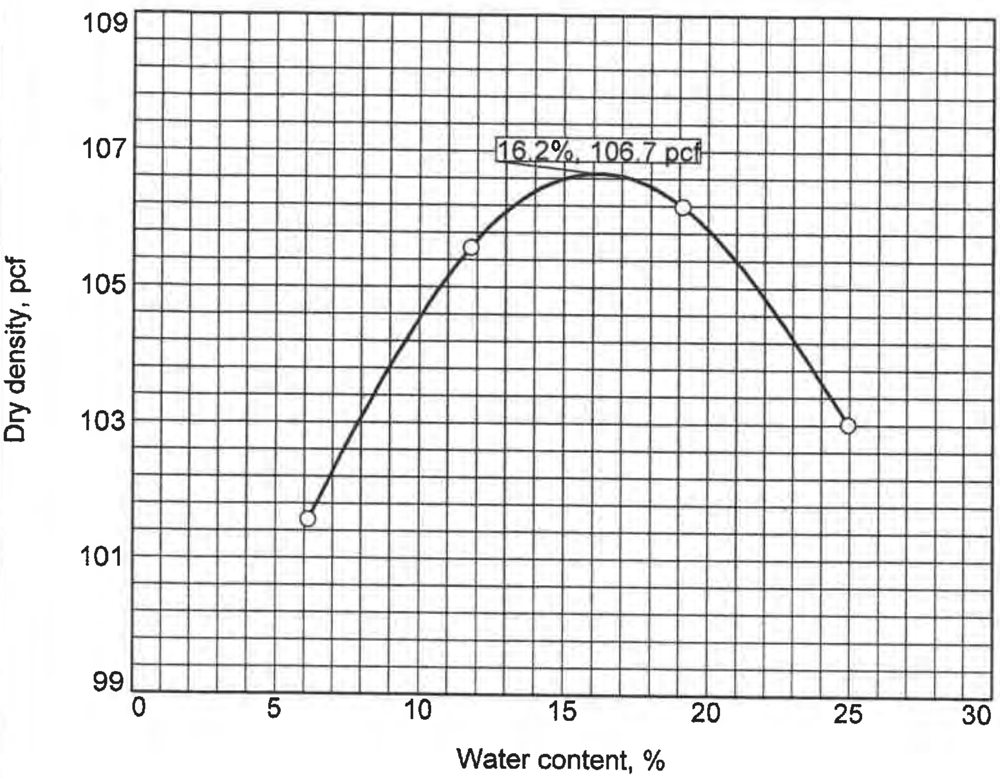
Test Data- Sample No. S-1 (TP-02, Bulk, 1'-2')

Standard Proctor Value: 106.7
Remolded Dry Density: 90.695 (85%)
Optimum Moisture Content: 16.2%
In-Situ Moisture Content: 3.9%

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	26.2	779
4	25.8	315
8	25.3	178
12	24.9	145
16.2	24.8	135



COMPACTION TEST REPORT



Curve No.
S-1

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ______
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ____ **LL** ____ **PI** ____
Sp.G. (ASTM D 854) ____
%>3/4 in. ____ **%<No.200** ____
USCS ____ **AASHTO** ____
Date Sampled ____
Date Tested ____
Tested By ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.83	22.60	23.23	23.40		
WM	13.75	13.75	13.75	13.75		
WW + T #1	819.1	628.0	736.8	868.1		
WD + T #1	771.7	561.8	618.6	694.8		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.1	11.8	19.1	24.9		
DRY DENSITY	101.6	105.6	106.2	103.0		

TEST RESULTS

Maximum dry density = 106.7 pcf

Optimum moisture = 16.2 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-02, Bulk, 1'-2' **Depth:** 1'-2' **Sample Number:** S-1

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Figure 1 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

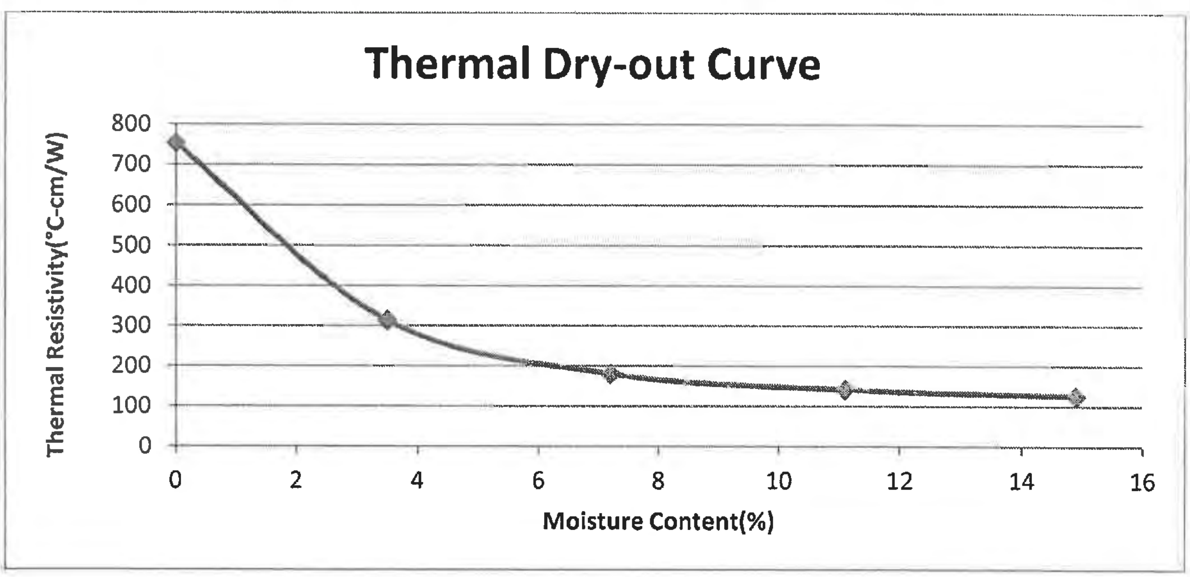
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-2

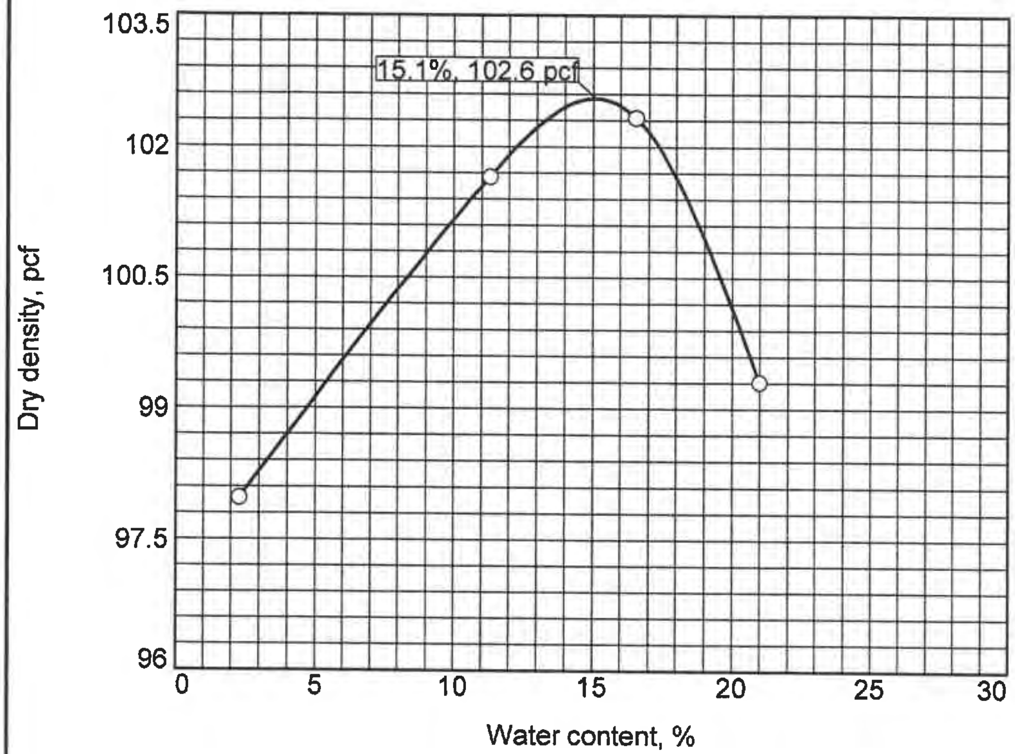
Test Data- Sample No. S-2 (TP-05, Bulk, 1'-2')

Standard Proctor Value: 102.6
Remolded Dry Density: 87.21 (85%)
Optimum Moisture Content: 14.9%
In-Situ Moisture Content: 4.1%

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	24.3	754
3.5	24	314
7.2	23.9	181
11.1	23.7	142
14.9	23.6	126



COMPACTION TEST REPORT



Curve No.
S-2

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ____________
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ______ **LL** ______ **PI** ______
Sp.G. (ASTM D 854) ______
%>3/4 in. ______ **%<No.200** ______
USCS ______ **AASHTO** ______
Date Sampled ______
Date Tested ______
Tested By ______

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.26	22.23	22.69	22.76		
WM	13.75	13.75	13.75	13.75		
WW + T #1	693.6	918.5	869.6	763.8		
WD + T #1	678.0	825.2	746.1	631.3		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	2.3	11.3	16.6	21.0		
DRY DENSITY	98.0	101.7	102.3	99.3		

TEST RESULTS

Maximum dry density = 102.6 pcf

Optimum moisture = 15.1 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-05, Bulk, 1'-2' **Depth:** 1'-2' **Sample Number:** S-2

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Figure 2 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

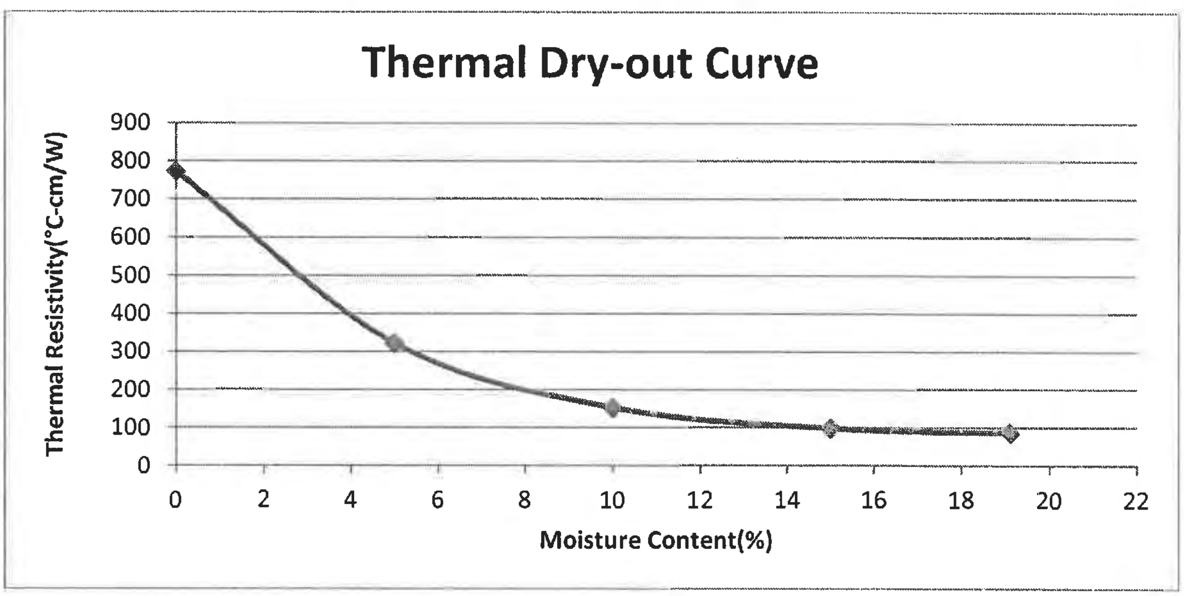
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-3

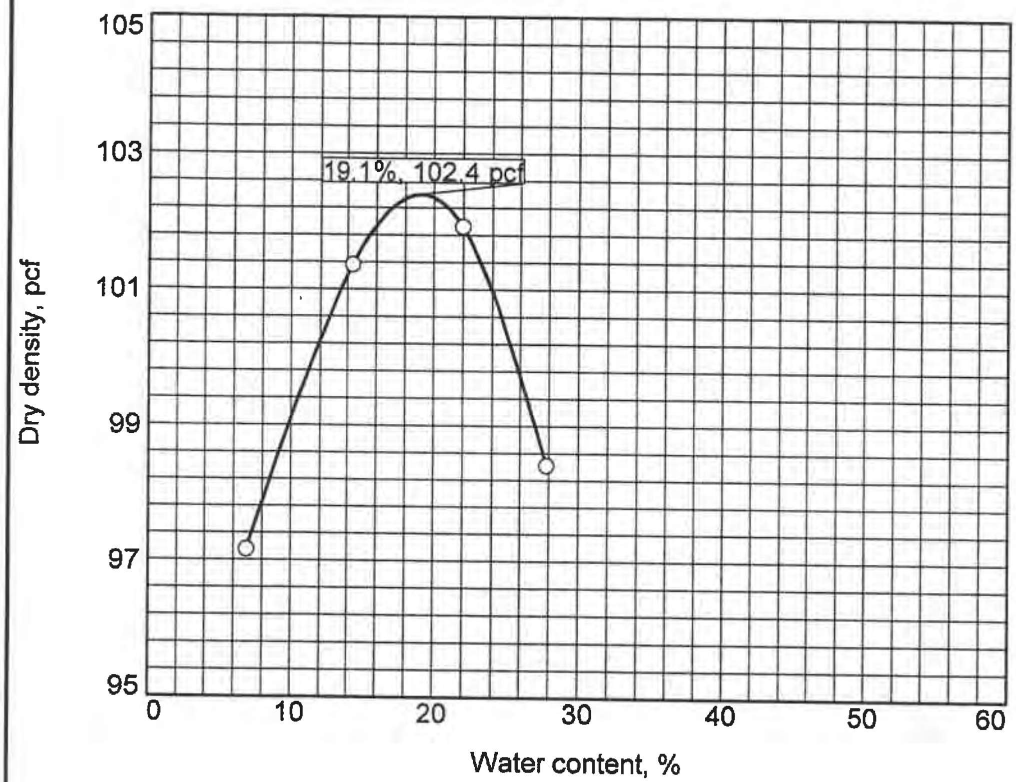
Test Data- Sample No. S-3 (TP-09, Bulk, 1'-2.5')

Standard Proctor Value: 102.4
Remolded Dry Density: 87.04 (85%)
Optimum Moisture Content: 19.1%
In-Situ Moisture Content: 6.17%

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	26.3	773
5	26	322
10	25.7	152
15	25.3	98
19.1	25.1	86



COMPACTION TEST REPORT



Curve No.
S-3

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM **LL** **PI**
Sp.G. (ASTM D 854)
%>3/4 in. **%<No.200**
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.54	22.44	23.07	23.18		
WM	13.75	13.75	13.75	13.75		
WW + T #1	708.6	655.1	877.4	872.9		
WD + T #1	662.8	572.8	719.3	682.9		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.9	14.4	22.0	27.8		
DRY DENSITY	97.2	101.4	101.9	98.4		

TEST RESULTS

Maximum dry density = 102.4 pcf

Optimum moisture = 19.1 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-09, Bulk, 1'-2.5' **Depth:** 1'-2.5' **Sample Number:** S-3

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Figure 3 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

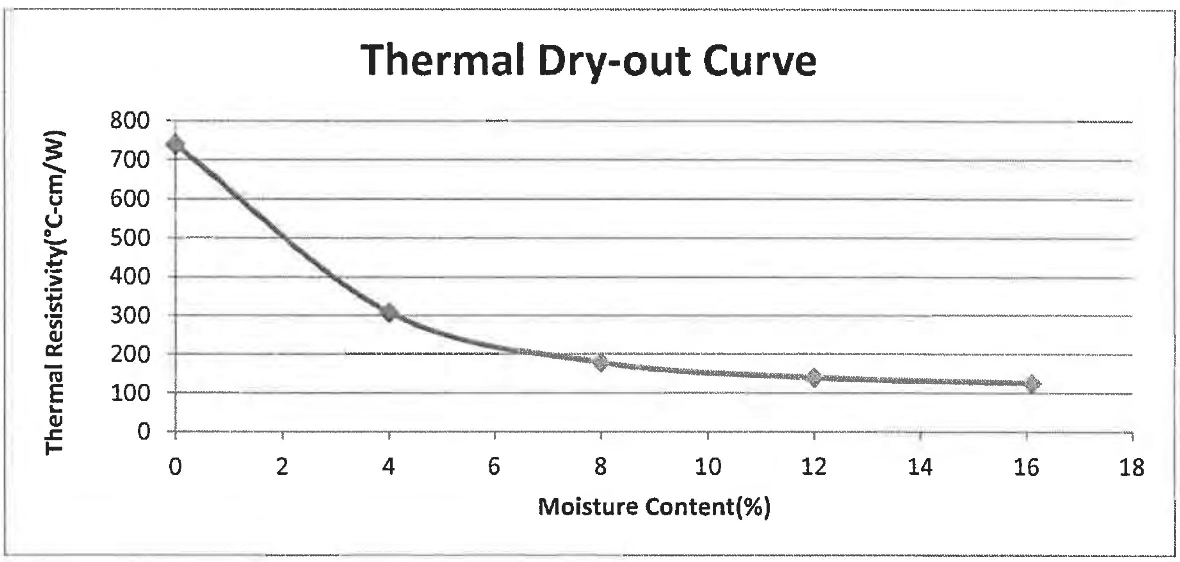
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-4

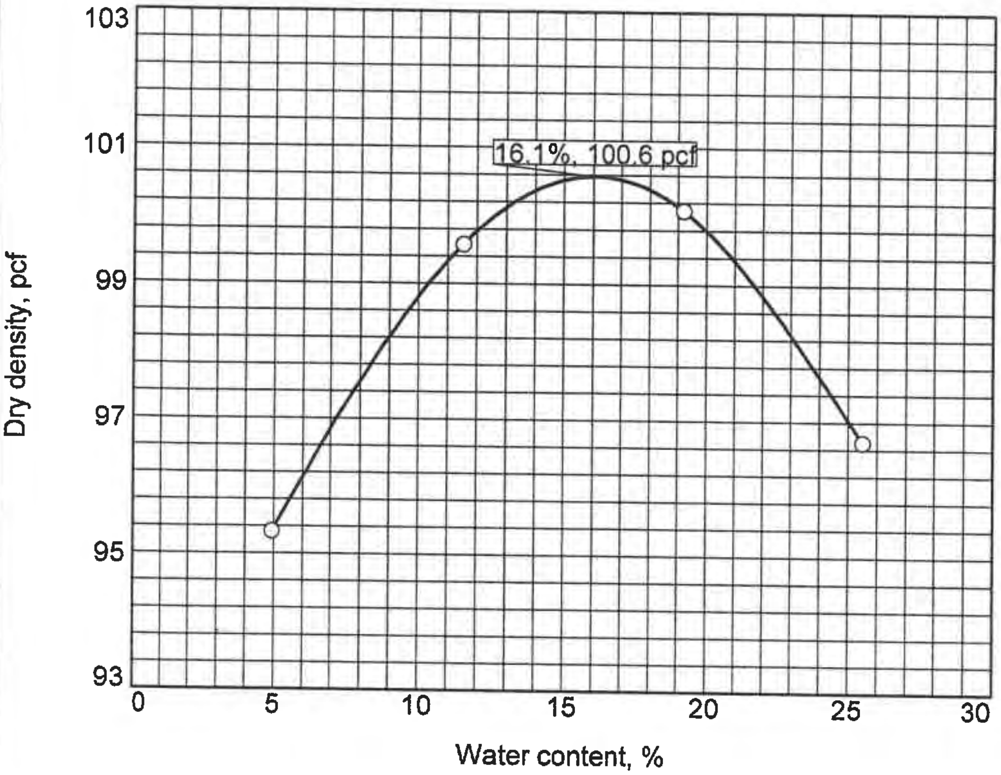
Test Data- Sample No. S-4 (TP-16, Bulk, 0.5'-2')

Standard Proctor Value: 100.6
Remolded Dry Density: 85.51 (85%)
Optimum Moisture Content: 16.1%
In-Situ Moisture Content: 4.03%

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	25.1	740
4	24.7	308
8	24.2	178
12	24	139
16.1	23.8	125



COMPACTION TEST REPORT



Curve No.
S-4

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM **LL** **PI**
Sp.G. (ASTM D 854)
%>3/4 in. **%<No.200**
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.25	22.08	22.69	22.85		
WM	13.75	13.75	13.75	13.75		
WW + T #1	706.0	599.5	857.6	810.2		
WD + T #1	672.8	537.5	719.5	645.6		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	4.9	11.5	19.2	25.5		
DRY DENSITY	95.3	99.6	100.1	96.7		

TEST RESULTS

Maximum dry density = 100.6 pcf

Optimum moisture = 16.1 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-16, Bulk, 0.5'-2' **Depth:** 0.5'-2' **Sample Number:** S-4

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Figure 4 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

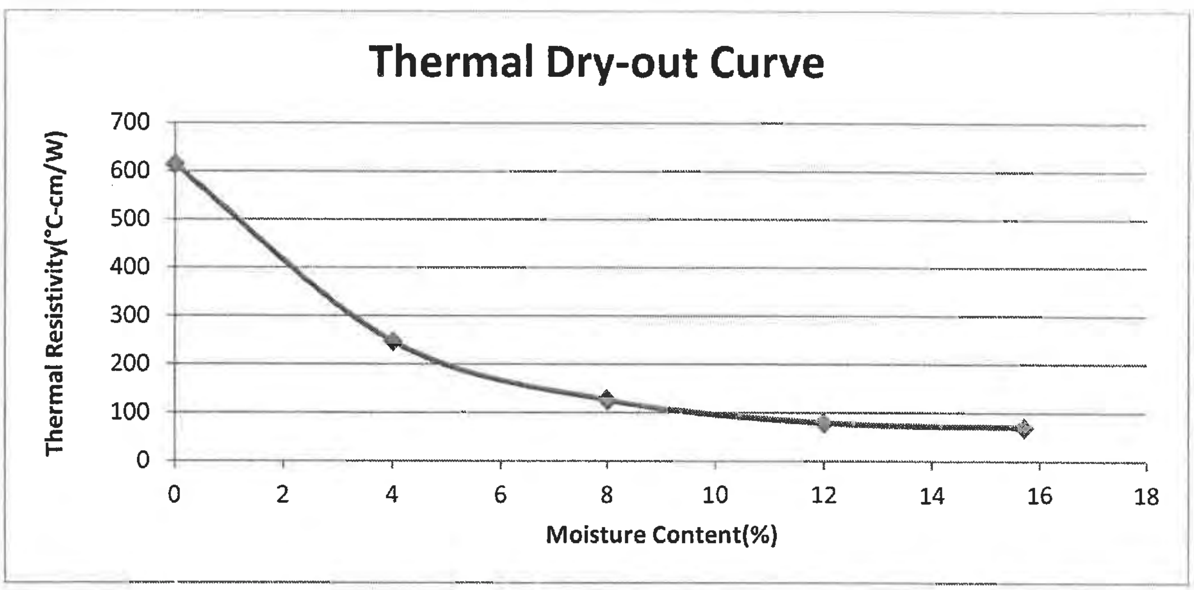
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-5

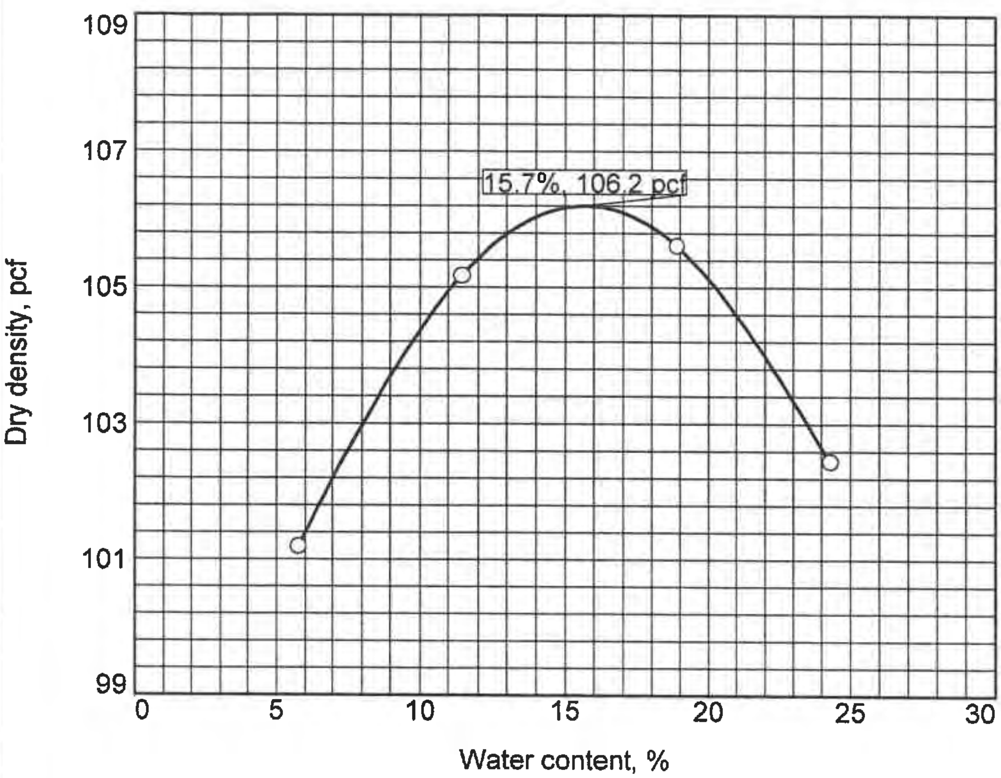
Test Data- Sample No. S-5 (TP-17, Bulk, 2'-4')

Standard Proctor Value: 106.7
Remolded Dry Density: 90.695 (85%)
Optimum Moisture Content: 15.7%
In-Situ Moisture Content: 4.07%

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	24.8	615
4	24.3	247
8	24	126
12	23.8	79
15.7	23.7	70



COMPACTION TEST REPORT



Curve No.
S-5

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM **LL** **PI**
Sp.G. (ASTM D 854)
%>3/4 in. **%<No.200**
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.77	22.54	23.16	23.30		
WM	13.75	13.75	13.75	13.75		
WW + T #1	766.9	625.5	740.8	854.3		
WD + T #1	725.1	561.2	623.2	687.3		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	5.8	11.5	18.9	24.3		
DRY DENSITY	101.2	105.2	105.6	102.5		

TEST RESULTS

Maximum dry density = 106.2 pcf

Optimum moisture = 15.7 %

Material Description

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-17, Bulk, 2'-4' **Depth:** 2'-4' **Sample Number:** S-5

Remarks:

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Title:

Figure 5 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

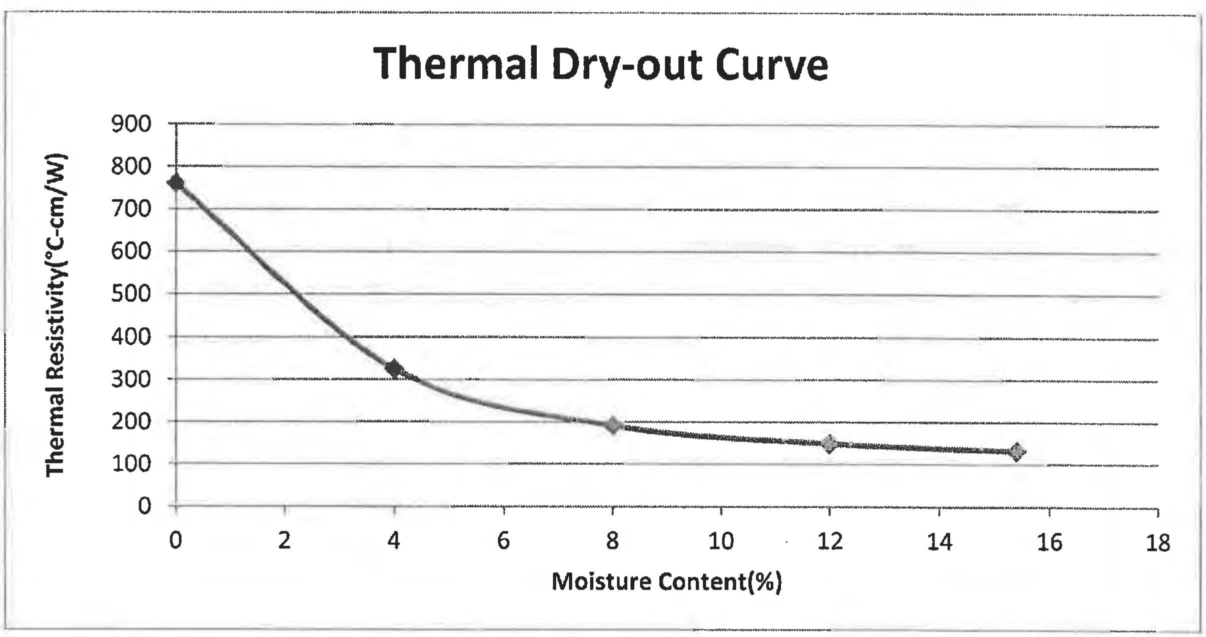
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-8

Test Data- Sample No. S-8 (B-23, Bulk, 1'-3')

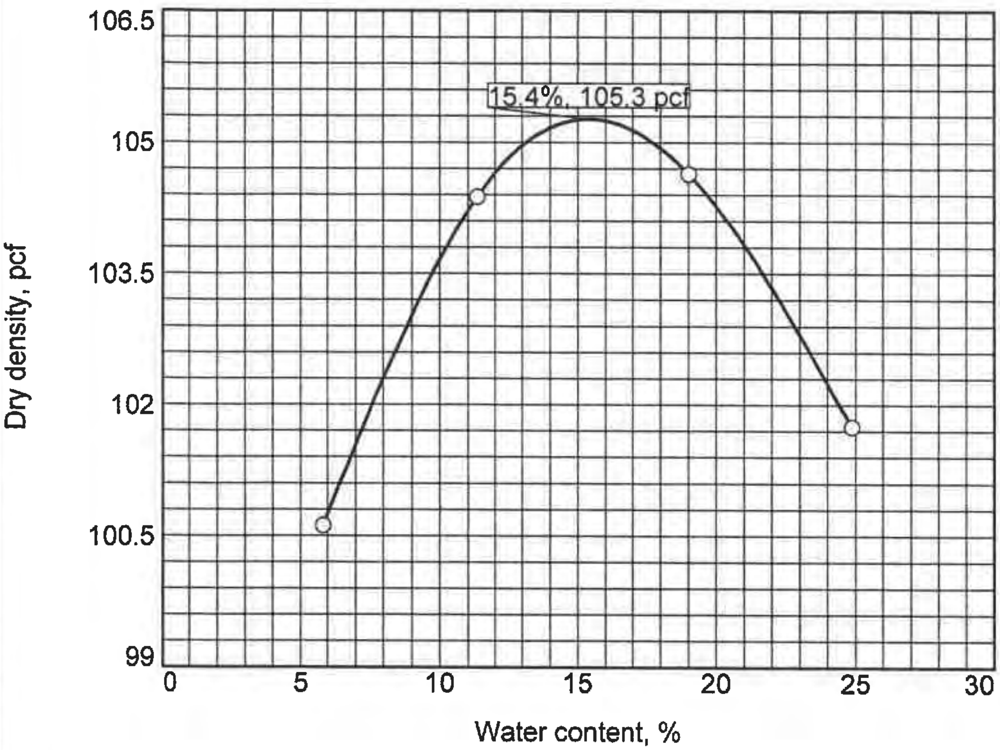
Standard Proctor Value: 105.3
Remolded Dry Density: 89.505 (85%)
Optimum Moisture Content: 15.4%
In-Situ Moisture Content: 4.06 %

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	25	762
4	24.6	325
8	24.2	192
12	24	149
15.4	23.8	132



COMPACTION TEST REPORT

Curve No.
S-8



Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM **LL** **PI**
Sp.G. (ASTM D 854)
%>3/4 in. **%<No.200**
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.73	22.46	23.09	23.28		
WM	13.75	13.75	13.75	13.75		
WW + T #1	705.5	582.2	852.9	792.3		
WD + T #1	666.6	522.9	716.6	634.5		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	5.8	11.3	19.0	24.9		
DRY DENSITY	100.6	104.4	104.6	101.7		

TEST RESULTS

Maximum dry density = 105.3 pcf

Optimum moisture = 15.4 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** B-23, Bulk, 1'-3' **Depth:** 1'-3' **Sample Number:** S-8

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Title:

Figure 8 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

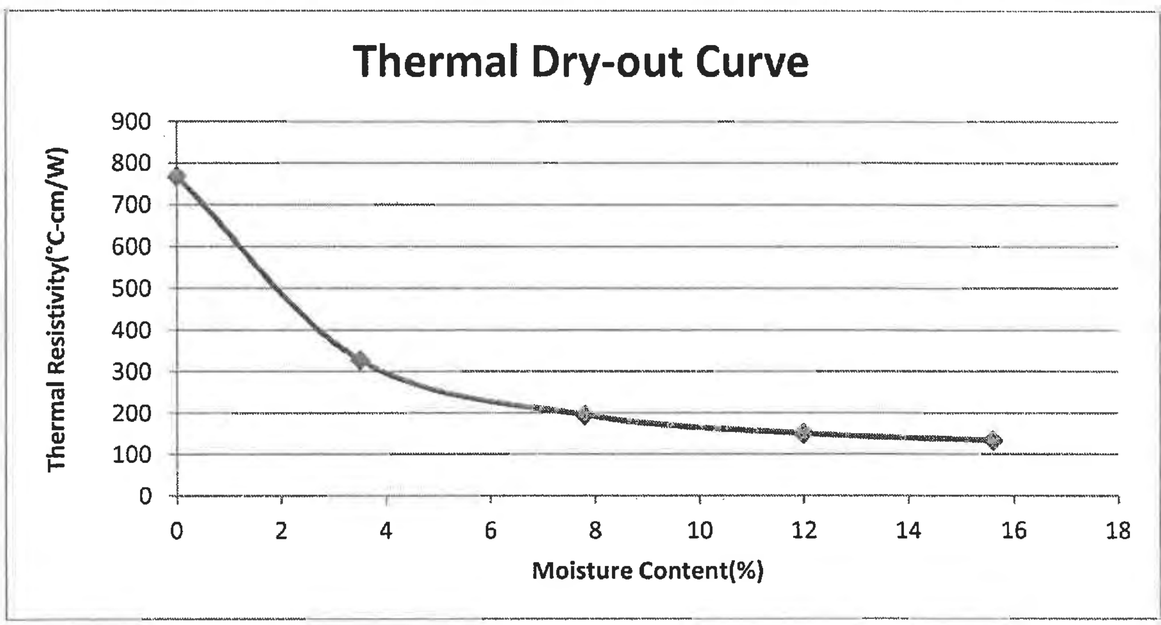
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-10

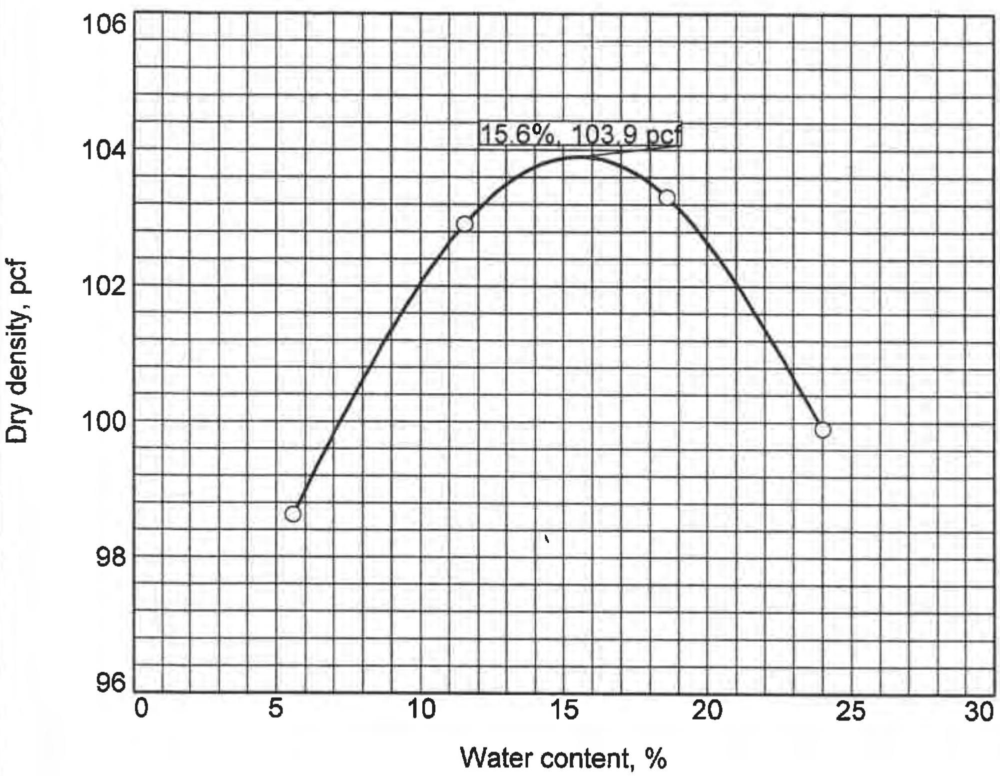
Test Data- Sample No. S-10 (TP-28, Bulk, 2'-4')

Standard Proctor Value: 103.9
Remolded Dry Density: 88.315 (85%)
Optimum Moisture Content: 15.6%
In-Situ Moisture Content: 4.76 %

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	25.2	768
3.5	25	328
7.8	24.6	194
12	24.2	150
15.6	24.1	133



COMPACTION TEST REPORT



Curve No.
S-10

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ____
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.
Test Performed on Material Passing 3/4 in. **Sieve**

NM ____ **LL** ____ **PI** ____
Sp.G. (ASTM D 854) ____
%>3/4 in. ____ **%<No.200** ____
USCS ____ **AASHTO** ____
Date Sampled ____
Date Tested ____
Tested By ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.56	22.36	22.94	23.04		
WM	13.75	13.75	13.75	13.75		
WW + T #1	774.9	662.9	902.1	781.5		
WD + T #1	734.0	594.3	760.6	630.2		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	5.6	11.5	18.6	24.0		
DRY DENSITY	98.6	102.9	103.3	99.9		

TEST RESULTS

Maximum dry density = 103.9 pcf

Optimum moisture = 15.6 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** TP-28, Bulk, 2'-4' **Depth:** 2'-4 **Sample Number:** S-10

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Figure 10 F 2

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THERMAL CONDUCTIVITY OF SOIL & SOFT ROCK BY THERMAL NEEDLE PROBE -IEEE 442

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

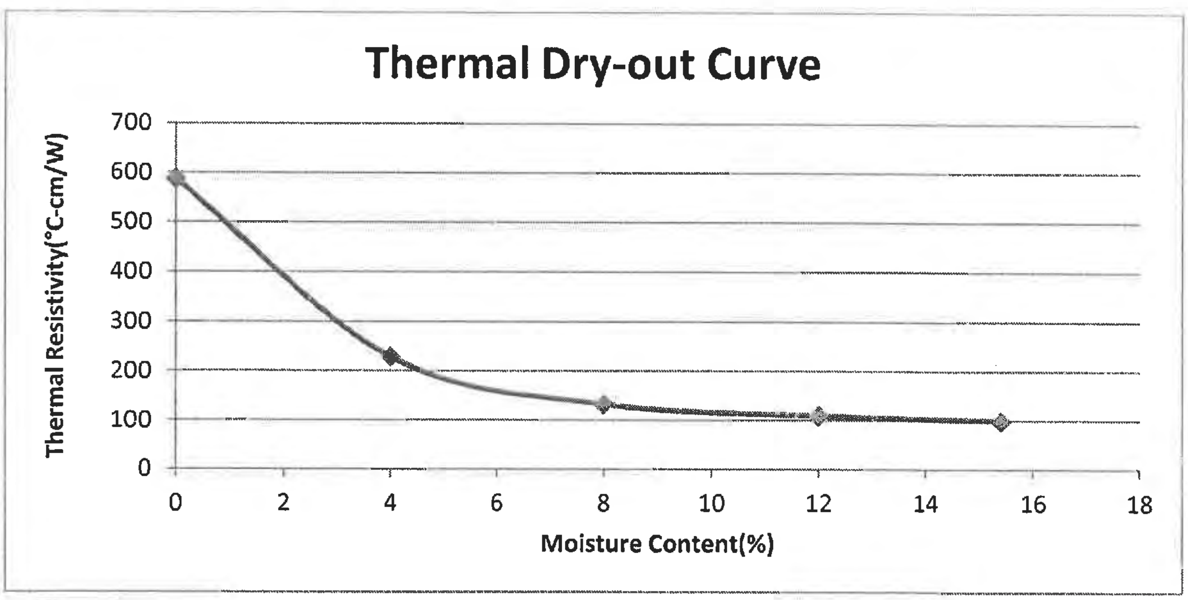
PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-11

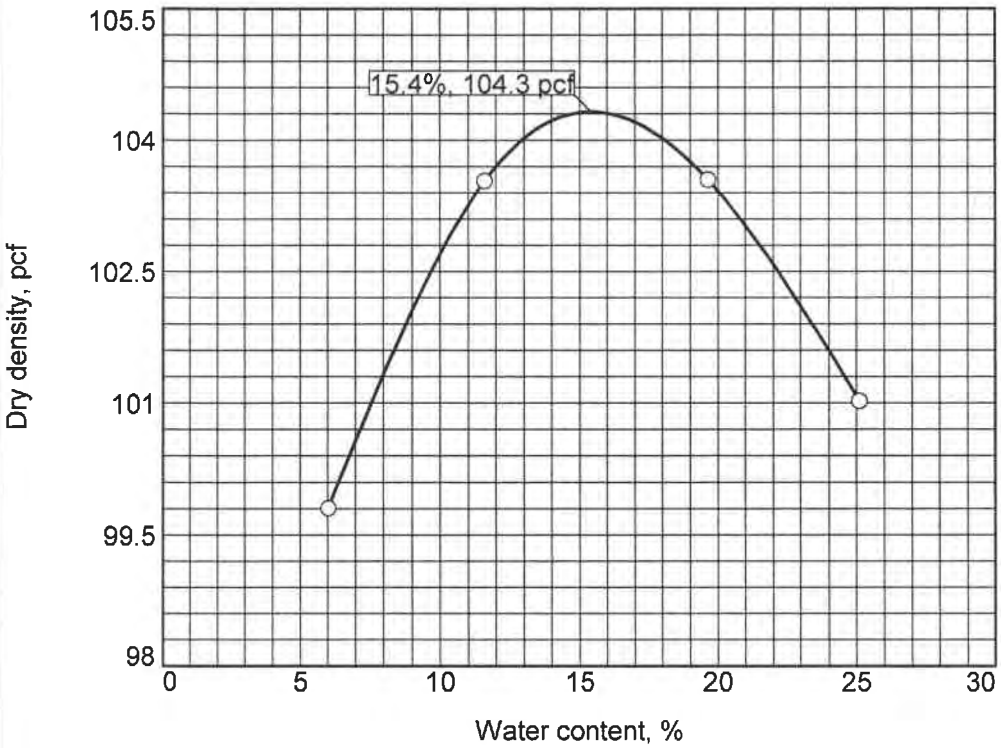
Test Data- Sample No. S-11 (B-SS-01, Bulk, 1'-4')

Standard Proctor Value: 104.8
Remolded Dry Density: 89.08 (85%)
Optimum Moisture Content: 15.4%
In-Situ Moisture Content: 4.81 %

Moisture Contents (%)	Initial Soil Temperature (°C)	Thermal Resistivity (°C-cm/W)
0	26.5	588
4	26	228
8	25.3	132
12	24.9	109
15.4	24.6	99



COMPACTION TEST REPORT



Curve No.
S-11

Test Specification:
ASTM D 1557-12 Method C Modified

Preparation Method ______
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 56
Mold Size 0.075 cu. ft.

Test Performed on Material Passing 3/4 in. **Sieve**

NM ____ **LL** ____ **PI** ____
Sp.G. (ASTM D 854) ____
%>3/4 in. ____ **%<No.200** ____
USCS ____ **AASHTO** ____
Date Sampled ____
Date Tested ____
Tested By ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	21.68	22.41	23.04	23.23		
WM	13.75	13.75	13.75	13.75		
WW + T #1	705.5	582.2	855.9	792.3		
WD + T #1	665.4	521.7	715.4	633.3		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	6.0	11.6	19.6	25.1		
DRY DENSITY	99.8	103.5	103.5	101.0		

TEST RESULTS

Maximum dry density = 104.3 pcf

Optimum moisture = 15.4 %

Material Description

Remarks:

Project No. AOB-5632 **Client:** ANS GEO Inc.
Project: CypressCreek-Ostrea Solar, Moxee, WA

○ **Location:** B-SS-01, Bulk, 1'-4' **Depth:** 1'-4' **Sample Number:** S-11

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Title:

Figure 11 F 2

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Fax: (908) 754-8633

CERTIFICATE OF TEST - CORROSION ANALYSIS

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite # A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-1, S-2, S-4 to S-8

TEST PERFORMED: 1) Standard Test Method for Water Soluble Sulfate in Soil AS PER ASTM C-1580
2) Standard Test Method for measuring pH of Soil for use in Corrosion Testing AS PER ASTM G51-18
3) Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil AS PER ASTM G-200
4) Standard Method for Test for Determining Water Soluble Chloride Ion AS PER AASHTO T-291
5) Standard Test Method for Measuring Soil Resistivity using two-Electrode AS PER ASTM G187-18

Sample No.	Sample ID	Sulfate (mg/Kg)	pH	ORP (mV)	Chloride (mg/Kg)	Resistivity (Ohm-cm)
S-1	TP-2, Bulk, 1'-2'	0	6.27	236	15	11,000
S-2	TP-5, Bulk, 1'-2'	15	6.44	215	25	9,000
S-4	TP-16, Bulk, 0.5'-2'	16	6.47	187	45	6,000
S-5	TP-17, Bulk, 2'-4'	27	5.1	186	40	8,500
S-6	TP-19, Bulk, 0.5'-2.5'	22	6.74	221	35	9,000
S-7	TP-22, Bulk, 1'-2'	20	6.52	203	55	10,000
S-8	B-23, Bulk, 1'-3'	11	6.72	211	30	9,000

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CERTIFICATE OF TEST - CORROSION ANALYSIS

CLIENT: ANS Geo, Inc.
4405 South Clinton Avenue, Suite#A
South Plainfield, NJ 07080

DATE: 12/22/2020

FILE NO: AOB-5632

PROJECT: Cypress Creek- Ostrea Solar
Moxee, WA

REPORT NO: S-9, S-10, S-12 to S-16

TEST PERFORMED:
1) Standard Test Method for Water Soluble Sulfate in Soil AS PER ASTM C-1580
2) Standard Test Method for measuring pH of Soil for use in Corrosion Testing AS PER ASTM G51-18
3) Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil AS PER ASTM G-200
4) Standard Method for Test for Determining Water Soluble Chloride Ion AS PER AASHTO T-291
5) Standard Test Method for Measuring Soil Resistivity using two-Electrode AS PER ASTM G187-18

Sample No.	Sample ID	Sulfate (mg/Kg)	pH	ORP (mV)	Chloride (mg/Kg)	Resistivity (Ohm-cm)
S-9	TP-25, Bulk, 1'-2'	15	5.91	197	35	10,500
S-10	TP-28, Bulk, 2'-4'	18	5.72	195	60	13,000
S-12	B-1, Bulk, 1'-3'	14	6.38	193	30	9,000
S-13	B-7, Bulk, 1'-3'	17	6.59	190	90	8,000
S-14	B-10, Bulk, 1'-3'	9	6.76	183	50	6,000
S-15	B-13, Bulk, 1'-3'	6	6.88	177	25	7,000
S-16	B-18, Bulk, 1'-3'	14	6.76	172	35	7,000

Attachment F

Environmental Sampling Results

TP-04 & TP-11

ENVIRONMENTAL RESULTS

CASCADE ANALYTICAL
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Wenatchee, WA 98801

(509) 452-7707
Fax: (509) 452-7773
1008 W. Ahtanum Rd.
Union Gap, WA 98903

Batch: 017005
Client: ANS Geo Inc
Account: 21800
Sampler:
PO Number:

--- Analytical Services Report ---

Report Date: 12/23/20

ANS Geo Inc

4475 S Clinton Ave #225
South Plainfield, NJ 07080

Laboratory Number: 20-C025782
Sample Identification: **Ostrea** Solar TP-11
Sample Comment: 1'-2'

Date Received: 12/ 7/20
Date Sampled: 12/ 3/20

Test Requested	Results	Units	RL	Method	Date Analyzed	Flags
Other Analysis	Analyzed by TAL/				12/22/20	

Approved By Name: Andy Schut
Lab Manager/Yakima

Signature:

Function:

CASCADE ANALYTICAL
A EUROFINS COMPANY
1-800-545-4206

(509) 662-1888
Fax: (509) 662-8183
3019 G. S. Center Road
Wenatchee, WA 98801

(509) 452-7707
Fax: (509) 452-7773
1008 W. Ahtanum Rd.
Union Gap, WA 98903

Batch: 017005
Client: ANS Geo Inc
Account: 21800
Sampler:
PO Number:

--- Analytical Services Report ---

Report Date: 12/23/20

ANS Geo Inc

4475 S Clinton Ave #225
South Plainfield, NJ 07080

Laboratory Number: 20-C025783
Sample Identification: Ostrea Solar TP-4
Sample Comment: 1'-2'

Date Received: 12/ 7/20
Date Sampled: 12/ 3/20

Test Requested	Results	Units	RL	Method	Date Analyzed	Flags
Other Analysis	Analyzed by TAL/S				12/22/20	

Approved By Name: Andy Schut
Function: Lab Manager/Yakima

Signature: at

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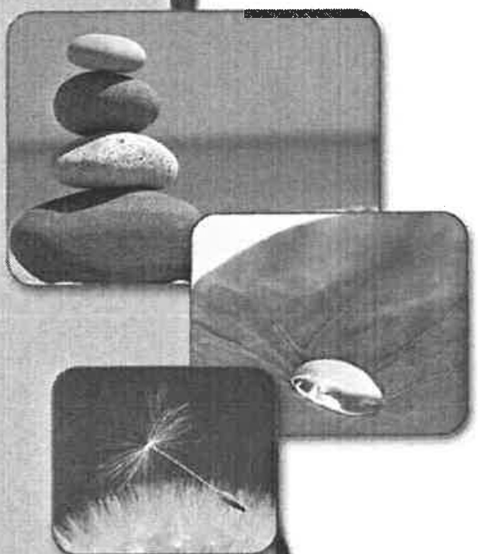

ANALYTICAL REPORT

Eurofins TestAmerica, Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

Laboratory Job ID: 580-99593-1
Client Project/Site: ANS Geo

For:
Cascade Analytical Inc
1008 W. Ahtanum Rd.
Union Gap, Washington 98903

Attn: Andy Schut

Authorized for release by:
12/22/2020 5:13:08 PM

Pauline Matlock, Project Manager
(253)922-2310
pauline.matlock@eurofinset.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-99593-1

Laboratory: Eurofins TestAmerica, Seattle

Narrative

Job Narrative
580-99593-1

Comments
No additional comments.

Receipt
The samples were received on 12/8/2020 2:44 PM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was -0.2° C.

GC/MS VOA
Method 8260D: The method blank for preparation batch 345397 and analytical batch 345537 contained Naphthalene above the Method Detection Limit (MDL), but below the Reporting Limit (RL). Data has been qualified and reported.

Method 8260D: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 580-345397 and analytical batch 580-345537 recovered outside control limits for the following analytes: Dichlorodifluoromethane. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 8260D: The continuing calibration verification (CCV) associated with batch 580-345537 recovered above the upper control limit for Bromomethane, Chloroethane, Dichlorodifluoromethane, 1,1-Dichloroethene, Chloromethane and Vinyl chloride. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is impacted: (CCVIS 580-345537/3).

Method 8260D: The associated CCVIS meets control criteria; 20.1% rounds to 20%. Data is reported. (CCVIS 580-346000/3)

Method 8260D: The laboratory control sample (LCS) for preparation batch 580-346011 and analytical batch 580-346000 recovered outside acceptance limits for m-Xylene & p-Xylene (LCS 78, LCSD 77, limit 80-132). There was insufficient sample to perform a re-extraction or re-analysis; therefore, the data have been reported. Sample is ND.

Method 8260D: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for preparation batch 580-346011 and analytical batch 580-346000 recovered outside control limits for the following analytes: Methylene Chloride.

Method 8260D: The continuing calibration verification (CCV) associated with batch 580-346000 recovered outside acceptance criteria, low biased, for m-Xylene & p-Xylene. A reporting limit (RL) standard was analyzed, and the target analyte was detected. Since the associated samples were non-detect for this analyte, the data have been reported.

Method 8260D: Surrogate recovery for the following samples were outside control limits: 20-C025780 (580-99593-1), 20-C025781 (580-99593-2) and 20-C025782 (580-99593-3). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA
Method 8270E: The method blank for preparation batch 580-345599 and analytical batch 580-345700 contained 2-Methylnaphthalene, Phenanthrene, Anthracene and 1-Methylnaphthalene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method 8270E: The method blank for preparation batch 580-345599 contained Naphthalene above the reporting limit (RL). None of the samples associated with this method blank contained the target compound; therefore, re-extraction and/or re-analysis of samples were not performed.

Method 8270E: The laboratory control sample and/or the laboratory control sample duplicate (LCS/LCSD) for preparation batch 580-345599 and analytical batch 580-345700 recovered outside control limits for the following analyte(s): 2,4-Dinitrophenol and 4-Chloroaniline. These have been identified as a poor performing analytes when analyzed using this method; therefore, re-extraction/re-analysis was not performed. Batch precision also exceeded control limits for 2,4-Dinitrophenol. These results have been

Job ID: 580-99593-1 (Continued)

Laboratory: Eurofins TestAmerica, Seattle (Continued)

qualified and reported.

Method 8270E: The following analytes have been identified, in the reference method and/or via historical data, to be poor and/or erratic performers: 2,4-Dinitrophenol. This analyte may have a %D >50%.

Method 8270E: The following analyte(s) recovered outside control limits for the LCS associated with preparation batch 580-345599 and analytical batch 580-345700: Benzo[g,h,i]perylene and 2,2'-oxybis[1-chloropropane]. This is not indicative of a systematic control problem because these were random marginal exceedances. Qualified results have been reported.

Method 8270E: The minimum response factor (RF) criteria for the continuing calibration verification (CCV) analyzed in batch 580-345700 was outside criteria for the following analyte(s): N-Nitrosodi-n-propylamine. As indicated in the reference method, sample analysis may proceed; however, any detection or non-detection for the affected analyte(s) is considered estimated.

Method 8270E: Surrogate recovery for the following sample was outside control limits: 20-C025780 (580-99593-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method 8270E: The continuing calibration verification (CCV) associated with batch 580-345574 recovered above the upper control limit for Benzo[a]anthracene, Bis(2-ethylhexyl)phthalate, Butyl benzyl phthalate and Benzoic acid. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated samples are impacted: 20-C025781 (580-99593-2), 20-C025782 (580-99593-3) and (CCVIS 580-345574/3).

Method 8270E: The following continuing calibration verification (CCV) standard associated with batch 580-345574 recovered outside acceptance criteria for %D for surrogate 2,4,6-Tribromophenol. Since all the other surrogates was within %D criteria; therefore, the data have been reported. (CCVIS 580-345574/3)

Method 8270E: The continuing calibration verification (CCV) associated with batch 580-345574 recovered outside acceptance criteria, low biased, for 2,2'-oxybis[1-chloropropane]. A reporting limit (RL) standard was analyzed, and the target analyte was detected. Since the associated samples were non-detect for this analyte, the data have been reported.

Method 8270E: The minimum response factor (RF) criteria for the continuing calibration verification (CCV) analyzed in batch 580-345574 was outside criteria for the following analyte(s): N-Nitrosodi-n-propylamine. As indicated in the reference method, sample analysis may proceed; however, any detection or non-detection for the affected analyte(s) is considered estimated.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
Method 5035: The following samples were provided to the laboratory with a significantly different initial weight than that required by the reference method: 20-C025780 (580-99593-1), 20-C025781 (580-99593-2), 20-C025782 (580-99593-3) and 20-C025783 (580-99593-4). Deviations in the weight by more than 20% may affect reporting limits and potentially method performance. The method specifies 10g. The amount provided was below this range.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*-	LCS and/or LCSD is outside acceptance limits, low biased.
*+	LCS and/or LCSD is outside acceptance limits, high biased.
*1	LCS/LCSD RPD exceeds control limits.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
S1-	Surrogate recovery exceeds control limits, low biased.
S1+	Surrogate recovery exceeds control limits, high biased.

GC/MS Semi VOA

Qualifier	Qualifier Description
*-	LCS and/or LCSD is outside acceptance limits, low biased.
*+	LCS and/or LCSD is outside acceptance limits, high biased.
F1	MS and/or MSD recovery exceeds control limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
S1-	Surrogate recovery exceeds control limits, low biased.

GC Semi VOA

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025782
Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3
Matrix: Solid
Percent Solids: 94.8

Method: 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND	*+	2.2	0.54	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Chloromethane	ND		5.5	1.0	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Vinyl chloride	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Bromomethane	ND		1.1	0.23	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Chloroethane	ND		11	0.83	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Trichlorofluoromethane	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1-Dichloroethene	ND		5.5	1.2	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Methylene Chloride	ND		44	11	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
trans-1,2-Dichloroethene	ND		2.2	0.44	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1-Dichloroethane	ND		1.1	0.21	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
2,2-Dichloropropane	ND		5.5	0.36	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
cis-1,2-Dichloroethene	ND		3.3	0.66	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Bromochloromethane	ND		2.2	0.28	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Chloroform	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1,1-Trichloroethane	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Carbon tetrachloride	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1-Dichloropropene	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Benzene	ND		2.2	0.43	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2-Dichloroethane	ND		1.1	0.22	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Trichloroethene	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2-Dichloropropane	ND		2.2	0.44	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Dibromomethane	ND		1.1	0.19	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Bromodichloromethane	ND		1.1	0.20	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
cis-1,3-Dichloropropene	ND		1.1	0.22	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Toluene	ND		11	1.4	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
trans-1,3-Dichloropropene	ND		11	0.66	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1,2-Trichloroethane	ND		2.2	0.28	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Tetrachloroethene	ND		2.2	0.44	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,3-Dichloropropane	ND		2.2	0.25	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Dibromochloromethane	ND		1.7	0.30	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2-Dibromoethane	ND		1.1	0.22	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Chlorobenzene	ND		2.2	0.28	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Ethylbenzene	ND		2.2	0.45	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1,1,2-Tetrachloroethane	ND		3.3	0.65	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,1,2,2-Tetrachloroethane	ND		4.4	0.99	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
m-Xylene & p-Xylene	ND		11	0.62	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
o-Xylene	ND		5.5	1.0	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Styrene	ND		3.3	0.82	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Bromoform	ND		5.5	0.93	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Isopropylbenzene	ND		2.2	0.51	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Bromobenzene	ND		11	1.1	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
N-Propylbenzene	ND		5.5	0.84	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2,3-Trichloropropane	ND		5.5	1.1	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
2-Chlorotoluene	ND		5.5	1.0	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,3,5-Trimethylbenzene	ND		5.5	0.89	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
4-Chlorotoluene	ND		5.5	1.1	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
t-Butylbenzene	ND		3.3	0.73	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2,4-Trimethylbenzene	ND		5.5	1.3	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
sec-Butylbenzene	ND		3.3	0.74	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1

Client Sample ID: 20-C025782
Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3
Matrix: Solid
Percent Solids: 94.8

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichlorobenzene	ND		5.5	1.2	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
4-Isopropyltoluene	ND		2.2	0.44	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,4-Dichlorobenzene	ND		5.5	1.1	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
n-Butylbenzene	ND		3.3	0.70	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2-Dichlorobenzene	ND		11	1.4	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2-Dibromo-3-Chloropropane	ND		11	1.8	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2,4-Trichlorobenzene	ND		2.2	0.46	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
1,2,3-Trichlorobenzene	ND		3.3	0.66	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Hexachlorobutadiene	ND		3.3	0.66	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1
Naphthalene	**6.7**	**J B**	**11**	**2.0**	**ug/Kg**	☼	**12/08/20 15:00**	**12/11/20 22:54**	**1**
Methyl tert-butyl ether	ND		2.2	0.33	ug/Kg	☼	12/08/20 15:00	12/11/20 22:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*117*		*80 - 120*	*12/08/20 15:00*	*12/11/20 22:54*	*1*
4-Bromofluorobenzene (Surr)	*68*	*S1-*	*80 - 120*	*12/08/20 15:00*	*12/11/20 22:54*	*1*
Dibromofluoromethane (Surr)	*70*	*S1-*	*80 - 120*	*12/08/20 15:00*	*12/11/20 22:54*	*1*
1,2-Dichloroethane-d4 (Surr)	*53*	*S1-*	*80 - 121*	*12/08/20 15:00*	*12/11/20 22:54*	*1*

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenol	ND		150	23	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Bis(2-chloroethyl)ether	ND		99	7.6	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Chlorophenol	ND		200	4.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
1,3-Dichlorobenzene	ND		50	4.8	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
1,4-Dichlorobenzene	ND		50	8.2	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzyl alcohol	ND		990	50	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
1,2-Dichlorobenzene	ND		50	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Methylphenol	ND		150	9.7	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
3 & 4 Methylphenol	ND		200	15	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
N-Nitrosodi-n-propylamine	ND		200	22	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Hexachloroethane	ND		150	4.3	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Nitrobenzene	ND		200	20	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Isophorone	ND		150	8.3	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Nitrophenol	ND		200	6.2	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4-Dimethylphenol	ND		200	60	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzoic acid	ND		4000	1200	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Bis(2-chloroethoxy)methane	ND		200	18	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4-Dichlorophenol	ND		200	60	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
1,2,4-Trichlorobenzene	ND		50	6.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Naphthalene	ND		25	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Chloroaniline	ND		1500	130	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Hexachlorobutadiene	ND		50	15	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Chloro-3-methylphenol	ND		150	33	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Methylnaphthalene	ND		50	8.7	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Hexachlorocyclopentadiene	ND		99	7.6	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4,6-Trichlorophenol	ND		150	13	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4,5-Trichlorophenol	ND		200	8.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Chloronaphthalene	ND		25	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2-Nitroaniline	ND		99	15	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Dimethyl phthalate	ND		150	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1

Client Sample ID: 20-C025782

Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3

Matrix: Solid
Percent Solids: 94.8

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthylene	ND		25	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,6-Dinitrotoluene	ND		150	15	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
3-Nitroaniline	ND		300	99	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Acenaphthene	ND		40	4.6	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4-Dinitrophenol	ND	*-	2000	580	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Nitrophenol	ND		2000	170	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Dibenzofuran	ND		150	5.9	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
2,4-Dinitrotoluene	ND		200	43	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Diethyl phthalate	ND		400	22	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Chlorophenyl phenyl ether	ND		200	6.3	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Fluorene	ND		25	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Nitroaniline	ND		150	50	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4,6-Dinitro-2-methylphenol	ND		990	99	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
N-Nitrosodiphenylamine	ND		60	7.9	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
4-Bromophenyl phenyl ether	ND		200	9.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Hexachlorobenzene	ND		50	15	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Pentachlorophenol	ND		400	63	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Phenanthrene	ND		60	5.8	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Anthracene	ND		60	16	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Di-n-butyl phthalate	ND		500	27	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Fluoranthene	ND		40	12	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Pyrene	ND		60	13	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Butyl benzyl phthalate	ND		200	51	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
3,3'-Dichlorobenzidine	ND		400	83	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzo[a]anthracene	ND		40	11	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Chrysene	ND		60	13	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Bis(2-ethylhexyl) phthalate	ND		600	70	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Di-n-octyl phthalate	ND		150	12	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzo[a]pyrene	ND		60	13	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Indeno[1,2,3-cd]pyrene	ND		40	12	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Dibenz(a,h)anthracene	ND		50	12	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzo[g,h,i]perylene	ND		60	18	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Carbazole	ND		150	7.2	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
1-Methylnaphthalene	ND		30	5.0	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzo[b]fluoranthene	ND		40	9.9	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
Benzo[k]fluoranthene	ND		60	14	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1
bis(chloroisopropyl) ether	ND	*-	200	6.1	ug/Kg	☼	12/11/20 15:17	12/15/20 19:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*92*		*47 - 119*	*12/11/20 15:17*	*12/15/20 19:25*	*1*
Phenol-d5 (Surr)	*74*		*59 - 120*	*12/11/20 15:17*	*12/15/20 19:25*	*1*
Nitrobenzene-d5 (Surr)	*96*		*54 - 120*	*12/11/20 15:17*	*12/15/20 19:25*	*1*
2-Fluorobiphenyl	*85*		*57 - 120*	*12/11/20 15:17*	*12/15/20 19:25*	*1*
2,4,6-Tribromophenol (Surr)	*103*		*52 - 115*	*12/11/20 15:17*	*12/15/20 19:25*	*1*
Terphenyl-d14 (Surr)	*115*		*73 - 125*	*12/11/20 15:17*	*12/15/20 19:25*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		11	5.2	mg/Kg	☼	12/10/20 09:15	12/10/20 13:19	1

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025782
Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3
Matrix: Solid
Percent Solids: 94.8

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*50 - 150*	*12/10/20 09:15*	*12/10/20 13:19*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50	12	mg/Kg	☼	12/21/20 08:35	12/21/20 23:15	1
Motor Oil (>C24-C36)	**31**	**J**	50	17	mg/Kg	☼	12/21/20 08:35	12/21/20 23:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*96*		*50 - 150*	*12/21/20 08:35*	*12/21/20 23:15*	*1*

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	**6.4**		0.41	0.039	mg/Kg	☼	12/17/20 12:22	12/18/20 15:58	10
Cadmium	**0.091**	**J**	0.65	0.063	mg/Kg	☼	12/17/20 12:22	12/18/20 15:58	10
Arsenic	**3.3**		0.41	0.081	mg/Kg	☼	12/17/20 12:22	12/18/20 15:58	10
Chromium	**15**		0.81	0.051	mg/Kg	☼	12/17/20 12:22	12/18/20 15:58	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.020**	**J**	0.026	0.0079	mg/Kg	☼	12/14/20 13:46	12/15/20 12:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**94.8**		0.1	0.1	%			12/09/20 15:39	1
Percent Moisture	**5.2**		0.1	0.1	%			12/09/20 15:39	1

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025783
Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4
Matrix: Solid
Percent Solids: 95.2

Method: 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.3	0.56	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Chloromethane	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Vinyl chloride	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Bromomethane	ND		1.1	0.24	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Chloroethane	ND		11	0.86	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Trichlorofluoromethane	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1-Dichloroethene	ND		5.7	1.3	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Methylene Chloride	ND	*1	46	11	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
trans-1,2-Dichloroethene	ND		2.3	0.46	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1-Dichloroethane	ND		1.1	0.22	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
2,2-Dichloropropane	ND		5.7	0.38	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
cis-1,2-Dichloroethene	ND		3.4	0.69	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Bromochloromethane	ND		2.3	0.29	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Chloroform	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1,1-Trichloroethane	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Carbon tetrachloride	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1-Dichloropropene	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Benzene	ND		2.3	0.45	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2-Dichloroethane	ND		1.1	0.23	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Trichloroethene	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2-Dichloropropane	ND		2.3	0.46	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Dibromomethane	ND		1.1	0.19	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Bromodichloromethane	ND		1.1	0.21	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
cis-1,3-Dichloropropene	ND		1.1	0.23	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Toluene	ND		11	1.5	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
trans-1,3-Dichloropropene	ND		11	0.69	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1,2-Trichloroethane	ND		2.3	0.29	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Tetrachloroethene	ND		2.3	0.46	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,3-Dichloropropane	ND		2.3	0.26	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Dibromochloromethane	ND		1.7	0.31	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2-Dibromoethane	ND		1.1	0.23	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Chlorobenzene	ND		2.3	0.29	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Ethylbenzene	ND		2.3	0.47	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1,1,2-Tetrachloroethane	ND		3.4	0.67	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,1,2,2-Tetrachloroethane	ND		4.6	1.0	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
m-Xylene & p-Xylene	ND	*-	11	0.64	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
o-Xylene	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Styrene	ND		3.4	0.85	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Bromoform	ND		5.7	0.96	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Isopropylbenzene	ND		2.3	0.53	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Bromobenzene	ND		11	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
N-Propylbenzene	ND		5.7	0.87	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2,3-Trichloropropane	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
2-Chlorotoluene	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,3,5-Trimethylbenzene	ND		5.7	0.93	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
4-Chlorotoluene	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
t-Butylbenzene	ND		3.4	0.75	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2,4-Trimethylbenzene	ND		5.7	1.4	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
sec-Butylbenzene	ND		3.4	0.77	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025783
Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4
Matrix: Solid
Percent Solids: 95.2

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichlorobenzene	ND		5.7	1.3	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
4-Isopropyltoluene	ND		2.3	0.46	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,4-Dichlorobenzene	ND		5.7	1.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
n-Butylbenzene	ND		3.4	0.72	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2-Dichlorobenzene	ND		11	1.5	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2-Dibromo-3-Chloropropane	ND		11	1.8	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2,4-Trichlorobenzene	ND		2.3	0.48	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
1,2,3-Trichlorobenzene	ND		3.4	0.69	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Hexachlorobutadiene	ND		3.4	0.69	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Naphthalene	ND		11	2.1	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1
Methyl tert-butyl ether	ND		2.3	0.34	ug/Kg	☼	12/08/20 15:30	12/19/20 17:39	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*90*		*80 - 120*	*12/08/20 15:30*	*12/19/20 17:39*	*1*
4-Bromofluorobenzene (Surr)	*97*		*80 - 120*	*12/08/20 15:30*	*12/19/20 17:39*	*1*
Dibromofluoromethane (Surr)	*105*		*80 - 120*	*12/08/20 15:30*	*12/19/20 17:39*	*1*
1,2-Dichloroethane-d4 (Surr)	*111*		*80 - 121*	*12/08/20 15:30*	*12/19/20 17:39*	*1*

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenol	ND		160	24	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Bis(2-chloroethyl)ether	ND		100	8.0	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Chlorophenol	ND		210	4.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
1,3-Dichlorobenzene	ND		52	5.0	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
1,4-Dichlorobenzene	ND		52	8.6	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzyl alcohol	ND		1000	52	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
1,2-Dichlorobenzene	ND		52	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Methylphenol	ND		160	10	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
3 & 4 Methylphenol	ND		210	16	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
N-Nitrosodi-n-propylamine	ND		210	23	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Hexachloroethane	ND		160	4.5	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Nitrobenzene	ND		210	21	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Isophorone	ND		160	8.7	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Nitrophenol	ND		210	6.5	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4-Dimethylphenol	ND	F2 F1	210	62	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzoic acid	ND	F1	4200	1300	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Bis(2-chloroethoxy)methane	ND		210	19	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4-Dichlorophenol	ND	F2	210	62	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
1,2,4-Trichlorobenzene	ND		52	6.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Naphthalene	ND		26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Chloroaniline	ND	F1 *-	1600	140	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Hexachlorobutadiene	ND		52	16	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Chloro-3-methylphenol	ND	F2	160	34	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Methylnaphthalene	ND		52	9.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Hexachlorocyclopentadiene	ND	F1	100	8.0	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4,6-Trichlorophenol	ND	F2	160	14	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4,5-Trichlorophenol	ND	F2	210	8.4	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Chloronaphthalene	ND		26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2-Nitroaniline	ND	F2	100	16	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Dimethyl phthalate	ND	F2	160	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025783

Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4

Matrix: Solid
Percent Solids: 95.2

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthylene	ND	F2	26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,6-Dinitrotoluene	ND	F2	160	16	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
3-Nitroaniline	ND	F2	310	100	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Acenaphthene	ND	F2	42	4.8	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4-Dinitrophenol	ND	F1 *-	2100	610	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Nitrophenol	ND		2100	180	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Dibenzofuran	ND	F2	160	6.1	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
2,4-Dinitrotoluene	ND		210	45	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Diethyl phthalate	ND		420	23	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Chlorophenyl phenyl ether	ND	F2	210	6.6	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Fluorene	ND	F2	26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Nitroaniline	ND	F2	160	52	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4,6-Dinitro-2-methylphenol	ND	F2	1000	100	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
N-Nitrosodiphenylamine	ND	F2 F1	62	8.3	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
4-Bromophenyl phenyl ether	ND		210	9.5	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Hexachlorobenzene	ND		52	16	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Pentachlorophenol	ND		420	66	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Phenanthrene	ND		62	6.0	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Anthracene	ND		62	17	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Di-n-butyl phthalate	ND		520	28	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Fluoranthene	ND	F2	42	12	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Pyrene	ND		62	14	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Butyl benzyl phthalate	ND		210	53	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
3,3'-Dichlorobenzidine	ND	F1	420	87	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzo[a]anthracene	ND		42	11	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Chrysene	ND		62	14	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Bis(2-ethylhexyl) phthalate	ND		620	74	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Di-n-octyl phthalate	ND		160	12	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzo[a]pyrene	ND		62	14	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Indeno[1,2,3-cd]pyrene	ND		42	12	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Dibenz(a,h)anthracene	ND		52	12	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzo[g,h,i]perylene	ND	F1 *-	62	19	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Carbazole	ND		160	7.6	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
1-Methylnaphthalene	ND		31	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzo[b]fluoranthene	ND		42	10	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
Benzo[k]fluoranthene	ND		62	15	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1
bis(chloroisopropyl) ether	ND	F1 *+	210	6.4	ug/Kg	☼	12/15/20 11:55	12/16/20 16:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*84*		*47 - 119*	*12/15/20 11:55*	*12/16/20 16:40*	*1*
Phenol-d5 (Surr)	*83*		*59 - 120*	*12/15/20 11:55*	*12/16/20 16:40*	*1*
Nitrobenzene-d5 (Surr)	*94*		*54 - 120*	*12/15/20 11:55*	*12/16/20 16:40*	*1*
2-Fluorobiphenyl	*97*		*57 - 120*	*12/15/20 11:55*	*12/16/20 16:40*	*1*
2,4,6-Tribromophenol (Surr)	*70*		*52 - 115*	*12/15/20 11:55*	*12/16/20 16:40*	*1*
Terphenyl-d14 (Surr)	*94*		*73 - 125*	*12/15/20 11:55*	*12/16/20 16:40*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		14	6.3	mg/Kg	☼	12/10/20 09:15	12/10/20 13:43	1

Eurofins TestAmerica, Seattle

Client Sample ID: 20-C025783
Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4
Matrix: Solid
Percent Solids: 95.2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*50 - 150*	*12/10/20 09:15*	*12/10/20 13:43*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50	12	mg/Kg	☼	12/21/20 08:35	12/21/20 23:35	1
Motor Oil (>C24-C36)	**33**	**J**	50	17	mg/Kg	☼	12/21/20 08:35	12/21/20 23:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*93*		*50 - 150*	*12/21/20 08:35*	*12/21/20 23:35*	*1*

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	**8.5**		0.42	0.041	mg/Kg	☼	12/17/20 12:22	12/18/20 15:54	10
Cadmium	**0.083**	**J**	0.68	0.065	mg/Kg	☼	12/17/20 12:22	12/18/20 15:54	10
Arsenic	**5.2**		0.42	0.085	mg/Kg	☼	12/17/20 12:22	12/18/20 15:54	10
Chromium	**16**		0.85	0.053	mg/Kg	☼	12/17/20 12:22	12/18/20 15:54	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.018**	**J**	0.021	0.0064	mg/Kg	☼	12/14/20 13:46	12/15/20 12:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**95.2**		0.1	0.1	%			12/09/20 15:39	1
Percent Moisture	**4.8**		0.1	0.1	%			12/09/20 15:39	1

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-345397/1-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345397

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0	0.49	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloromethane	ND		5.0	0.93	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Vinyl chloride	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromomethane	ND		1.0	0.21	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloroethane	ND		10	0.75	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Trichlorofluoromethane	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloroethene	ND		5.0	1.1	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Methylene Chloride	ND		40	9.9	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
trans-1,2-Dichloroethene	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloroethane	ND		1.0	0.19	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
2,2-Dichloropropane	ND		5.0	0.33	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
cis-1,2-Dichloroethene	ND		3.0	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromochloromethane	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloroform	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,1-Trichloroethane	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Carbon tetrachloride	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloropropene	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Benzene	ND		2.0	0.39	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dichloroethane	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Trichloroethene	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dichloropropane	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Dibromomethane	ND		1.0	0.17	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromodichloromethane	ND		1.0	0.18	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
cis-1,3-Dichloropropene	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Toluene	ND		10	1.3	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
trans-1,3-Dichloropropene	ND		10	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,2-Trichloroethane	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Tetrachloroethene	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,3-Dichloropropane	ND		2.0	0.23	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Dibromochloromethane	ND		1.5	0.27	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dibromoethane	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chlorobenzene	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Ethylbenzene	ND		2.0	0.41	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,1,2-Tetrachloroethane	ND		3.0	0.59	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,2,2-Tetrachloroethane	ND		4.0	0.90	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
m-Xylene & p-Xylene	ND		10	0.56	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
o-Xylene	ND		5.0	0.92	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Styrene	ND		3.0	0.74	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromoform	ND		5.0	0.84	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Isopropylbenzene	ND		2.0	0.46	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromobenzene	ND		10	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
N-Propylbenzene	ND		5.0	0.76	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,3-Trichloropropane	ND		5.0	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
2-Chlorotoluene	ND		5.0	0.93	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,3,5-Trimethylbenzene	ND		5.0	0.81	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
4-Chlorotoluene	ND		5.0	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
t-Butylbenzene	ND		3.0	0.66	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,4-Trimethylbenzene	ND		5.0	1.2	ug/Kg		12/11/20 16:40	12/11/20 20:46	1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-345397/1-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345397

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
sec-Butylbenzene	ND		3.0	0.67	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,3-Dichlorobenzene	ND		5.0	1.1	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
4-Isopropyltoluene	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,4-Dichlorobenzene	ND		5.0	0.98	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
n-Butylbenzene	ND		3.0	0.63	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dichlorobenzene	ND		10	1.3	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dibromo-3-Chloropropane	ND		10	1.6	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,4-Trichlorobenzene	ND		2.0	0.42	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,3-Trichlorobenzene	ND		3.0	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Hexachlorobutadiene	ND		3.0	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Naphthalene	1.85	J	10	1.8	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Methyl tert-butyl ether	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*88*		*80 - 120*	*12/11/20 16:40*	*12/11/20 20:46*	*1*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*	*12/11/20 16:40*	*12/11/20 20:46*	*1*
Dibromofluoromethane (Surr)	*103*		*80 - 120*	*12/11/20 16:40*	*12/11/20 20:46*	*1*
1,2-Dichloroethane-d4 (Surr)	*111*		*80 - 121*	*12/11/20 16:40*	*12/11/20 20:46*	*1*

Lab Sample ID: LCS 580-345397/2-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345397

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dichlorodifluoromethane	20.0	35.0	*+	ug/Kg		175	24 - 150
Chloromethane	20.0	27.8		ug/Kg		139	52 - 150
Vinyl chloride	20.0	24.3		ug/Kg		122	54 - 150
Bromomethane	20.0	26.6		ug/Kg		133	42 - 150
Chloroethane	20.0	24.0		ug/Kg		120	50 - 150
Trichlorofluoromethane	20.0	22.8		ug/Kg		114	71 - 150
1,1-Dichloroethene	20.0	25.4		ug/Kg		127	73 - 143
Methylene Chloride	20.0	22.9	J	ug/Kg		114	66 - 140
trans-1,2-Dichloroethene	20.0	21.6		ug/Kg		108	77 - 134
1,1-Dichloroethane	20.0	21.9		ug/Kg		110	78 - 135
2,2-Dichloropropane	20.0	22.0		ug/Kg		110	62 - 150
cis-1,2-Dichloroethene	20.0	22.2		ug/Kg		111	68 - 132
Bromochloromethane	20.0	23.0		ug/Kg		115	76 - 131
Chloroform	20.0	20.7		ug/Kg		103	74 - 133
1,1,1-Trichloroethane	20.0	21.3		ug/Kg		106	78 - 144
Carbon tetrachloride	20.0	22.4		ug/Kg		112	66 - 150
1,1-Dichloropropene	20.0	20.9		ug/Kg		104	76 - 140
Benzene	20.0	21.8		ug/Kg		109	79 - 135
1,2-Dichloroethane	20.0	22.4		ug/Kg		112	76 - 132
Trichloroethene	20.0	21.7		ug/Kg		109	80 - 134
1,2-Dichloropropane	20.0	22.0		ug/Kg		110	65 - 136
Dibromomethane	20.0	23.5		ug/Kg		118	72 - 130
Bromodichloromethane	20.0	20.3		ug/Kg		102	73 - 125
cis-1,3-Dichloropropene	20.0	18.5		ug/Kg		93	80 - 122

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 580-345397/2-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345397

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Toluene	20.0	18.2		ug/Kg		91	75 - 137
trans-1,3-Dichloropropene	20.0	18.3		ug/Kg		91	80 - 121
1,1,2-Trichloroethane	20.0	20.1		ug/Kg		101	80 - 123
Tetrachloroethene	20.0	17.3		ug/Kg		87	58 - 150
1,3-Dichloropropane	20.0	19.3		ug/Kg		96	75 - 120
Dibromochloromethane	20.0	18.8		ug/Kg		94	75 - 132
1,2-Dibromoethane	20.0	20.6		ug/Kg		103	77 - 123
Chlorobenzene	20.0	18.3		ug/Kg		91	80 - 131
Ethylbenzene	20.0	19.6		ug/Kg		98	80 - 135
1,1,1,2-Tetrachloroethane	20.0	18.4		ug/Kg		92	79 - 128
1,1,2,2-Tetrachloroethane	20.0	19.3		ug/Kg		97	77 - 127
m-Xylene & p-Xylene	20.0	17.1		ug/Kg		86	80 - 132
o-Xylene	20.0	19.1		ug/Kg		95	80 - 132
Styrene	20.0	18.4		ug/Kg		92	79 - 129
Bromoform	20.0	19.0		ug/Kg		95	71 - 146
Isopropylbenzene	20.0	18.9		ug/Kg		94	81 - 140
Bromobenzene	20.0	19.2		ug/Kg		96	78 - 126
N-Propylbenzene	20.0	17.8		ug/Kg		89	68 - 149
1,2,3-Trichloropropane	20.0	19.7		ug/Kg		98	77 - 127
2-Chlorotoluene	20.0	16.6		ug/Kg		83	77 - 134
1,3,5-Trimethylbenzene	20.0	17.8		ug/Kg		89	72 - 142
4-Chlorotoluene	20.0	16.8		ug/Kg		84	71 - 137
t-Butylbenzene	20.0	17.4		ug/Kg		87	72 - 144
1,2,4-Trimethylbenzene	20.0	17.8		ug/Kg		89	73 - 138
sec-Butylbenzene	20.0	18.0		ug/Kg		90	71 - 143
1,3-Dichlorobenzene	20.0	18.3		ug/Kg		91	78 - 132
4-Isopropyltoluene	20.0	17.8		ug/Kg		89	71 - 142
1,4-Dichlorobenzene	20.0	18.4		ug/Kg		92	77 - 123
n-Butylbenzene	20.0	16.8		ug/Kg		84	69 - 143
1,2-Dichlorobenzene	20.0	18.5		ug/Kg		93	78 - 126
1,2-Dibromo-3-Chloropropane	20.0	20.1		ug/Kg		100	75 - 129
1,2,4-Trichlorobenzene	20.0	20.0		ug/Kg		100	74 - 131
1,2,3-Trichlorobenzene	20.0	19.5		ug/Kg		97	68 - 136
Hexachlorobutadiene	20.0	18.6		ug/Kg		93	65 - 150
Naphthalene	20.0	21.5		ug/Kg		107	64 - 136
Methyl tert-butyl ether	20.0	24.0		ug/Kg		120	77 - 132

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*93*		*80 - 120*
4-Bromofluorobenzene (Surr)	*104*		*80 - 120*
Dibromofluoromethane (Surr)	*104*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*106*		*80 - 121*

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-345397/3-A	**Client Sample ID: Lab Control Sample Dup**
Matrix: Solid	**Prep Type: Total/NA**
Analysis Batch: 345537	**Prep Batch: 345397**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dichlorodifluoromethane	20.0	42.0	*+	ug/Kg		210	24 - 150	18	40
Chloromethane	20.0	28.9		ug/Kg		144	52 - 150	4	26
Vinyl chloride	20.0	27.8		ug/Kg		139	54 - 150	13	40
Bromomethane	20.0	27.0		ug/Kg		135	42 - 150	2	40
Chloroethane	20.0	25.4		ug/Kg		127	50 - 150	6	31
Trichlorofluoromethane	20.0	23.4		ug/Kg		117	71 - 150	3	36
1,1-Dichloroethene	20.0	25.8		ug/Kg		129	73 - 143	2	34
Methylene Chloride	20.0	24.7	J	ug/Kg		124	66 - 140	8	30
trans-1,2-Dichloroethene	20.0	21.2		ug/Kg		106	77 - 134	2	33
1,1-Dichloroethane	20.0	22.3		ug/Kg		112	78 - 135	2	31
2,2-Dichloropropane	20.0	22.7		ug/Kg		113	62 - 150	3	40
cis-1,2-Dichloroethene	20.0	22.2		ug/Kg		111	68 - 132	0	32
Bromochloromethane	20.0	23.6		ug/Kg		118	76 - 131	3	28
Chloroform	20.0	21.0		ug/Kg		105	74 - 133	1	36
1,1,1-Trichloroethane	20.0	21.9		ug/Kg		109	78 - 144	3	38
Carbon tetrachloride	20.0	22.7		ug/Kg		114	66 - 150	1	39
1,1-Dichloropropene	20.0	21.3		ug/Kg		106	76 - 140	2	38
Benzene	20.0	22.8		ug/Kg		114	79 - 135	4	31
1,2-Dichloroethane	20.0	23.2		ug/Kg		116	76 - 132	4	29
Trichloroethene	20.0	21.7		ug/Kg		108	80 - 134	0	40
1,2-Dichloropropane	20.0	23.4		ug/Kg		117	65 - 136	6	37
Dibromomethane	20.0	23.8		ug/Kg		119	72 - 130	1	34
Bromodichloromethane	20.0	20.8		ug/Kg		104	73 - 125	2	40
cis-1,3-Dichloropropene	20.0	19.1		ug/Kg		96	80 - 122	3	40
Toluene	20.0	19.0		ug/Kg		95	75 - 137	4	34
trans-1,3-Dichloropropene	20.0	19.0		ug/Kg		95	80 - 121	4	40
1,1,2-Trichloroethane	20.0	20.2		ug/Kg		101	80 - 123	1	39
Tetrachloroethene	20.0	17.5		ug/Kg		87	58 - 150	1	40
1,3-Dichloropropane	20.0	20.1		ug/Kg		101	75 - 120	4	37
Dibromochloromethane	20.0	19.1		ug/Kg		96	75 - 132	2	40
1,2-Dibromoethane	20.0	21.5		ug/Kg		107	77 - 123	4	37
Chlorobenzene	20.0	19.0		ug/Kg		95	80 - 131	4	40
Ethylbenzene	20.0	20.5		ug/Kg		103	80 - 135	5	37
1,1,1,2-Tetrachloroethane	20.0	18.9		ug/Kg		95	79 - 128	3	40
1,1,2,2-Tetrachloroethane	20.0	19.5		ug/Kg		97	77 - 127	1	40
m-Xylene & p-Xylene	20.0	17.6		ug/Kg		88	80 - 132	3	38
o-Xylene	20.0	20.0		ug/Kg		100	80 - 132	5	39
Styrene	20.0	19.0		ug/Kg		95	79 - 129	3	40
Bromoform	20.0	18.4		ug/Kg		92	71 - 146	3	40
Isopropylbenzene	20.0	19.2		ug/Kg		96	81 - 140	2	40
Bromobenzene	20.0	19.6		ug/Kg		98	78 - 126	2	40
N-Propylbenzene	20.0	18.6		ug/Kg		93	68 - 149	4	40
1,2,3-Trichloropropane	20.0	19.0		ug/Kg		95	77 - 127	3	40
2-Chlorotoluene	20.0	17.8		ug/Kg		89	77 - 134	7	40
1,3,5-Trimethylbenzene	20.0	18.4		ug/Kg		92	72 - 142	3	40
4-Chlorotoluene	20.0	17.3		ug/Kg		87	71 - 137	3	40
t-Butylbenzene	20.0	18.0		ug/Kg		90	72 - 144	3	40
1,2,4-Trimethylbenzene	20.0	18.7		ug/Kg		94	73 - 138	5	40

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-345397/3-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345397

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
sec-Butylbenzene	20.0	18.5		ug/Kg		93	71 - 143	3	40
1,3-Dichlorobenzene	20.0	19.2		ug/Kg		96	78 - 132	5	40
4-Isopropyltoluene	20.0	18.6		ug/Kg		93	71 - 142	5	40
1,4-Dichlorobenzene	20.0	19.3		ug/Kg		96	77 - 123	4	40
n-Butylbenzene	20.0	17.7		ug/Kg		88	69 - 143	6	40
1,2-Dichlorobenzene	20.0	19.4		ug/Kg		97	78 - 126	4	40
1,2-Dibromo-3-Chloropropane	20.0	19.0		ug/Kg		95	75 - 129	5	40
1,2,4-Trichlorobenzene	20.0	20.4		ug/Kg		102	74 - 131	2	40
1,2,3-Trichlorobenzene	20.0	19.3		ug/Kg		97	68 - 136	1	40
Hexachlorobutadiene	20.0	18.6		ug/Kg		93	65 - 150	0	36
Naphthalene	20.0	20.8		ug/Kg		104	64 - 136	3	40
Methyl tert-butyl ether	20.0	25.0		ug/Kg		125	77 - 132	4	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*91*		*80 - 120*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*
Dibromofluoromethane (Surr)	*104*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*109*		*80 - 121*

Lab Sample ID: MB 580-346011/1-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 346011

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0	0.49	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Chloromethane	ND		5.0	0.93	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Vinyl chloride	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Bromomethane	ND		1.0	0.21	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Chloroethane	ND		10	0.75	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Trichlorofluoromethane	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1-Dichloroethene	ND		5.0	1.1	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Methylene Chloride	ND		40	9.9	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
trans-1,2-Dichloroethene	ND		2.0	0.40	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1-Dichloroethane	ND		1.0	0.19	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
2,2-Dichloropropane	ND		5.0	0.33	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
cis-1,2-Dichloroethene	ND		3.0	0.60	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Bromochloromethane	ND		2.0	0.25	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Chloroform	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1,1-Trichloroethane	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Carbon tetrachloride	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1-Dichloropropene	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Benzene	ND		2.0	0.39	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2-Dichloroethane	ND		1.0	0.20	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Trichloroethene	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2-Dichloropropane	ND		2.0	0.40	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Dibromomethane	ND		1.0	0.17	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Bromodichloromethane	ND		1.0	0.18	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
cis-1,3-Dichloropropene	ND		1.0	0.20	ug/Kg		12/19/20 15:29	12/19/20 16:47	1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-346011/1-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 346011

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	ND		10	1.3	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
trans-1,3-Dichloropropene	ND		10	0.60	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1,2-Trichloroethane	ND		2.0	0.25	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Tetrachloroethene	ND		2.0	0.40	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,3-Dichloropropane	ND		2.0	0.23	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Dibromochloromethane	ND		1.5	0.27	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2-Dibromoethane	ND		1.0	0.20	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Chlorobenzene	ND		2.0	0.25	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Ethylbenzene	ND		2.0	0.41	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1,1,2-Tetrachloroethane	ND		3.0	0.59	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,1,2,2-Tetrachloroethane	ND		4.0	0.90	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
m-Xylene & p-Xylene	ND		10	0.56	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
o-Xylene	ND		5.0	0.92	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Styrene	ND		3.0	0.74	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Bromoform	ND		5.0	0.84	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Isopropylbenzene	ND		2.0	0.46	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Bromobenzene	ND		10	1.0	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
N-Propylbenzene	ND		5.0	0.76	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2,3-Trichloropropane	ND		5.0	1.0	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
2-Chlorotoluene	ND		5.0	0.93	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,3,5-Trimethylbenzene	ND		5.0	0.81	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
4-Chlorotoluene	ND		5.0	1.0	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
t-Butylbenzene	ND		3.0	0.66	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2,4-Trimethylbenzene	ND		5.0	1.2	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
sec-Butylbenzene	ND		3.0	0.67	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,3-Dichlorobenzene	ND		5.0	1.1	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
4-Isopropyltoluene	ND		2.0	0.40	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,4-Dichlorobenzene	ND		5.0	0.98	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
n-Butylbenzene	ND		3.0	0.63	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2-Dichlorobenzene	ND		10	1.3	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2-Dibromo-3-Chloropropane	ND		10	1.6	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2,4-Trichlorobenzene	ND		2.0	0.42	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
1,2,3-Trichlorobenzene	ND		3.0	0.60	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Hexachlorobutadiene	ND		3.0	0.60	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Naphthalene	ND		10	1.8	ug/Kg		12/19/20 15:29	12/19/20 16:47	1
Methyl tert-butyl ether	ND		2.0	0.30	ug/Kg		12/19/20 15:29	12/19/20 16:47	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*92*		*80 - 120*	*12/19/20 15:29*	*12/19/20 16:47*	*1*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*	*12/19/20 15:29*	*12/19/20 16:47*	*1*
Dibromofluoromethane (Surr)	*101*		*80 - 120*	*12/19/20 15:29*	*12/19/20 16:47*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*80 - 121*	*12/19/20 15:29*	*12/19/20 16:47*	*1*

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 580-346011/2-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346011

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dichlorodifluoromethane	20.0	25.3		ug/Kg		127	24 - 150
Chloromethane	20.0	23.6		ug/Kg		118	52 - 150
Vinyl chloride	20.0	21.0		ug/Kg		105	54 - 150
Bromomethane	20.0	20.1		ug/Kg		101	42 - 150
Chloroethane	20.0	24.0		ug/Kg		120	50 - 150
Trichlorofluoromethane	20.0	21.4		ug/Kg		107	71 - 150
1,1-Dichloroethene	20.0	23.0		ug/Kg		115	73 - 143
Methylene Chloride	20.0	14.9	J	ug/Kg		75	66 - 140
trans-1,2-Dichloroethene	20.0	19.1		ug/Kg		95	77 - 134
1,1-Dichloroethane	20.0	20.5		ug/Kg		103	78 - 135
2,2-Dichloropropane	20.0	20.1		ug/Kg		101	62 - 150
cis-1,2-Dichloroethene	20.0	20.0		ug/Kg		100	68 - 132
Bromochloromethane	20.0	20.8		ug/Kg		104	76 - 131
Chloroform	20.0	18.5		ug/Kg		93	74 - 133
1,1,1-Trichloroethane	20.0	20.0		ug/Kg		100	78 - 144
Carbon tetrachloride	20.0	21.3		ug/Kg		106	66 - 150
1,1-Dichloropropene	20.0	20.3		ug/Kg		102	76 - 140
Benzene	20.0	20.1		ug/Kg		100	79 - 135
1,2-Dichloroethane	20.0	19.4		ug/Kg		97	76 - 132
Trichloroethene	20.0	19.9		ug/Kg		99	80 - 134
1,2-Dichloropropane	20.0	19.9		ug/Kg		100	65 - 136
Dibromomethane	20.0	20.5		ug/Kg		103	72 - 130
Bromodichloromethane	20.0	18.3		ug/Kg		91	73 - 125
cis-1,3-Dichloropropene	20.0	16.3		ug/Kg		82	80 - 122
Toluene	20.0	17.3		ug/Kg		87	75 - 137
trans-1,3-Dichloropropene	20.0	16.5		ug/Kg		82	80 - 121
1,1,2-Trichloroethane	20.0	16.9		ug/Kg		84	80 - 123
Tetrachloroethene	20.0	16.8		ug/Kg		84	58 - 150
1,3-Dichloropropane	20.0	17.1		ug/Kg		86	75 - 120
Dibromochloromethane	20.0	16.4		ug/Kg		82	75 - 132
1,2-Dibromoethane	20.0	18.1		ug/Kg		91	77 - 123
Chlorobenzene	20.0	16.7		ug/Kg		84	80 - 131
Ethylbenzene	20.0	17.7		ug/Kg		88	80 - 135
1,1,1,2-Tetrachloroethane	20.0	16.4		ug/Kg		82	79 - 128
1,1,2,2-Tetrachloroethane	20.0	16.3		ug/Kg		81	77 - 127
m-Xylene & p-Xylene	20.0	15.6	*-	ug/Kg		78	80 - 132
o-Xylene	20.0	17.4		ug/Kg		87	80 - 132
Styrene	20.0	16.6		ug/Kg		83	79 - 129
Bromoform	20.0	15.5		ug/Kg		78	71 - 146
Isopropylbenzene	20.0	16.9		ug/Kg		85	81 - 140
Bromobenzene	20.0	16.3		ug/Kg		81	78 - 126
N-Propylbenzene	20.0	16.0		ug/Kg		80	68 - 149
1,2,3-Trichloropropane	20.0	16.1		ug/Kg		80	77 - 127
2-Chlorotoluene	20.0	15.3		ug/Kg		77	77 - 134
1,3,5-Trimethylbenzene	20.0	15.7		ug/Kg		78	72 - 142
4-Chlorotoluene	20.0	15.3		ug/Kg		77	71 - 137
t-Butylbenzene	20.0	15.4		ug/Kg		77	72 - 144
1,2,4-Trimethylbenzene	20.0	16.0		ug/Kg		80	73 - 138

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 580-346011/2-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346011

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
sec-Butylbenzene	20.0	15.6		ug/Kg		78	71 - 143
1,3-Dichlorobenzene	20.0	16.1		ug/Kg		81	78 - 132
4-Isopropyltoluene	20.0	15.4		ug/Kg		77	71 - 142
1,4-Dichlorobenzene	20.0	15.8		ug/Kg		79	77 - 123
n-Butylbenzene	20.0	14.4		ug/Kg		72	69 - 143
1,2-Dichlorobenzene	20.0	16.2		ug/Kg		81	78 - 126
1,2-Dibromo-3-Chloropropane	20.0	15.8		ug/Kg		79	75 - 129
1,2,4-Trichlorobenzene	20.0	16.9		ug/Kg		85	74 - 131
1,2,3-Trichlorobenzene	20.0	16.6		ug/Kg		83	68 - 136
Hexachlorobutadiene	20.0	14.5		ug/Kg		73	65 - 150
Naphthalene	20.0	18.1		ug/Kg		90	64 - 136
Methyl tert-butyl ether	20.0	21.0		ug/Kg		105	77 - 132

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*88*		*80 - 120*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*
Dibromofluoromethane (Surr)	*101*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*104*		*80 - 121*

Lab Sample ID: LCSD 580-346011/3-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 346011

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dichlorodifluoromethane	20.0	24.5		ug/Kg		122	24 - 150	4	40
Chloromethane	20.0	24.7		ug/Kg		123	52 - 150	5	26
Vinyl chloride	20.0	24.3		ug/Kg		121	54 - 150	15	40
Bromomethane	20.0	22.0		ug/Kg		110	42 - 150	9	40
Chloroethane	20.0	21.5		ug/Kg		107	50 - 150	11	31
Trichlorofluoromethane	20.0	19.5		ug/Kg		97	71 - 150	10	36
1,1-Dichloroethene	20.0	22.2		ug/Kg		111	73 - 143	4	34
Methylene Chloride	20.0	21.3	J *1	ug/Kg		106	66 - 140	35	30
trans-1,2-Dichloroethene	20.0	19.5		ug/Kg		98	77 - 134	2	33
1,1-Dichloroethane	20.0	21.2		ug/Kg		106	78 - 135	3	31
2,2-Dichloropropane	20.0	20.7		ug/Kg		104	62 - 150	3	40
cis-1,2-Dichloroethene	20.0	20.8		ug/Kg		104	68 - 132	4	32
Bromochloromethane	20.0	21.2		ug/Kg		106	76 - 131	2	28
Chloroform	20.0	19.4		ug/Kg		97	74 - 133	5	36
1,1,1-Trichloroethane	20.0	20.1		ug/Kg		101	78 - 144	1	38
Carbon tetrachloride	20.0	21.7		ug/Kg		109	66 - 150	2	39
1,1-Dichloropropene	20.0	20.1		ug/Kg		101	76 - 140	1	38
Benzene	20.0	20.5		ug/Kg		102	79 - 135	2	31
1,2-Dichloroethane	20.0	20.3		ug/Kg		101	76 - 132	5	29
Trichloroethene	20.0	19.5		ug/Kg		97	80 - 134	2	40
1,2-Dichloropropane	20.0	20.8		ug/Kg		104	65 - 136	4	37
Dibromomethane	20.0	21.1		ug/Kg		106	72 - 130	3	34
Bromodichloromethane	20.0	18.6		ug/Kg		93	73 - 125	2	40
cis-1,3-Dichloropropene	20.0	16.2		ug/Kg		81	80 - 122	1	40

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-346011/3-A
Matrix: Solid
Analysis Batch: 346000

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 346011

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Toluene	20.0	16.7		ug/Kg		83	75 - 137	4	34
trans-1,3-Dichloropropene	20.0	16.4		ug/Kg		82	80 - 121	0	40
1,1,2-Trichloroethane	20.0	17.3		ug/Kg		86	80 - 123	2	39
Tetrachloroethene	20.0	15.4		ug/Kg		77	58 - 150	8	40
1,3-Dichloropropane	20.0	17.7		ug/Kg		89	75 - 120	3	37
Dibromochloromethane	20.0	16.9		ug/Kg		85	75 - 132	4	40
1,2-Dibromoethane	20.0	18.0		ug/Kg		90	77 - 123	1	37
Chlorobenzene	20.0	16.7		ug/Kg		84	80 - 131	0	40
Ethylbenzene	20.0	18.0		ug/Kg		90	80 - 135	2	37
1,1,1,2-Tetrachloroethane	20.0	16.2		ug/Kg		81	79 - 128	1	40
1,1,2,2-Tetrachloroethane	20.0	17.1		ug/Kg		86	77 - 127	5	40
m-Xylene & p-Xylene	20.0	15.5	*-	ug/Kg		77	80 - 132	1	38
o-Xylene	20.0	17.0		ug/Kg		85	80 - 132	2	39
Styrene	20.0	16.6		ug/Kg		83	79 - 129	0	40
Bromoform	20.0	15.9		ug/Kg		79	71 - 146	2	40
Isopropylbenzene	20.0	17.1		ug/Kg		86	81 - 140	1	40
Bromobenzene	20.0	16.8		ug/Kg		84	78 - 126	3	40
N-Propylbenzene	20.0	16.6		ug/Kg		83	68 - 149	3	40
1,2,3-Trichloropropane	20.0	17.5		ug/Kg		88	77 - 127	9	40
2-Chlorotoluene	20.0	16.5		ug/Kg		82	77 - 134	7	40
1,3,5-Trimethylbenzene	20.0	16.4		ug/Kg		82	72 - 142	5	40
4-Chlorotoluene	20.0	16.0		ug/Kg		80	71 - 137	4	40
t-Butylbenzene	20.0	15.9		ug/Kg		80	72 - 144	3	40
1,2,4-Trimethylbenzene	20.0	16.6		ug/Kg		83	73 - 138	4	40
sec-Butylbenzene	20.0	16.7		ug/Kg		84	71 - 143	7	40
1,3-Dichlorobenzene	20.0	16.4		ug/Kg		82	78 - 132	2	40
4-Isopropyltoluene	20.0	16.5		ug/Kg		82	71 - 142	7	40
1,4-Dichlorobenzene	20.0	16.4		ug/Kg		82	77 - 123	4	40
n-Butylbenzene	20.0	15.4		ug/Kg		77	69 - 143	7	40
1,2-Dichlorobenzene	20.0	16.4		ug/Kg		82	78 - 126	1	40
1,2-Dibromo-3-Chloropropane	20.0	17.4		ug/Kg		87	75 - 129	10	40
1,2,4-Trichlorobenzene	20.0	17.6		ug/Kg		88	74 - 131	4	40
1,2,3-Trichlorobenzene	20.0	16.5		ug/Kg		82	68 - 136	0	40
Hexachlorobutadiene	20.0	15.3		ug/Kg		76	65 - 150	5	36
Naphthalene	20.0	17.6		ug/Kg		88	64 - 136	3	40
Methyl tert-butyl ether	20.0	21.4		ug/Kg		107	77 - 132	2	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*90*		*80 - 120*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*
Dibromofluoromethane (Surr)	*100*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*105*		*80 - 121*

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-345599/1-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345599

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenol	ND		150	23	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Bis(2-chloroethyl)ether	ND		100	7.7	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Chlorophenol	ND		200	4.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,3-Dichlorobenzene	ND		50	4.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,4-Dichlorobenzene	ND		50	8.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzyl alcohol	ND		1000	50	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,2-Dichlorobenzene	ND		50	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Methylphenol	ND		150	9.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
3 & 4 Methylphenol	ND		200	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
N-Nitrosodi-n-propylamine	ND		200	22	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachloroethane	ND		150	4.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Nitrobenzene	ND		200	20	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Isophorone	ND		150	8.4	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Nitrophenol	ND		200	6.2	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dimethylphenol	ND		200	60	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzoic acid	ND		4000	1200	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Bis(2-chloroethoxy)methane	ND		200	18	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dichlorophenol	ND		200	60	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,2,4-Trichlorobenzene	ND		50	6.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Naphthalene	34.8		25	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Chloroaniline	ND		1500	130	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachlorobutadiene	ND		50	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Chloro-3-methylphenol	ND		150	33	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Methylnaphthalene	13.9	J	50	8.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachlorocyclopentadiene	ND		100	7.7	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4,6-Trichlorophenol	ND		150	13	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4,5-Trichlorophenol	ND		200	8.1	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Chloronaphthalene	ND		25	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Nitroaniline	ND		100	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Dimethyl phthalate	ND		150	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Acenaphthylene	ND		25	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,6-Dinitrotoluene	ND		150	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
3-Nitroaniline	ND		300	100	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Acenaphthene	9.31	J	40	4.6	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dinitrophenol	ND		2000	590	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Nitrophenol	ND		2000	170	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Dibenzofuran	ND		150	5.9	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dinitrotoluene	ND		200	43	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Diethyl phthalate	ND		400	22	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Chlorophenyl phenyl ether	ND		200	6.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Fluorene	ND		25	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Nitroaniline	ND		150	50	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4,6-Dinitro-2-methylphenol	ND		1000	100	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
N-Nitrosodiphenylamine	ND		60	8.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Bromophenyl phenyl ether	ND		200	9.1	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachlorobenzene	ND		50	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Pentachlorophenol	ND		400	63	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Phenanthrene	11.3	J	60	5.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-345599/1-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345599

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Anthracene	ND		60	16	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Di-n-butyl phthalate	ND		500	27	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Fluoranthene	ND		40	12	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Pyrene	ND		60	13	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Butyl benzyl phthalate	ND		200	51	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
3,3'-Dichlorobenzidine	ND		400	84	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzo[a]anthracene	ND		40	11	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Chrysene	ND		60	13	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Bis(2-ethylhexyl) phthalate	ND		600	71	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Di-n-octyl phthalate	ND		150	12	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzo[a]pyrene	ND		60	13	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Indeno[1,2,3-cd]pyrene	ND		40	12	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Dibenz(a,h)anthracene	ND		50	12	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzo[g,h,i]perylene	ND		60	18	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Carbazole	ND		150	7.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1-Methylnaphthalene	7.21	J	30	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzo[b]fluoranthene	ND		40	10	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzo[k]fluoranthene	ND		60	14	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
bis(chloroisopropyl) ether	ND		200	6.1	ug/Kg		12/15/20 11:55	12/16/20 14:46	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*88*		*47 - 119*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
Phenol-d5 (Surr)	*84*		*59 - 120*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
Nitrobenzene-d5 (Surr)	*97*		*54 - 120*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
2-Fluorobiphenyl	*106*		*57 - 120*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
2,4,6-Tribromophenol (Surr)	*53*		*52 - 115*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
Terphenyl-d14 (Surr)	*115*		*73 - 125*	*12/15/20 11:55*	*12/16/20 14:46*	*1*

Lab Sample ID: LCS 580-345599/2-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenol	1000	858		ug/Kg		86	59 - 120
Bis(2-chloroethyl)ether	1000	1020		ug/Kg		102	61 - 120
2-Chlorophenol	1000	889		ug/Kg		89	66 - 120
1,3-Dichlorobenzene	1000	881		ug/Kg		88	57 - 120
1,4-Dichlorobenzene	1000	852		ug/Kg		85	57 - 120
Benzyl alcohol	1000	968	J	ug/Kg		97	10 - 134
1,2-Dichlorobenzene	1000	856		ug/Kg		86	62 - 120
2-Methylphenol	1000	780		ug/Kg		78	53 - 120
3 & 4 Methylphenol	1000	807		ug/Kg		81	54 - 120
N-Nitrosodi-n-propylamine	1000	995		ug/Kg		100	56 - 138
Hexachloroethane	1000	881		ug/Kg		88	57 - 132
Nitrobenzene	1000	1020		ug/Kg		102	57 - 128
Isophorone	1000	1010		ug/Kg		101	61 - 128
2-Nitrophenol	1000	993		ug/Kg		99	49 - 123
2,4-Dimethylphenol	1000	747		ug/Kg		75	31 - 129

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 580-345599/2-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzoic acid	2000	ND		ug/Kg		22	10 - 120
Bis(2-chloroethoxy)methane	1000	975		ug/Kg		97	60 - 120
2,4-Dichlorophenol	1000	933		ug/Kg		93	63 - 120
1,2,4-Trichlorobenzene	1000	977		ug/Kg		98	66 - 120
Naphthalene	1000	954		ug/Kg		95	68 - 120
4-Chloroaniline	1000	ND	*-	ug/Kg		7	10 - 120
Hexachlorobutadiene	1000	924		ug/Kg		92	64 - 130
4-Chloro-3-methylphenol	1000	1170		ug/Kg		117	55 - 120
2-Methylnaphthalene	1000	945		ug/Kg		95	70 - 120
Hexachlorocyclopentadiene	1000	618		ug/Kg		62	53 - 131
2,4,6-Trichlorophenol	1000	989		ug/Kg		99	37 - 120
2,4,5-Trichlorophenol	1000	781		ug/Kg		78	41 - 120
2-Chloronaphthalene	1000	1100		ug/Kg		110	65 - 120
2-Nitroaniline	1000	1080		ug/Kg		108	54 - 126
Dimethyl phthalate	1000	1070		ug/Kg		107	71 - 120
Acenaphthylene	1000	1080		ug/Kg		108	63 - 120
2,6-Dinitrotoluene	1000	1060		ug/Kg		106	70 - 126
3-Nitroaniline	1000	465		ug/Kg		47	34 - 120
Acenaphthene	1000	1110		ug/Kg		111	64 - 120
2,4-Dinitrophenol	2000	ND	*-	ug/Kg		7	10 - 139
4-Nitrophenol	2000	1780	J	ug/Kg		89	10 - 140
Dibenzofuran	1000	1110		ug/Kg		111	68 - 120
2,4-Dinitrotoluene	1000	1040		ug/Kg		104	63 - 120
Diethyl phthalate	1000	1060		ug/Kg		106	66 - 135
4-Chlorophenyl phenyl ether	1000	1100		ug/Kg		110	70 - 120
Fluorene	1000	1060		ug/Kg		106	68 - 121
4-Nitroaniline	1000	1030		ug/Kg		103	36 - 141
4,6-Dinitro-2-methylphenol	2000	835	J	ug/Kg		42	13 - 141
N-Nitrosodiphenylamine	1000	961		ug/Kg		96	67 - 128
4-Bromophenyl phenyl ether	1000	1010		ug/Kg		101	65 - 127
Hexachlorobenzene	1000	905		ug/Kg		91	65 - 126
Pentachlorophenol	2000	854		ug/Kg		43	10 - 120
Phenanthrene	1000	922		ug/Kg		92	68 - 126
Anthracene	1000	944		ug/Kg		94	67 - 131
Di-n-butyl phthalate	1000	980		ug/Kg		98	66 - 150
Fluoranthene	1000	976		ug/Kg		98	69 - 133
Pyrene	1000	968		ug/Kg		97	68 - 141
Butyl benzyl phthalate	1000	997		ug/Kg		100	58 - 150
3,3'-Dichlorobenzidine	2000	1460		ug/Kg		73	49 - 148
Benzo[a]anthracene	1000	977		ug/Kg		98	60 - 135
Chrysene	1000	1010		ug/Kg		101	69 - 127
Bis(2-ethylhexyl) phthalate	1000	997		ug/Kg		100	45 - 150
Di-n-octyl phthalate	1000	1160		ug/Kg		116	53 - 150
Benzo[a]pyrene	1000	952		ug/Kg		95	62 - 129
Indeno[1,2,3-cd]pyrene	1000	525		ug/Kg		52	52 - 146
Dibenz(a,h)anthracene	1000	629		ug/Kg		63	59 - 139
Benzo[g,h,i]perylene	1000	488	*-	ug/Kg		49	64 - 146
Carbazole	1000	1130		ug/Kg		113	43 - 150
1-Methylnaphthalene	1000	982		ug/Kg		98	69 - 120

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 580-345599/2-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[b]fluoranthene	1000	1070		ug/Kg		107	58 - 136
Benzo[k]fluoranthene	1000	1090		ug/Kg		109	68 - 123
bis(chloroisopropyl) ether	1000	1240	*+	ug/Kg		124	55 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorophenol (Surr)	*91*		*47 - 119*
Phenol-d5 (Surr)	*89*		*59 - 120*
Nitrobenzene-d5 (Surr)	*105*		*54 - 120*
2-Fluorobiphenyl	*104*		*57 - 120*
2,4,6-Tribromophenol (Surr)	*82*		*52 - 115*
Terphenyl-d14 (Surr)	*92*		*73 - 125*

Lab Sample ID: 580-99593-4 MS
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: 20-C025783
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenol	ND		1050	917		ug/Kg	☼	88	59 - 120
Bis(2-chloroethyl)ether	ND		1050	1090		ug/Kg	☼	104	61 - 120
2-Chlorophenol	ND		1050	1010		ug/Kg	☼	96	66 - 120
1,3-Dichlorobenzene	ND		1050	946		ug/Kg	☼	90	57 - 120
1,4-Dichlorobenzene	ND		1050	952		ug/Kg	☼	91	57 - 120
Benzyl alcohol	ND		1050	1080		ug/Kg	☼	104	10 - 134
1,2-Dichlorobenzene	ND		1050	964		ug/Kg	☼	92	62 - 120
2-Methylphenol	ND		1050	882		ug/Kg	☼	84	53 - 120
3 & 4 Methylphenol	ND		1050	863		ug/Kg	☼	83	54 - 120
N-Nitrosodi-n-propylamine	ND		1050	1190		ug/Kg	☼	114	56 - 138
Hexachloroethane	ND		1050	938		ug/Kg	☼	90	57 - 132
Nitrobenzene	ND		1050	1130		ug/Kg	☼	108	57 - 128
Isophorone	ND		1050	1110		ug/Kg	☼	106	61 - 128
2-Nitrophenol	ND		1050	1020		ug/Kg	☼	98	49 - 123
2,4-Dimethylphenol	ND	F2 F1	1050	889		ug/Kg	☼	85	31 - 129
Benzoic acid	ND	F1	2090	ND	F1	ug/Kg	☼	0	10 - 120
Bis(2-chloroethoxy)methane	ND		1050	1060		ug/Kg	☼	101	60 - 120
2,4-Dichlorophenol	ND	F2	1050	1040		ug/Kg	☼	99	63 - 120
1,2,4-Trichlorobenzene	ND		1050	1040		ug/Kg	☼	99	66 - 120
Naphthalene	ND		1050	985		ug/Kg	☼	94	68 - 120
4-Chloroaniline	ND	F1 *-	1050	ND	F1	ug/Kg	☼	0	10 - 120
Hexachlorobutadiene	ND		1050	994		ug/Kg	☼	95	64 - 130
4-Chloro-3-methylphenol	ND	F2	1050	1230		ug/Kg	☼	118	55 - 120
2-Methylnaphthalene	ND		1050	1050		ug/Kg	☼	100	70 - 120
Hexachlorocyclopentadiene	ND	F1	1050	437	F1	ug/Kg	☼	42	53 - 131
2,4,6-Trichlorophenol	ND	F2	1050	1080		ug/Kg	☼	104	37 - 120
2,4,5-Trichlorophenol	ND	F2	1050	870		ug/Kg	☼	83	41 - 120
2-Chloronaphthalene	ND		1050	1120		ug/Kg	☼	107	65 - 120
2-Nitroaniline	ND	F2	1050	1110		ug/Kg	☼	106	54 - 126
Dimethyl phthalate	ND	F2	1050	1060		ug/Kg	☼	101	71 - 120
Acenaphthylene	ND	F2	1050	1090		ug/Kg	☼	104	63 - 120

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99593-4 MS
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: 20-C025783
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
2,6-Dinitrotoluene	ND	F2	1050	1100		ug/Kg	☼	105	70 - 126
3-Nitroaniline	ND	F2	1050	600		ug/Kg	☼	57	34 - 120
Acenaphthene	ND	F2	1050	1110		ug/Kg	☼	106	64 - 120
2,4-Dinitrophenol	ND	F1 *-	2090	ND	F1	ug/Kg	☼	0	10 - 139
4-Nitrophenol	ND		2090	1870	J	ug/Kg	☼	90	10 - 140
Dibenzofuran	ND	F2	1050	1110		ug/Kg	☼	106	68 - 120
2,4-Dinitrotoluene	ND		1050	1040		ug/Kg	☼	100	63 - 120
Diethyl phthalate	ND		1050	1080		ug/Kg	☼	103	66 - 135
4-Chlorophenyl phenyl ether	ND	F2	1050	1120		ug/Kg	☼	107	70 - 120
Fluorene	ND	F2	1050	1070		ug/Kg	☼	103	68 - 121
4-Nitroaniline	ND	F2	1050	978		ug/Kg	☼	94	36 - 141
4,6-Dinitro-2-methylphenol	ND	F2	2090	292	J	ug/Kg	☼	14	13 - 141
N-Nitrosodiphenylamine	ND	F2 F1	1050	1070		ug/Kg	☼	102	67 - 128
4-Bromophenyl phenyl ether	ND		1050	1130		ug/Kg	☼	108	65 - 127
Hexachlorobenzene	ND		1050	1060		ug/Kg	☼	101	65 - 126
Pentachlorophenol	ND		2090	1410		ug/Kg	☼	67	10 - 120
Phenanthrene	ND		1050	1060		ug/Kg	☼	101	68 - 126
Anthracene	ND		1050	1070		ug/Kg	☼	102	67 - 131
Di-n-butyl phthalate	ND		1050	1160		ug/Kg	☼	111	66 - 150
Fluoranthene	ND	F2	1050	1140		ug/Kg	☼	109	69 - 133
Pyrene	ND		1050	1130		ug/Kg	☼	108	68 - 141
Butyl benzyl phthalate	ND		1050	1010		ug/Kg	☼	97	58 - 150
3,3'-Dichlorobenzidine	ND	F1	2090	1510		ug/Kg	☼	72	49 - 148
Benzo[a]anthracene	ND		1050	988		ug/Kg	☼	94	60 - 135
Chrysene	ND		1050	982		ug/Kg	☼	94	69 - 127
Bis(2-ethylhexyl) phthalate	ND		1050	1030		ug/Kg	☼	98	45 - 150
Di-n-octyl phthalate	ND		1050	1370		ug/Kg	☼	131	53 - 150
Benzo[a]pyrene	ND		1050	1090		ug/Kg	☼	104	62 - 129
Indeno[1,2,3-cd]pyrene	ND		1050	673		ug/Kg	☼	64	52 - 146
Dibenz(a,h)anthracene	ND		1050	706		ug/Kg	☼	67	59 - 139
Benzo[g,h,i]perylene	ND	F1 *-	1050	559	F1	ug/Kg	☼	53	64 - 146
Carbazole	ND		1050	1260		ug/Kg	☼	120	43 - 150
1-Methylnaphthalene	ND		1050	1070		ug/Kg	☼	102	69 - 120
Benzo[b]fluoranthene	ND		1050	1270		ug/Kg	☼	121	58 - 136
Benzo[k]fluoranthene	ND		1050	1160		ug/Kg	☼	110	68 - 123
bis(chloroisopropyl) ether	ND	F1 *+	1050	1600	F1	ug/Kg	☼	153	55 - 120

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2-Fluorophenol (Surr)	*99*		*47 - 119*
Phenol-d5 (Surr)	*99*		*59 - 120*
Nitrobenzene-d5 (Surr)	*118*		*54 - 120*
2-Fluorobiphenyl	*110*		*57 - 120*
2,4,6-Tribromophenol (Surr)	*103*		*52 - 115*
Terphenyl-d14 (Surr)	*113*		*73 - 125*

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99593-4 MSD
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: 20-C025783
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phenol	ND		1050	817		ug/Kg	☼	78	59 - 120	12	30
Bis(2-chloroethyl)ether	ND		1050	1080		ug/Kg	☼	103	61 - 120	1	30
2-Chlorophenol	ND		1050	904		ug/Kg	☼	86	66 - 120	11	32
1,3-Dichlorobenzene	ND		1050	906		ug/Kg	☼	87	57 - 120	4	29
1,4-Dichlorobenzene	ND		1050	897		ug/Kg	☼	86	57 - 120	6	35
Benzyl alcohol	ND		1050	977	J	ug/Kg	☼	93	10 - 134	10	40
1,2-Dichlorobenzene	ND		1050	885		ug/Kg	☼	85	62 - 120	9	30
2-Methylphenol	ND		1050	608		ug/Kg	☼	58	53 - 120	37	40
3 & 4 Methylphenol	ND		1050	659		ug/Kg	☼	63	54 - 120	27	36
N-Nitrosodi-n-propylamine	ND		1050	1120		ug/Kg	☼	107	56 - 138	6	35
Hexachloroethane	ND		1050	947		ug/Kg	☼	91	57 - 132	1	34
Nitrobenzene	ND		1050	1110		ug/Kg	☼	106	57 - 128	2	33
Isophorone	ND		1050	1050		ug/Kg	☼	100	61 - 128	6	31
2-Nitrophenol	ND		1050	882		ug/Kg	☼	84	49 - 123	15	30
2,4-Dimethylphenol	ND	F2 F1	1050	193	J F2 F1	ug/Kg	☼	18	31 - 129	129	40
Benzoic acid	ND	F1	2090	ND	F1	ug/Kg	☼	0	10 - 120	NC	40
Bis(2-chloroethoxy)methane	ND		1050	996		ug/Kg	☼	95	60 - 120	6	33
2,4-Dichlorophenol	ND	F2	1050	817	F2	ug/Kg	☼	78	63 - 120	24	19
1,2,4-Trichlorobenzene	ND		1050	918		ug/Kg	☼	88	66 - 120	12	18
Naphthalene	ND		1050	900		ug/Kg	☼	86	68 - 120	9	15
4-Chloroaniline	ND	F1 *-	1050	ND	F1	ug/Kg	☼	0	10 - 120	NC	40
Hexachlorobutadiene	ND		1050	850		ug/Kg	☼	81	64 - 130	16	19
4-Chloro-3-methylphenol	ND	F2	1050	898	F2	ug/Kg	☼	86	55 - 120	31	25
2-Methylnaphthalene	ND		1050	899		ug/Kg	☼	86	70 - 120	15	21
Hexachlorocyclopentadiene	ND	F1	1050	466	F1	ug/Kg	☼	45	53 - 131	6	21
2,4,6-Trichlorophenol	ND	F2	1050	849	F2	ug/Kg	☼	81	37 - 120	24	20
2,4,5-Trichlorophenol	ND	F2	1050	617	F2	ug/Kg	☼	59	41 - 120	34	23
2-Chloronaphthalene	ND		1050	911		ug/Kg	☼	87	65 - 120	20	21
2-Nitroaniline	ND	F2	1050	848	F2	ug/Kg	☼	81	54 - 126	27	16
Dimethyl phthalate	ND	F2	1050	839	F2	ug/Kg	☼	80	71 - 120	23	21
Acenaphthylene	ND	F2	1050	844	F2	ug/Kg	☼	81	63 - 120	26	18
2,6-Dinitrotoluene	ND	F2	1050	891	F2	ug/Kg	☼	85	70 - 126	21	18
3-Nitroaniline	ND	F2	1050	382	F2	ug/Kg	☼	37	34 - 120	44	25
Acenaphthene	ND	F2	1050	905	F2	ug/Kg	☼	87	64 - 120	20	19
2,4-Dinitrophenol	ND	F1 *-	2090	ND	F1	ug/Kg	☼	0	10 - 139	NC	40
4-Nitrophenol	ND		2090	1530	J	ug/Kg	☼	73	10 - 140	20	31
Dibenzofuran	ND	F2	1050	905	F2	ug/Kg	☼	87	68 - 120	20	18
2,4-Dinitrotoluene	ND		1050	826		ug/Kg	☼	79	63 - 120	23	23
Diethyl phthalate	ND		1050	865		ug/Kg	☼	83	66 - 135	22	22
4-Chlorophenyl phenyl ether	ND	F2	1050	871	F2	ug/Kg	☼	83	70 - 120	25	21
Fluorene	ND	F2	1050	854	F2	ug/Kg	☼	82	68 - 121	23	17
4-Nitroaniline	ND	F2	1050	616	F2	ug/Kg	☼	59	36 - 141	45	23
4,6-Dinitro-2-methylphenol	ND	F2	2090	477	J F2	ug/Kg	☼	23	13 - 141	48	40
N-Nitrosodiphenylamine	ND	F2 F1	1050	218	F2 F1	ug/Kg	☼	21	67 - 128	132	30
4-Bromophenyl phenyl ether	ND		1050	888		ug/Kg	☼	85	65 - 127	24	32
Hexachlorobenzene	ND		1050	853		ug/Kg	☼	82	65 - 126	21	32
Pentachlorophenol	ND		2090	1080		ug/Kg	☼	52	10 - 120	26	40
Phenanthrene	ND		1050	866		ug/Kg	☼	83	68 - 126	20	27

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99593-4 MSD
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: 20-C025783
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Anthracene	ND		1050	863		ug/Kg	☼	83	67 - 131	21	28
Di-n-butyl phthalate	ND		1050	935		ug/Kg	☼	89	66 - 150	21	26
Fluoranthene	ND	F2	1050	896	F2	ug/Kg	☼	86	69 - 133	24	21
Pyrene	ND		1050	913		ug/Kg	☼	87	68 - 141	21	24
Butyl benzyl phthalate	ND		1050	996		ug/Kg	☼	95	58 - 150	1	27
3,3'-Dichlorobenzidine	ND	F1	2090	ND	F1	ug/Kg	☼	0	49 - 148	NC	40
Benzo[a]anthracene	ND		1050	953		ug/Kg	☼	91	60 - 135	4	21
Chrysene	ND		1050	969		ug/Kg	☼	93	69 - 127	1	27
Bis(2-ethylhexyl) phthalate	ND		1050	1000		ug/Kg	☼	96	45 - 150	3	25
Di-n-octyl phthalate	ND		1050	1340		ug/Kg	☼	128	53 - 150	3	18
Benzo[a]pyrene	ND		1050	939		ug/Kg	☼	90	62 - 129	14	27
Indeno[1,2,3-cd]pyrene	ND		1050	588		ug/Kg	☼	56	52 - 146	13	30
Dibenz(a,h)anthracene	ND		1050	662		ug/Kg	☼	63	59 - 139	6	29
Benzo[g,h,i]perylene	ND	F1 *-	1050	493	F1	ug/Kg	☼	47	64 - 146	13	26
Carbazole	ND		1050	1010		ug/Kg	☼	97	43 - 150	22	24
1-Methylnaphthalene	ND		1050	938		ug/Kg	☼	90	69 - 120	13	24
Benzo[b]fluoranthene	ND		1050	1160		ug/Kg	☼	111	58 - 136	9	25
Benzo[k]fluoranthene	ND		1050	1190		ug/Kg	☼	113	68 - 123	3	18
bis(chloroisopropyl) ether	ND	F1 *+	1050	1450	F1	ug/Kg	☼	138	55 - 120	10	33

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2-Fluorophenol (Surr)	*85*		*47 - 119*
Phenol-d5 (Surr)	*84*		*59 - 120*
Nitrobenzene-d5 (Surr)	*97*		*54 - 120*
2-Fluorobiphenyl	*85*		*57 - 120*
2,4,6-Tribromophenol (Surr)	*67*		*52 - 115*
Terphenyl-d14 (Surr)	*85*		*73 - 125*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-345217/1-A
Matrix: Solid
Analysis Batch: 345300

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345217

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		5.0	2.3	mg/Kg		12/10/20 09:15	12/10/20 10:03	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*50 - 150*	*12/10/20 09:15*	*12/10/20 10:03*	*1*

Lab Sample ID: LCS 580-345217/2-A
Matrix: Solid
Analysis Batch: 345300

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345217

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	40.0	37.3		mg/Kg		93	80 - 120

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-345217/2-A
Matrix: Solid
Analysis Batch: 345300

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345217

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*

Lab Sample ID: LCSD 580-345217/3-A
Matrix: Solid
Analysis Batch: 345300

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345217

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	40.0	36.4		mg/Kg		91	80 - 120	3	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-346049/1-A
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 346049

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50	12	mg/Kg		12/21/20 08:35	12/21/20 19:54	1
Motor Oil (>C24-C36)	ND		50	18	mg/Kg		12/21/20 08:35	12/21/20 19:54	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	*101*		*50 - 150*	*12/21/20 08:35*	*12/21/20 19:54*	*1*

Lab Sample ID: LCS 580-346049/2-A
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	500	458		mg/Kg		92	70 - 125
Motor Oil (>C24-C36)	500	445		mg/Kg		89	70 - 129

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	*83*		*50 - 150*

Lab Sample ID: LCSD 580-346049/3-A
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	500	486		mg/Kg		97	70 - 125	6	16
Motor Oil (>C24-C36)	500	479		mg/Kg		96	70 - 129	7	16

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	*93*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: 580-99765-A-1-E MS
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2500	F1	1420	3180	F1	mg/Kg	☼	50	70 - 125
Motor Oil (>C24-C36)	4700	F1	1420	5920		mg/Kg	☼	84	70 - 129

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
o-Terphenyl	*78*		*50 - 150*

Lab Sample ID: 580-99765-A-1-F MSD
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2500	F1	1430	3400	F1	mg/Kg	☼	65	70 - 125	7	16
Motor Oil (>C24-C36)	4700	F1	1430	6650	F1	mg/Kg	☼	135	70 - 129	12	16

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
o-Terphenyl	*85*		*50 - 150*

Lab Sample ID: 580-99593-1 DU
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
#2 Diesel (C10-C24)	ND		ND		mg/Kg	☼	NC	35
Motor Oil (>C24-C36)	29	J	36.3	J	mg/Kg	☼	21	35

Surrogate	*DU %Recovery*	*DU Qualifier*	*Limits*
o-Terphenyl	*89*		*50 - 150*

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 580-345820/21-A
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345820

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.50	0.048	mg/Kg		12/17/20 12:22	12/18/20 12:04	10
Cadmium	ND		0.80	0.077	mg/Kg		12/17/20 12:22	12/18/20 12:04	10
Arsenic	ND		0.50	0.10	mg/Kg		12/17/20 12:22	12/18/20 12:04	10
Chromium	ND		1.0	0.063	mg/Kg		12/17/20 12:22	12/18/20 12:04	10

Lab Sample ID: LCS 580-345820/22-A
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	50.0	51.9		mg/Kg		104	80 - 120
Cadmium	50.0	50.8		mg/Kg		102	80 - 120
Arsenic	50.0	51.4		mg/Kg		103	80 - 120

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-345820/22-A
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	50.0	52.4		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 580-345820/23-A
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	50.0	52.4		mg/Kg		105	80 - 120	1	20
Cadmium	50.0	51.3		mg/Kg		103	80 - 120	1	20
Arsenic	50.0	52.1		mg/Kg		104	80 - 120	1	20
Chromium	50.0	52.9		mg/Kg		106	80 - 120	1	20

Lab Sample ID: 580-99593-1 MS
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	9.0		39.4	56.2		mg/Kg	☼	120	80 - 120
Cadmium	0.11	J	39.4	47.4		mg/Kg	☼	120	80 - 120
Arsenic	6.2		39.4	49.2		mg/Kg	☼	109	80 - 120
Chromium	26		39.4	68.1		mg/Kg	☼	107	80 - 120

Lab Sample ID: 580-99593-1 MSD
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	9.0		39.8	49.0		mg/Kg	☼	100	80 - 120	14	20
Cadmium	0.11	J	39.8	40.1		mg/Kg	☼	100	80 - 120	17	20
Arsenic	6.2		39.8	43.8		mg/Kg	☼	95	80 - 120	12	20
Chromium	26		39.8	62.2		mg/Kg	☼	91	80 - 120	9	20

Lab Sample ID: 580-99593-1 DU
Matrix: Solid
Analysis Batch: 345924

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lead	9.0		8.90		mg/Kg	☼	1	20
Cadmium	0.11	J	0.111	J	mg/Kg	☼	5	20
Arsenic	6.2		5.86		mg/Kg	☼	5	20
Chromium	26		24.3		mg/Kg	☼	7	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 580-345513/22-A
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345513

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.030	0.0090	mg/Kg		12/14/20 13:46	12/15/20 11:53	1

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Method: 7471A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 580-345513/23-A
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345513

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.167	0.170		mg/Kg		102	80 - 120

Lab Sample ID: LCSD 580-345513/24-A
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345513

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.167	0.168		mg/Kg		101	80 - 120	1	20

Lab Sample ID: 580-99593-1 MS
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345513

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.022		0.120	0.157		mg/Kg	☼	113	80 - 120

Lab Sample ID: 580-99593-1 MSD
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345513

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.022		0.122	0.167		mg/Kg	☼	119	80 - 120	6	20

Lab Sample ID: 580-99593-1 DU
Matrix: Solid
Analysis Batch: 345714

Client Sample ID: 20-C025780
Prep Type: Total/NA
Prep Batch: 345513

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Mercury	0.022		0.0241		mg/Kg	☼	8	20

Method: 2540G - SM 2540G

Lab Sample ID: 580-99605-A-5 DU
Matrix: Solid
Analysis Batch: 345181

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Solids	77.3		77.4		%		0.09	20
Percent Moisture	22.7		22.6		%		0.3	20

Lab Chronicle

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Client Sample ID: 20-C025782
Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1	345181	12/09/20 15:39	S1S	TAL SEA

Client Sample ID: 20-C025782
Date Collected: 12/07/20 10:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-3
Matrix: Solid
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			345397	12/08/20 15:00	ASJ	TAL SEA
Total/NA	Analysis	8260D		1	345537	12/11/20 22:54	CJB	TAL SEA
Total/NA	Prep	3546			345374	12/11/20 15:17	S1S	TAL SEA
Total/NA	Analysis	8270E		1	345574	12/15/20 19:25	W1T	TAL SEA
Total/NA	Prep	5035			345217	12/10/20 09:15	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	345300	12/10/20 13:19	CJ	TAL SEA
Total/NA	Prep	3546			346049	12/21/20 08:35	CCH	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	346129	12/21/20 23:15	ADB	TAL SEA
Total/NA	Prep	3050B			345820	12/17/20 12:22	JCP	TAL SEA
Total/NA	Analysis	6020B		10	346045	12/18/20 15:58	FCW	TAL SEA
Total/NA	Prep	7471A			345513	12/14/20 13:46	JCP	TAL SEA
Total/NA	Analysis	7471A		1	345714	12/15/20 12:11	FCW	TAL SEA

Client Sample ID: 20-C025783
Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1	345181	12/09/20 15:39	S1S	TAL SEA

Client Sample ID: 20-C025783
Date Collected: 12/07/20 13:10
Date Received: 12/08/20 14:44

Lab Sample ID: 580-99593-4
Matrix: Solid
Percent Solids: 95.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			346011	12/08/20 15:30	CJB	TAL SEA
Total/NA	Analysis	8260D		1	346000	12/19/20 17:39	CJB	TAL SEA
Total/NA	Prep	3546			345599	12/15/20 11:55	S1S	TAL SEA
Total/NA	Analysis	8270E		1	345700	12/16/20 16:40	W1T	TAL SEA
Total/NA	Prep	5035			345217	12/10/20 09:15	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	345300	12/10/20 13:43	CJ	TAL SEA
Total/NA	Prep	3546			346049	12/21/20 08:35	CCH	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	346129	12/21/20 23:35	ADB	TAL SEA
Total/NA	Prep	3050B			345820	12/17/20 12:22	JCP	TAL SEA
Total/NA	Analysis	6020B		10	346045	12/18/20 15:54	FCW	TAL SEA
Total/NA	Prep	7471A			345513	12/14/20 13:46	JCP	TAL SEA
Total/NA	Analysis	7471A		1	345714	12/15/20 12:13	FCW	TAL SEA

Laboratory References:

TAL SEA = Eurofins TestAmerica, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Laboratory: Eurofins TestAmerica, Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Washington	State	C553	02-18-21

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
2540G		Solid	Percent Moisture
2540G		Solid	Percent Solids

Sample Summary

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99593-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
580-99593-3	20-C025782	Solid	12/07/20 10:10	12/08/20 14:44	
580-99593-4	20-C025783	Solid	12/07/20 13:10	12/08/20 14:44	

Eurofins TestAmerica, Seattle
5755 8th Street East

Tacoma, WA 98424-1317
phone 253.922.2310 fax 253.922.5047

Chain of Custody Record
Sample Origin: State of WA

eurofins | Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☑ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Andy Schut	Site Contact: Same	Date: 12/7/20	TALS Project #:
Eurofins Cascade Analytical, Union Gap	Email: andrewschut@eurofinsus.com	Lab Contact:	Carrier: UPS	COC No:
1008 W Ahtanum Rd Ste 2	Tel: 509-452-7707			____ of ____ COCs
Union Gap				
(509) 452-7707 Phone				
(xxx) xxx-xxxx FAX				
Project Name: ANS Geo				
Site:				
P O # 017005				

Analysis Turnaround Time
☐ CALENDAR DAYS ☑ WORKING DAYS
TAT if different from Below ________
☑ 2 weeks
☐ 1 week
☐ 2 days
☐ 1 day

Loc: 580
99593

[1] Sampler:
[1] Refer to note below.

For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	8260 D SIM	8270 C SIM	NWTPH-Dx	NWTPH-Gx	MTCA-5 Metals	Sample Specific Notes:
20-C025782	12/7/20	10:10	G	s	4			x	x	x	x	x	
20-C025783	12/7/20	13:10	G	s	4			x	x	x	x	x	

580-99593 Chain of Custody

Therm. ID: A1 Cor: -0.2 ° Unc: 0.7 °
Cooler Dsc: Styro box
Packing: bub
Cust. Seal: Yes X No____
Blue Ice Wet, Dry, None
FedEx:
UPS: Gnd
Lab Cour:
Other:

[1] I attest to the validity and authenticity of this (these) sample(s). I am aware that tampering with or intentionally mislabeling the sample(s) location, date or time of collection may be considered fraud and subject to legal action (NAC445.0636)
Signature:________________ Date

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for ______ Months

Special Instructions/QC Requirements & Comments: Drinking water samples for compliance with Oregon Health Authority. Please report to Oregon state.

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd:______ Corr'd:______		Therm ID No.:______
Relinquished by: James King	Company: Eurofins Cascade - UG	Date/Time: 12/7/20 16:30	Received by: Tan Blake	Company: TA-Sea	Date/Time: 12/8/20
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-004, Rev. 1.22, dated 12/3/2019

Login Sample Receipt Checklist

Client: Cascade Analytical Inc

Job Number: 580-99593-1

Login Number: 99593
List Number: 1
Creator: Hobbs, Kenneth F

List Source: Eurofins TestAmerica, Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Eurofins TestAmerica, Seattle
5755 8th Street East

Tacoma, WA 98424-1317
phone 253.922.2310 fax 253.922.5047

Chain of Custody Record
Sample Origin: State of WA

eurofins Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☑ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

	Project Manager: Andy Schut			TALS Project #:
Client Contact	Email: andrewschut@eurofinsus.com	Site Contact: Same	Date: 12/7/20	COC No:
Eurofins Cascade Analytical, Union Gap	Tel: 509-452-7707	Lab Contact:	Carrier: UPS	____ of ____ COCs
1008 W Ahtanum Rd Ste 2	**Analysis Turnaround Time**			[1] Sampler:
Union Gap	☐ CALENDAR DAYS ☑ WORKING DAYS			[1] Refer to note below.
(509) 452-7707 Phone	TAT if different from Below ______			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	☑ 2 weeks			Walk-in Client:
Project Name: ANS Geo	☐ 1 week			Lab Sampling:
Site:	☐ 2 days			Job / SDG No.:
P O # 017005	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	8260 D SIM	8270 C SIM	NWTPH-Dx	NWTPH-Gx	MTCA-5 Metals	Sample Specific Notes:
20-C025782	12/7/20	10:10	G	s	4			x	x	x	x	x	
20-C025783	12/7/20	13:10	G	s	4			x	x	x	x	x	

[1] I attest to the validity end euthenticity of this (these) sample(s). I am aware that tampering with or intentionally mislabeling the sample(s) location, date or time of collection may be considered fraud and subject to legal action (NAC445.0636)
Signature: ______ Date ______

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for ______ Months

Special Instructions/QC Requirements & Comments: Drinking water samples for compliance with Oregon Health Authority. Please report to Oregon state.

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: ______ Corr'd: ______ Therm ID No.: ______		
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

TP-19

ENVIRONMENTAL RESULTS

CASCADE ANALYTICAL
A EUROFINS COMPANY
1-800-545-4206

(509) 662-1888
Fax: (509) 662-8183
3019 G. S. Center Road
Wenatchee, WA 98801

(509) 452-7707
Fax: (509) 452-7773
1008 W. Ahtanum Rd.
Union Gap, WA 98903

Batch: 017069
Client: ANS Geo Inc
Account: 21800
Sampler:
PO Number:

--- Analytical Services Report ---

Report Date: 12/31/20

ANS Geo Inc
4475 S Clinton Ave #225
South Plainfield, NJ 07080

Laboratory Number: 20-C025910 Date Received: 12/ 7/20
Sample Identification: Ostrea Solar TP-19 Date Sampled: 12/ 5/20

Test Requested	Results	Units	RL	Method	Date Analyzed	Flags
~~Other Analysis~~	~~Analyzed by TAL/S~~				~~12/31/20~~	

Approved By Name: Andy Schut Signature:

Function: Lab Manager/Yakima

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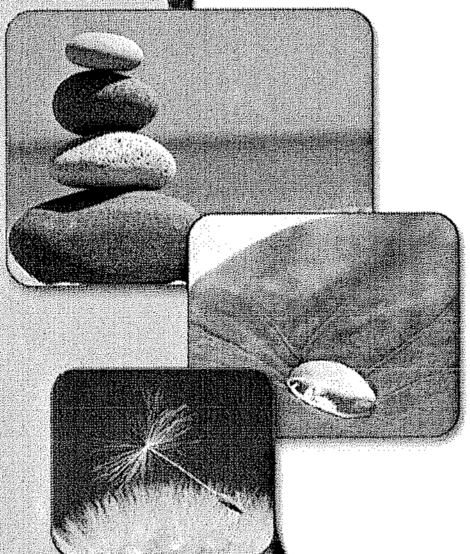

ANALYTICAL REPORT

Eurofins TestAmerica, Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

Laboratory Job ID: 580-99649-1
Client Project/Site: ANS Geo

For:
Cascade Analytical Inc
1008 W. Ahtanum Rd.
Union Gap, Washington 98903

Attn: Andy Schut

Authorized for release by:
12/31/2020 10:00:35 AM

Pauline Matlock, Project Manager
(253)922-2310
pauline.matlock@eurofinset.com

LINKS

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Job ID: 580-99649-1

Laboratory: Eurofins TestAmerica, Seattle

Narrative

Job Narrative
580-99649-1

Comments
No additional comments.

Receipt
The samples were received on 12/10/2020 10:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.0° C.

GC/MS VOA
Method 8260D: Naphthalene was detected in the method blank greater than the method detection limit but less than the reporting limit. The data have been qualified and reported.

Method 8260D: The continuing calibration verification (CCV) associated with batch 580-345537 recovered above the upper control limit for Bromomethane, Chloroethane, Dichlorodifluoromethane, 1,1-Dichloroethene, Chloromethane and Vinyl chloride. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is impacted: (CCVIS 580-345537/3).

Method 8260D: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 580-345397 and analytical batch 580-345537 recovered outside control limits for the following analytes: Dichlorodifluoromethane. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 8260D: Surrogate recovery for the following samples were outside control limits: 20-C025910 (580-99649-1), 20-C025911 (580-99649-2) and 20-C025912 (580-99649-3). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA
Method 8270E: The method blank for preparation batch 580-345599 contained Naphthalene above the reporting limit (RL). None of the samples associated with this method blank contained the target compound; therefore, re-extraction and/or re-analysis of samples were not performed.

Method 8270E: The method blank for preparation batch 580-345599 and analytical batch 580-345700 contained 2-Methylnaphthalene, Phenanthrene, Anthracene and 1-Methylnaphthalene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method 8270E: The minimum response factor (RF) criteria for the continuing calibration verification (CCV) analyzed in batch 580-345700 was outside criteria for the following analyte(s): N-Nitrosodi-n-propylamine. As indicated in the reference method, sample analysis may proceed; however, any detection or non-detection for the affected analyte(s) is considered estimated.

Method 8270E: The following analytes have been identified, in the reference method and/or via historical data, to be poor and/or erratic performers: 2,4-Dinitrophenol. This analyte may have a %D >50%. (CCVIS 580-3457001/3)

Method 8270E: The laboratory control sample and/or the laboratory control sample duplicate (LCS/LCSD) for preparation batch 580-345599 and analytical batch 580-346684 recovered outside control limits for the following analyte(s): 3,3'-Dichlorobenzidine. 3,3'-Dichlorobenzidine has been identified as a poor performing analyte when analyzed using this method; therefore, re-extraction/re-analysis was not performed.

Method 8270E: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 580-345599 and analytical batch 580-346684 recovered outside control limits for the following analytes: Bis(chloroisopropyl)ether. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 8270E: The minimum response factor (RF) criteria for the continuing calibration verification (CCV) analyzed in batch 580-346684

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
S1-	Surrogate recovery exceeds control limits, low biased.
S1+	Surrogate recovery exceeds control limits, high biased.

GC/MS Semi VOA

Qualifier	Qualifier Description
*-	LCS and/or LCSD is outside acceptance limits, low biased.
*+	LCS and/or LCSD is outside acceptance limits, high biased.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
S1-	Surrogate recovery exceeds control limits, low biased.
S1+	Surrogate recovery exceeds control limits, high biased.

GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated

Client Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99649-1

Client Sample ID: 20-C025910
Date Collected: 12/09/20 15:00
Date Received: 12/10/20 10:00

Lab Sample ID: 580-99649-1
Matrix: Solid
Percent Solids: 95.7

Method: 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND	*+	2.2	0.54	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Chloromethane	ND		5.5	1.0	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Vinyl chloride	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Bromomethane	ND		1.1	0.23	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Chloroethane	ND		11	0.82	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Trichlorofluoromethane	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1-Dichloroethene	ND		5.5	1.2	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Methylene Chloride	ND		44	11	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
trans-1,2-Dichloroethene	ND		2.2	0.44	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1-Dichloroethane	ND		1.1	0.21	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
2,2-Dichloropropane	ND		5.5	0.36	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
cis-1,2-Dichloroethene	ND		3.3	0.66	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Bromochloromethane	ND		2.2	0.27	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Chloroform	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1,1-Trichloroethane	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Carbon tetrachloride	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1-Dichloropropene	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Benzene	ND		2.2	0.43	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,2-Dichloroethane	ND		1.1	0.22	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Trichloroethene	ND		2.2	0.33	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,2-Dichloropropane	ND		2.2	0.44	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Dibromomethane	ND		1.1	0.19	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Bromodichloromethane	ND		1.1	0.20	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
cis-1,3-Dichloropropene	ND		1.1	0.22	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Toluene	ND		11	1.4	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
trans-1,3-Dichloropropene	ND		11	0.66	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1,2-Trichloroethane	ND		2.2	0.27	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Tetrachloroethene	ND		2.2	0.44	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,3-Dichloropropane	ND		2.2	0.25	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Dibromochloromethane	ND		1.6	0.30	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,2-Dibromoethane	ND		1.1	0.22	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Chlorobenzene	ND		2.2	0.27	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Ethylbenzene	ND		2.2	0.45	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1,1,2-Tetrachloroethane	ND		3.3	0.65	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,1,2,2-Tetrachloroethane	ND		4.4	0.99	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
m-Xylene & p-Xylene	ND		11	0.61	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
o-Xylene	ND		5.5	1.0	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Styrene	ND		3.3	0.81	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Bromoform	ND		5.5	0.92	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Isopropylbenzene	ND		2.2	0.50	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
Bromobenzene	ND		11	1.1	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
N-Propylbenzene	ND		5.5	0.83	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,2,3-Trichloropropane	ND		5.5	1.1	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
2-Chlorotoluene	ND		5.5	1.0	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,3,5-Trimethylbenzene	ND		5.5	0.89	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
4-Chlorotoluene	ND		5.5	1.1	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
t-Butylbenzene	ND		3.3	0.72	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
1,2,4-Trimethylbenzene	ND		5.5	1.3	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1
sec-Butylbenzene	ND		3.3	0.73	ug/Kg	☼	12/10/20 11:00	12/11/20 23:47	1

Client Sample ID: 20-C025910
Date Collected: 12/09/20 15:00
Date Received: 12/10/20 10:00

Lab Sample ID: 580-99649-1
Matrix: Solid
Percent Solids: 95.7

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthylene	ND		26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
2,6-Dinitrotoluene	ND		160	16	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
3-Nitroaniline	ND		310	100	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Acenaphthene	ND		42	4.8	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
2,4-Dinitrophenol	ND		2100	610	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
4-Nitrophenol	ND		2100	180	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Dibenzofuran	ND		160	6.1	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
2,4-Dinitrotoluene	ND		210	45	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Diethyl phthalate	ND		420	23	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
4-Chlorophenyl phenyl ether	ND		210	6.5	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Fluorene	ND		26	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
4-Nitroaniline	ND		160	52	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
4,6-Dinitro-2-methylphenol	ND		1000	100	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
N-Nitrosodiphenylamine	ND		62	8.3	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
4-Bromophenyl phenyl ether	ND		210	9.4	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Hexachlorobenzene	ND		52	16	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Pentachlorophenol	ND		420	65	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Phenanthrene	ND		62	6.0	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Anthracene	ND		62	17	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Di-n-butyl phthalate	ND		520	28	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Fluoranthene	ND		42	12	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Pyrene	ND		62	13	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Butyl benzyl phthalate	ND		210	53	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
3,3'-Dichlorobenzidine	ND	*-	420	87	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Benzo[a]anthracene	ND		42	11	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Chrysene	ND		62	13	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Bis(2-ethylhexyl) phthalate	ND		620	74	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Di-n-octyl phthalate	ND		160	12	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Benzo[a]pyrene	ND		62	13	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Indeno[1,2,3-cd]pyrene	ND		42	12	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Dibenz(a,h)anthracene	ND		52	12	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Benzo[g,h,i]perylene	ND		62	19	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Carbazole	ND		160	7.6	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
1-Methylnaphthalene	ND		31	5.2	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Benzo[b]fluoranthene	ND		42	10	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
Benzo[k]fluoranthene	ND		62	15	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1
bis(chloroisopropyl) ether	ND	*+	210	6.3	ug/Kg	☼	12/15/20 11:55	12/16/20 15:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*77*		*47 - 119*	*12/15/20 11:55*	*12/16/20 15:31*	*1*
Phenol-d5 (Surr)	*78*		*59 - 120*	*12/15/20 11:55*	*12/16/20 15:31*	*1*
Nitrobenzene-d5 (Surr)	*91*		*54 - 120*	*12/15/20 11:55*	*12/16/20 15:31*	*1*
2-Fluorobiphenyl	*86*		*57 - 120*	*12/15/20 11:55*	*12/16/20 15:31*	*1*
2,4,6-Tribromophenol (Surr)	*47*	*S1-*	*52 - 115*	*12/15/20 11:55*	*12/16/20 15:31*	*1*
Terphenyl-d14 (Surr)	*90*		*73 - 125*	*12/15/20 11:55*	*12/16/20 15:31*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		51	13	mg/Kg	☼	12/21/20 08:35	12/21/20 23:55	1
Motor Oil (>C24-C36)	**36**	**J**	**51**	**18**	**mg/Kg**	☼	**12/21/20 08:35**	**12/21/20 23:55**	**1**

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99649-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-345397/1-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345397

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0	0.49	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloromethane	ND		5.0	0.93	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Vinyl chloride	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromomethane	ND		1.0	0.21	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloroethane	ND		10	0.75	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Trichlorofluoromethane	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloroethene	ND		5.0	1.1	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Methylene Chloride	ND		40	9.9	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
trans-1,2-Dichloroethene	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloroethane	ND		1.0	0.19	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
2,2-Dichloropropane	ND		5.0	0.33	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
cis-1,2-Dichloroethene	ND		3.0	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromochloromethane	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chloroform	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,1-Trichloroethane	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Carbon tetrachloride	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1-Dichloropropene	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Benzene	ND		2.0	0.39	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dichloroethane	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Trichloroethene	ND		2.0	0.30	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dichloropropane	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Dibromomethane	ND		1.0	0.17	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromodichloromethane	ND		1.0	0.18	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
cis-1,3-Dichloropropene	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Toluene	ND		10	1.3	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
trans-1,3-Dichloropropene	ND		10	0.60	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,2-Trichloroethane	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Tetrachloroethene	ND		2.0	0.40	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,3-Dichloropropane	ND		2.0	0.23	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Dibromochloromethane	ND		1.5	0.27	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2-Dibromoethane	ND		1.0	0.20	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Chlorobenzene	ND		2.0	0.25	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Ethylbenzene	ND		2.0	0.41	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,1,2-Tetrachloroethane	ND		3.0	0.59	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,1,2,2-Tetrachloroethane	ND		4.0	0.90	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
m-Xylene & p-Xylene	ND		10	0.56	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
o-Xylene	ND		5.0	0.92	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Styrene	ND		3.0	0.74	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromoform	ND		5.0	0.84	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Isopropylbenzene	ND		2.0	0.46	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
Bromobenzene	ND		10	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
N-Propylbenzene	ND		5.0	0.76	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,3-Trichloropropane	ND		5.0	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
2-Chlorotoluene	ND		5.0	0.93	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,3,5-Trimethylbenzene	ND		5.0	0.81	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
4-Chlorotoluene	ND		5.0	1.0	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
t-Butylbenzene	ND		3.0	0.66	ug/Kg		12/11/20 16:40	12/11/20 20:46	1
1,2,4-Trimethylbenzene	ND		5.0	1.2	ug/Kg		12/11/20 16:40	12/11/20 20:46	1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 580-345397/2-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345397

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Toluene	20.0	18.2		ug/Kg		91	75 - 137
trans-1,3-Dichloropropene	20.0	18.3		ug/Kg		91	80 - 121
1,1,2-Trichloroethane	20.0	20.1		ug/Kg		101	80 - 123
Tetrachloroethene	20.0	17.3		ug/Kg		87	58 - 150
1,3-Dichloropropane	20.0	19.3		ug/Kg		96	75 - 120
Dibromochloromethane	20.0	18.8		ug/Kg		94	75 - 132
1,2-Dibromoethane	20.0	20.6		ug/Kg		103	77 - 123
Chlorobenzene	20.0	18.3		ug/Kg		91	80 - 131
Ethylbenzene	20.0	19.6		ug/Kg		98	80 - 135
1,1,1,2-Tetrachloroethane	20.0	18.4		ug/Kg		92	79 - 128
1,1,2,2-Tetrachloroethane	20.0	19.3		ug/Kg		97	77 - 127
m-Xylene & p-Xylene	20.0	17.1		ug/Kg		86	80 - 132
o-Xylene	20.0	19.1		ug/Kg		95	80 - 132
Styrene	20.0	18.4		ug/Kg		92	79 - 129
Bromoform	20.0	19.0		ug/Kg		95	71 - 146
Isopropylbenzene	20.0	18.9		ug/Kg		94	81 - 140
Bromobenzene	20.0	19.2		ug/Kg		96	78 - 126
N-Propylbenzene	20.0	17.8		ug/Kg		89	68 - 149
1,2,3-Trichloropropane	20.0	19.7		ug/Kg		98	77 - 127
2-Chlorotoluene	20.0	16.6		ug/Kg		83	77 - 134
1,3,5-Trimethylbenzene	20.0	17.8		ug/Kg		89	72 - 142
4-Chlorotoluene	20.0	16.8		ug/Kg		84	71 - 137
t-Butylbenzene	20.0	17.4		ug/Kg		87	72 - 144
1,2,4-Trimethylbenzene	20.0	17.8		ug/Kg		89	73 - 138
sec-Butylbenzene	20.0	18.0		ug/Kg		90	71 - 143
1,3-Dichlorobenzene	20.0	18.3		ug/Kg		91	78 - 132
4-Isopropyltoluene	20.0	17.8		ug/Kg		89	71 - 142
1,4-Dichlorobenzene	20.0	18.4		ug/Kg		92	77 - 123
n-Butylbenzene	20.0	16.8		ug/Kg		84	69 - 143
1,2-Dichlorobenzene	20.0	18.5		ug/Kg		93	78 - 126
1,2-Dibromo-3-Chloropropane	20.0	20.1		ug/Kg		100	75 - 129
1,2,4-Trichlorobenzene	20.0	20.0		ug/Kg		100	74 - 131
1,2,3-Trichlorobenzene	20.0	19.5		ug/Kg		97	68 - 136
Hexachlorobutadiene	20.0	18.6		ug/Kg		93	65 - 150
Naphthalene	20.0	21.5		ug/Kg		107	64 - 136
Methyl tert-butyl ether	20.0	24.0		ug/Kg		120	77 - 132

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*93*		*80 - 120*
4-Bromofluorobenzene (Surr)	*104*		*80 - 120*
Dibromofluoromethane (Surr)	*104*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*106*		*80 - 121*

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99649-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-345397/3-A
Matrix: Solid
Analysis Batch: 345537

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345397

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
sec-Butylbenzene	20.0	18.5		ug/Kg		93	71 - 143	3	40
1,3-Dichlorobenzene	20.0	19.2		ug/Kg		96	78 - 132	5	40
4-Isopropyltoluene	20.0	18.6		ug/Kg		93	71 - 142	5	40
1,4-Dichlorobenzene	20.0	19.3		ug/Kg		96	77 - 123	4	40
n-Butylbenzene	20.0	17.7		ug/Kg		88	69 - 143	6	40
1,2-Dichlorobenzene	20.0	19.4		ug/Kg		97	78 - 126	4	40
1,2-Dibromo-3-Chloropropane	20.0	19.0		ug/Kg		95	75 - 129	5	40
1,2,4-Trichlorobenzene	20.0	20.4		ug/Kg		102	74 - 131	2	40
1,2,3-Trichlorobenzene	20.0	19.3		ug/Kg		97	68 - 136	1	40
Hexachlorobutadiene	20.0	18.6		ug/Kg		93	65 - 150	0	36
Naphthalene	20.0	20.8		ug/Kg		104	64 - 136	3	40
Methyl tert-butyl ether	20.0	25.0		ug/Kg		125	77 - 132	4	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*91*		*80 - 120*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*
Dibromofluoromethane (Surr)	*104*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*109*		*80 - 121*

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-345599/1-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345599

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenol	ND		150	23	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Bis(2-chloroethyl)ether	ND		100	7.7	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Chlorophenol	ND		200	4.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,3-Dichlorobenzene	ND		50	4.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,4-Dichlorobenzene	ND		50	8.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzyl alcohol	ND		1000	50	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,2-Dichlorobenzene	ND		50	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Methylphenol	ND		150	9.8	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
3 & 4 Methylphenol	ND		200	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
N-Nitrosodi-n-propylamine	ND		200	22	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachloroethane	ND		150	4.3	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Nitrobenzene	ND		200	20	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Isophorone	ND		150	8.4	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2-Nitrophenol	ND		200	6.2	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dimethylphenol	ND		200	60	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Benzoic acid	ND		4000	1200	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Bis(2-chloroethoxy)methane	ND		200	18	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
2,4-Dichlorophenol	ND		200	60	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
1,2,4-Trichlorobenzene	ND		50	6.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Naphthalene	34.8		25	5.0	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Chloroaniline	ND		1500	130	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
Hexachlorobutadiene	ND		50	15	ug/Kg		12/15/20 11:55	12/16/20 14:46	1
4-Chloro-3-methylphenol	ND		150	33	ug/Kg		12/15/20 11:55	12/16/20 14:46	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-345599/1-A
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345599

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5 (Surr)	*97*		*54 - 120*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
2-Fluorobiphenyl	*106*		*57 - 120*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
2,4,6-Tribromophenol (Surr)	*53*		*52 - 115*	*12/15/20 11:55*	*12/16/20 14:46*	*1*
Terphenyl-d14 (Surr)	*115*		*73 - 125*	*12/15/20 11:55*	*12/16/20 14:46*	*1*

Lab Sample ID: LCS 580-345599/2-A
Matrix: Solid
Analysis Batch: 346684

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenol	1000	935		ug/Kg		94	59 - 120
Bis(2-chloroethyl)ether	1000	1180		ug/Kg		118	61 - 120
2-Chlorophenol	1000	985		ug/Kg		99	66 - 120
1,3-Dichlorobenzene	1000	1010		ug/Kg		101	57 - 120
1,4-Dichlorobenzene	1000	1010		ug/Kg		101	57 - 120
Benzyl alcohol	1000	417	J	ug/Kg		42	10 - 134
1,2-Dichlorobenzene	1000	1000		ug/Kg		100	62 - 120
2-Methylphenol	1000	800		ug/Kg		80	53 - 120
3 & 4 Methylphenol	1000	838		ug/Kg		84	54 - 120
N-Nitrosodi-n-propylamine	1000	1180		ug/Kg		118	56 - 138
Hexachloroethane	1000	1110		ug/Kg		111	57 - 132
Nitrobenzene	1000	1260		ug/Kg		126	57 - 128
Isophorone	1000	1200		ug/Kg		120	61 - 128
2-Nitrophenol	1000	996		ug/Kg		100	49 - 123
2,4-Dimethylphenol	1000	450		ug/Kg		45	31 - 129
Benzoic acid	2000	ND		ug/Kg		18	10 - 120
Bis(2-chloroethoxy)methane	1000	1180		ug/Kg		118	60 - 120
2,4-Dichlorophenol	1000	922		ug/Kg		92	63 - 120
1,2,4-Trichlorobenzene	1000	1060		ug/Kg		106	66 - 120
Naphthalene	1000	1030		ug/Kg		103	68 - 120
4-Chloroaniline	1000	136	J	ug/Kg		14	10 - 120
Hexachlorobutadiene	1000	1090		ug/Kg		109	64 - 130
4-Chloro-3-methylphenol	1000	727		ug/Kg		73	55 - 120
2-Methylnaphthalene	1000	1050		ug/Kg		105	70 - 120
Hexachlorocyclopentadiene	1000	889		ug/Kg		89	53 - 131
2,4,6-Trichlorophenol	1000	911		ug/Kg		91	37 - 120
2,4,5-Trichlorophenol	1000	645		ug/Kg		64	41 - 120
2-Chloronaphthalene	1000	1010		ug/Kg		101	65 - 120
2-Nitroaniline	1000	999		ug/Kg		100	54 - 126
Dimethyl phthalate	1000	1050		ug/Kg		105	71 - 120
Acenaphthylene	1000	1010		ug/Kg		101	63 - 120
2,6-Dinitrotoluene	1000	1080		ug/Kg		108	70 - 126
3-Nitroaniline	1000	425		ug/Kg		43	34 - 120
Acenaphthene	1000	1080		ug/Kg		108	64 - 120
2,4-Dinitrophenol	2000	1280	J	ug/Kg		64	10 - 139
4-Nitrophenol	2000	716	J	ug/Kg		36	10 - 140
Dibenzofuran	1000	1080		ug/Kg		108	68 - 120
2,4-Dinitrotoluene	1000	1050		ug/Kg		105	63 - 120

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99593-A-4-C MS
Matrix: Solid
Analysis Batch: 345700

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 345599

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzyl alcohol	ND		1050	1080		ug/Kg	☼	104	10 - 134
1,2-Dichlorobenzene	ND		1050	964		ug/Kg	☼	92	62 - 120
2-Methylphenol	ND		1050	882		ug/Kg	☼	84	53 - 120
3 & 4 Methylphenol	ND		1050	863		ug/Kg	☼	83	54 - 120
N-Nitrosodi-n-propylamine	ND		1050	1190		ug/Kg	☼	114	56 - 138
Hexachloroethane	ND		1050	938		ug/Kg	☼	90	57 - 132
Nitrobenzene	ND		1050	1130		ug/Kg	☼	108	57 - 128
Isophorone	ND		1050	1110		ug/Kg	☼	106	61 - 128
2-Nitrophenol	ND		1050	1020		ug/Kg	☼	98	49 - 123
2,4-Dimethylphenol	ND	F2 F1	1050	889		ug/Kg	☼	85	31 - 129
Benzoic acid	ND	F1	2090	ND	F1	ug/Kg	☼	0	10 - 120
Bis(2-chloroethoxy)methane	ND		1050	1060		ug/Kg	☼	101	60 - 120
2,4-Dichlorophenol	ND	F2	1050	1040		ug/Kg	☼	99	63 - 120
1,2,4-Trichlorobenzene	ND		1050	1040		ug/Kg	☼	99	66 - 120
Naphthalene	ND		1050	985		ug/Kg	☼	94	68 - 120
4-Chloroaniline	ND	F1 *-	1050	ND	F1	ug/Kg	☼	0	10 - 120
Hexachlorobutadiene	ND		1050	994		ug/Kg	☼	95	64 - 130
4-Chloro-3-methylphenol	ND	F2	1050	1230		ug/Kg	☼	118	55 - 120
2-Methylnaphthalene	ND		1050	1050		ug/Kg	☼	100	70 - 120
Hexachlorocyclopentadiene	ND	F1	1050	437	F1	ug/Kg	☼	42	53 - 131
2,4,6-Trichlorophenol	ND	F2	1050	1080		ug/Kg	☼	104	37 - 120
2,4,5-Trichlorophenol	ND	F2	1050	870		ug/Kg	☼	83	41 - 120
2-Chloronaphthalene	ND		1050	1120		ug/Kg	☼	107	65 - 120
2-Nitroaniline	ND	F2	1050	1110		ug/Kg	☼	106	54 - 126
Dimethyl phthalate	ND	F2	1050	1060		ug/Kg	☼	101	71 - 120
Acenaphthylene	ND	F2	1050	1090		ug/Kg	☼	104	63 - 120
2,6-Dinitrotoluene	ND	F2	1050	1100		ug/Kg	☼	105	70 - 126
3-Nitroaniline	ND	F2	1050	600		ug/Kg	☼	57	34 - 120
Acenaphthene	ND	F2	1050	1110		ug/Kg	☼	106	64 - 120
2,4-Dinitrophenol	ND	F1 *-	2090	ND	F1	ug/Kg	☼	0	10 - 139
4-Nitrophenol	ND		2090	1870	J	ug/Kg	☼	90	10 - 140
Dibenzofuran	ND	F2	1050	1110		ug/Kg	☼	106	68 - 120
2,4-Dinitrotoluene	ND		1050	1040		ug/Kg	☼	100	63 - 120
Diethyl phthalate	ND		1050	1080		ug/Kg	☼	103	66 - 135
4-Chlorophenyl phenyl ether	ND	F2	1050	1120		ug/Kg	☼	107	70 - 120
Fluorene	ND	F2	1050	1070		ug/Kg	☼	103	68 - 121
4-Nitroaniline	ND	F2	1050	978		ug/Kg	☼	94	36 - 141
4,6-Dinitro-2-methylphenol	ND	F2	2090	292	J	ug/Kg	☼	14	13 - 141
N-Nitrosodiphenylamine	ND	F2 F1	1050	1070		ug/Kg	☼	102	67 - 128
4-Bromophenyl phenyl ether	ND		1050	1130		ug/Kg	☼	108	65 - 127
Hexachlorobenzene	ND		1050	1060		ug/Kg	☼	101	65 - 126
Pentachlorophenol	ND		2090	1410		ug/Kg	☼	67	10 - 120
Phenanthrene	ND		1050	1060		ug/Kg	☼	101	68 - 126
Anthracene	ND		1050	1070		ug/Kg	☼	102	67 - 131
Di-n-butyl phthalate	ND		1050	1160		ug/Kg	☼	111	66 - 150
Fluoranthene	ND	F2	1050	1140		ug/Kg	☼	109	69 - 133
Pyrene	ND		1050	1130		ug/Kg	☼	108	68 - 141
Butyl benzyl phthalate	ND		1050	1010		ug/Kg	☼	97	58 - 150
3,3'-Dichlorobenzidine	ND	F1	2090	1510		ug/Kg	☼	72	49 - 148

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99593-A-4-D MSD | **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 345700 | **Prep Batch: 345599**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hexachlorobutadiene	ND		1050	850		ug/Kg	☼	81	64 - 130	16	19
4-Chloro-3-methylphenol	ND	F2	1050	898	F2	ug/Kg	☼	86	55 - 120	31	25
2-Methylnaphthalene	ND		1050	899		ug/Kg	☼	86	70 - 120	15	21
Hexachlorocyclopentadiene	ND	F1	1050	466	F1	ug/Kg	☼	45	53 - 131	6	21
2,4,6-Trichlorophenol	ND	F2	1050	849	F2	ug/Kg	☼	81	37 - 120	24	20
2,4,5-Trichlorophenol	ND	F2	1050	617	F2	ug/Kg	☼	59	41 - 120	34	23
2-Chloronaphthalene	ND		1050	911		ug/Kg	☼	87	65 - 120	20	21
2-Nitroaniline	ND	F2	1050	848	F2	ug/Kg	☼	81	54 - 126	27	16
Dimethyl phthalate	ND	F2	1050	839	F2	ug/Kg	☼	80	71 - 120	23	21
Acenaphthylene	ND	F2	1050	844	F2	ug/Kg	☼	81	63 - 120	26	18
2,6-Dinitrotoluene	ND	F2	1050	891	F2	ug/Kg	☼	85	70 - 126	21	18
3-Nitroaniline	ND	F2	1050	382	F2	ug/Kg	☼	37	34 - 120	44	25
Acenaphthene	ND	F2	1050	905	F2	ug/Kg	☼	87	64 - 120	20	19
2,4-Dinitrophenol	ND	F1 *-	2090	ND	F1	ug/Kg	☼	0	10 - 139	NC	40
4-Nitrophenol	ND		2090	1530	J	ug/Kg	☼	73	10 - 140	20	31
Dibenzofuran	ND	F2	1050	905	F2	ug/Kg	☼	87	68 - 120	20	18
2,4-Dinitrotoluene	ND		1050	826		ug/Kg	☼	79	63 - 120	23	23
Diethyl phthalate	ND		1050	865		ug/Kg	☼	83	66 - 135	22	22
4-Chlorophenyl phenyl ether	ND	F2	1050	871	F2	ug/Kg	☼	83	70 - 120	25	21
Fluorene	ND	F2	1050	854	F2	ug/Kg	☼	82	68 - 121	23	17
4-Nitroaniline	ND	F2	1050	616	F2	ug/Kg	☼	59	36 - 141	45	23
4,6-Dinitro-2-methylphenol	ND	F2	2090	477	J F2	ug/Kg	☼	23	13 - 141	48	40
N-Nitrosodiphenylamine	ND	F2 F1	1050	218	F2 F1	ug/Kg	☼	21	67 - 128	132	30
4-Bromophenyl phenyl ether	ND		1050	888		ug/Kg	☼	85	65 - 127	24	32
Hexachlorobenzene	ND		1050	853		ug/Kg	☼	82	65 - 126	21	32
Pentachlorophenol	ND		2090	1080		ug/Kg	☼	52	10 - 120	26	40
Phenanthrene	ND		1050	866		ug/Kg	☼	83	68 - 126	20	27
Anthracene	ND		1050	863		ug/Kg	☼	83	67 - 131	21	28
Di-n-butyl phthalate	ND		1050	935		ug/Kg	☼	89	66 - 150	21	26
Fluoranthene	ND	F2	1050	896	F2	ug/Kg	☼	86	69 - 133	24	21
Pyrene	ND		1050	913		ug/Kg	☼	87	68 - 141	21	24
Butyl benzyl phthalate	ND		1050	996		ug/Kg	☼	95	58 - 150	1	27
3,3'-Dichlorobenzidine	ND	F1	2090	ND	F1	ug/Kg	☼	0	49 - 148	NC	40
Benzo[a]anthracene	ND		1050	953		ug/Kg	☼	91	60 - 135	4	21
Chrysene	ND		1050	969		ug/Kg	☼	93	69 - 127	1	27
Bis(2-ethylhexyl) phthalate	ND		1050	1000		ug/Kg	☼	96	45 - 150	3	25
Di-n-octyl phthalate	ND		1050	1340		ug/Kg	☼	128	53 - 150	3	18
Benzo[a]pyrene	ND		1050	939		ug/Kg	☼	90	62 - 129	14	27
Indeno[1,2,3-cd]pyrene	ND		1050	588		ug/Kg	☼	56	52 - 146	13	30
Dibenz(a,h)anthracene	ND		1050	662		ug/Kg	☼	63	59 - 139	6	29
Benzo[g,h,i]perylene	ND	F1 *-	1050	493	F1	ug/Kg	☼	47	64 - 146	13	26
Carbazole	ND		1050	1010		ug/Kg	☼	97	43 - 150	22	24
1-Methylnaphthalene	ND		1050	938		ug/Kg	☼	90	69 - 120	13	24
Benzo[b]fluoranthene	ND		1050	1160		ug/Kg	☼	111	58 - 136	9	25
Benzo[k]fluoranthene	ND		1050	1190		ug/Kg	☼	113	68 - 123	3	18
bis(chloroisopropyl) ether	ND	F1 *+	1050	1450	F1	ug/Kg	☼	138	55 - 120	10	33

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-346259/1-A
Matrix: Solid
Analysis Batch: 346294

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 346259

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibenzofuran	ND		150	5.9	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
2,4-Dinitrotoluene	ND		200	43	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Diethyl phthalate	ND		400	22	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
4-Chlorophenyl phenyl ether	ND		200	6.3	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Fluorene	ND		25	5.0	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
4-Nitroaniline	ND		150	50	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
4,6-Dinitro-2-methylphenol	ND		1000	100	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
N-Nitrosodiphenylamine	ND		60	8.0	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
4-Bromophenyl phenyl ether	ND		200	9.1	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Hexachlorobenzene	ND		50	15	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Pentachlorophenol	ND		400	63	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Phenanthrene	ND		60	5.8	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Anthracene	ND		60	16	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Di-n-butyl phthalate	ND		500	27	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Fluoranthene	ND		40	12	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Pyrene	ND		60	13	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Butyl benzyl phthalate	ND		200	51	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
3,3'-Dichlorobenzidine	ND		400	84	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Benzo[a]anthracene	ND		40	11	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Chrysene	ND		60	13	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Bis(2-ethylhexyl) phthalate	ND		600	71	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Di-n-octyl phthalate	ND		150	12	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Benzo[a]pyrene	ND		60	13	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Indeno[1,2,3-cd]pyrene	ND		40	12	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Dibenz(a,h)anthracene	ND		50	12	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Benzo[g,h,i]perylene	ND		60	18	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Carbazole	ND		150	7.3	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
1-Methylnaphthalene	ND		30	5.0	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Benzo[b]fluoranthene	ND		40	10	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
Benzo[k]fluoranthene	ND		60	14	ug/Kg		12/22/20 18:55	12/23/20 16:07	1
bis(chloroisopropyl) ether	ND		200	6.1	ug/Kg		12/22/20 18:55	12/23/20 16:07	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*90*		*47 - 119*	*12/22/20 18:55*	*12/23/20 16:07*	*1*
Phenol-d5 (Surr)	*83*		*59 - 120*	*12/22/20 18:55*	*12/23/20 16:07*	*1*
Nitrobenzene-d5 (Surr)	*96*		*54 - 120*	*12/22/20 18:55*	*12/23/20 16:07*	*1*
2-Fluorobiphenyl	*123*	*S1+*	*57 - 120*	*12/22/20 18:55*	*12/23/20 16:07*	*1*
2,4,6-Tribromophenol (Surr)	*63*		*52 - 115*	*12/22/20 18:55*	*12/23/20 16:07*	*1*
Terphenyl-d14 (Surr)	*123*		*73 - 125*	*12/22/20 18:55*	*12/23/20 16:07*	*1*

Lab Sample ID: LCS 580-346259/2-A
Matrix: Solid
Analysis Batch: 346294

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346259

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenol	1000	869		ug/Kg		87	59 - 120
Bis(2-chloroethyl)ether	1000	1080		ug/Kg		108	61 - 120
2-Chlorophenol	1000	986		ug/Kg		99	66 - 120

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 580-346259/2-A
Matrix: Solid
Analysis Batch: 346294

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346259

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Butyl benzyl phthalate	1000	939		ug/Kg		94	58 - 150
3,3'-Dichlorobenzidine	2000	1200		ug/Kg		60	49 - 148
Benzo[a]anthracene	1000	983		ug/Kg		98	60 - 135
Chrysene	1000	1060		ug/Kg		106	69 - 127
Bis(2-ethylhexyl) phthalate	1000	925		ug/Kg		92	45 - 150
Di-n-octyl phthalate	1000	1010		ug/Kg		101	53 - 150
Benzo[a]pyrene	1000	1070		ug/Kg		107	62 - 129
Indeno[1,2,3-cd]pyrene	1000	890		ug/Kg		89	52 - 146
Dibenz(a,h)anthracene	1000	1010		ug/Kg		101	59 - 139
Benzo[g,h,i]perylene	1000	998		ug/Kg		100	64 - 146
Carbazole	1000	1240		ug/Kg		124	43 - 150
1-Methylnaphthalene	1000	1020		ug/Kg		102	69 - 120
Benzo[b]fluoranthene	1000	1160		ug/Kg		116	58 - 136
Benzo[k]fluoranthene	1000	1040		ug/Kg		104	68 - 123
bis(chloroisopropyl) ether	1000	750		ug/Kg		75	55 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorophenol (Surr)	*99*		*47 - 119*
Phenol-d5 (Surr)	*95*		*59 - 120*
Nitrobenzene-d5 (Surr)	*99*		*54 - 120*
2-Fluorobiphenyl	*107*		*57 - 120*
2,4,6-Tribromophenol (Surr)	*92*		*52 - 115*
Terphenyl-d14 (Surr)	*112*		*73 - 125*

Lab Sample ID: 580-99649-2 MS
Matrix: Solid
Analysis Batch: 346294

Client Sample ID: 20-C025911
Prep Type: Total/NA
Prep Batch: 346259

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenol	ND		1140	954		ug/Kg	☼	84	59 - 120
Bis(2-chloroethyl)ether	ND		1140	1300		ug/Kg	☼	114	61 - 120
2-Chlorophenol	ND		1140	1040	J	ug/Kg	☼	91	66 - 120
1,3-Dichlorobenzene	ND		1140	1150		ug/Kg	☼	101	57 - 120
1,4-Dichlorobenzene	ND		1140	1120		ug/Kg	☼	98	57 - 120
Benzyl alcohol	ND	F1	1140	ND	F1	ug/Kg	☼	0	10 - 134
1,2-Dichlorobenzene	ND		1140	1120		ug/Kg	☼	98	62 - 120
2-Methylphenol	ND		1140	988		ug/Kg	☼	87	53 - 120
3 & 4 Methylphenol	ND		1140	865	J	ug/Kg	☼	76	54 - 120
N-Nitrosodi-n-propylamine	ND		1140	1190		ug/Kg	☼	105	56 - 138
Hexachloroethane	ND		1140	1140		ug/Kg	☼	100	57 - 132
Nitrobenzene	ND		1140	1230		ug/Kg	☼	108	57 - 128
Isophorone	ND		1140	1190		ug/Kg	☼	104	61 - 128
2-Nitrophenol	ND		1140	1220		ug/Kg	☼	107	49 - 123
2,4-Dimethylphenol	ND		1140	788	J	ug/Kg	☼	69	31 - 129
Benzoic acid	ND		2280	ND		ug/Kg	☼	NC	10 - 120
Bis(2-chloroethoxy)methane	ND		1140	1120		ug/Kg	☼	99	60 - 120
2,4-Dichlorophenol	ND	F2	1140	1090	J	ug/Kg	☼	96	63 - 120
1,2,4-Trichlorobenzene	ND		1140	1270		ug/Kg	☼	112	66 - 120

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-99649-2 MS — **Client Sample ID: 20-C025911**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 346294 — **Prep Batch: 346259**

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2-Fluorophenol (Surr)	*87*		*47 - 119*
Phenol-d5 (Surr)	*87*		*59 - 120*
Nitrobenzene-d5 (Surr)	*102*		*54 - 120*
2-Fluorobiphenyl	*98*		*57 - 120*
2,4,6-Tribromophenol (Surr)	*72*		*52 - 115*
Terphenyl-d14 (Surr)	*101*		*73 - 125*

Lab Sample ID: 580-99649-2 MSD — **Client Sample ID: 20-C025911**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 346294 — **Prep Batch: 346259**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phenol	ND		1110	893		ug/Kg	☼	81	59 - 120	7	30
Bis(2-chloroethyl)ether	ND		1110	1160		ug/Kg	☼	105	61 - 120	11	30
2-Chlorophenol	ND		1110	1000	J	ug/Kg	☼	90	66 - 120	4	32
1,3-Dichlorobenzene	ND		1110	1030		ug/Kg	☼	93	57 - 120	11	29
1,4-Dichlorobenzene	ND		1110	992		ug/Kg	☼	90	57 - 120	12	35
Benzyl alcohol	ND	F1	1110	ND	F1	ug/Kg	☼	0	10 - 134	NC	40
1,2-Dichlorobenzene	ND		1110	1040		ug/Kg	☼	94	62 - 120	7	30
2-Methylphenol	ND		1110	881		ug/Kg	☼	80	53 - 120	11	40
3 & 4 Methylphenol	ND		1110	854	J	ug/Kg	☼	77	54 - 120	1	36
N-Nitrosodi-n-propylamine	ND		1110	987	J	ug/Kg	☼	89	56 - 138	19	35
Hexachloroethane	ND		1110	1030		ug/Kg	☼	93	57 - 132	10	34
Nitrobenzene	ND		1110	1110		ug/Kg	☼	100	57 - 128	10	33
Isophorone	ND		1110	1080		ug/Kg	☼	98	61 - 128	9	31
2-Nitrophenol	ND		1110	1070	J	ug/Kg	☼	97	49 - 123	13	30
2,4-Dimethylphenol	ND		1110	733	J	ug/Kg	☼	66	31 - 129	7	40
Benzoic acid	ND		2210	ND		ug/Kg	☼	NC	10 - 120	NC	40
Bis(2-chloroethoxy)methane	ND		1110	1010	J	ug/Kg	☼	92	60 - 120	10	33
2,4-Dichlorophenol	ND	F2	1110	793	J F2	ug/Kg	☼	72	63 - 120	32	19
1,2,4-Trichlorobenzene	ND		1110	1130		ug/Kg	☼	102	66 - 120	12	18
Naphthalene	ND		1110	1070		ug/Kg	☼	96	68 - 120	11	15
4-Chloroaniline	ND	F1 *-	1110	ND	F1	ug/Kg	☼	0	10 - 120	NC	40
Hexachlorobutadiene	ND		1110	1200		ug/Kg	☼	108	64 - 130	10	19
4-Chloro-3-methylphenol	ND	F1 F2	1110	1260	F2	ug/Kg	☼	114	55 - 120	35	25
2-Methylnaphthalene	ND		1110	1050		ug/Kg	☼	95	70 - 120	12	21
Hexachlorocyclopentadiene	ND	F1 F2	1110	368	J F1 F2	ug/Kg	☼	33	53 - 131	29	21
2,4,6-Trichlorophenol	ND		1110	993		ug/Kg	☼	90	37 - 120	1	20
2,4,5-Trichlorophenol	ND		1110	1070	J	ug/Kg	☼	97	41 - 120	1	23
2-Chloronaphthalene	ND		1110	984		ug/Kg	☼	89	65 - 120	15	21
2-Nitroaniline	ND		1110	1060		ug/Kg	☼	96	54 - 126	6	16
Dimethyl phthalate	ND		1110	916		ug/Kg	☼	83	71 - 120	16	21
Acenaphthylene	ND		1110	1120		ug/Kg	☼	101	63 - 120	9	18
2,6-Dinitrotoluene	ND		1110	1160		ug/Kg	☼	104	70 - 126	7	18
3-Nitroaniline	ND	F1 *-	1110	ND	F1	ug/Kg	☼	0	34 - 120	NC	25
Acenaphthene	ND		1110	1090		ug/Kg	☼	98	64 - 120	13	19
2,4-Dinitrophenol	ND		2210	ND		ug/Kg	☼	NC	10 - 139	NC	40
4-Nitrophenol	ND		2210	1060	J	ug/Kg	☼	48	10 - 140	2	31

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-345756/1-A
Matrix: Solid
Analysis Batch: 345856

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 345756

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	*89*		*50 - 150*	*12/16/20 15:22*	*12/16/20 16:10*	*1*

Lab Sample ID: LCS 580-345756/2-A
Matrix: Solid
Analysis Batch: 345856

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 345756

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	40.0	37.9		mg/Kg		95	80 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	*100*		*50 - 150*

Lab Sample ID: LCSD 580-345756/3-A
Matrix: Solid
Analysis Batch: 345856

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 345756

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	40.0	37.6		mg/Kg		94	80 - 120	1	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-346049/1-A
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 346049

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50	12	mg/Kg		12/21/20 08:35	12/21/20 19:54	1
Motor Oil (>C24-C36)	ND		50	18	mg/Kg		12/21/20 08:35	12/21/20 19:54	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	*101*		*50 - 150*	*12/21/20 08:35*	*12/21/20 19:54*	*1*

Lab Sample ID: LCS 580-346049/2-A
Matrix: Solid
Analysis Batch: 346129

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 346049

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	500	458		mg/Kg		92	70 - 125
Motor Oil (>C24-C36)	500	445		mg/Kg		89	70 - 129

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	*83*		*50 - 150*

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 580-345820/21-A
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.10	mg/Kg		12/17/20 12:22	12/18/20 12:04	10
Chromium	ND		1.0	0.063	mg/Kg		12/17/20 12:22	12/18/20 12:04	10

Lab Sample ID: LCS 580-345820/22-A
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	50.0	51.9		mg/Kg		104	80 - 120
Cadmium	50.0	50.8		mg/Kg		102	80 - 120
Arsenic	50.0	51.4		mg/Kg		103	80 - 120
Chromium	50.0	52.4		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 580-345820/23-A
Client Sample ID: Lab Control Sample Dup
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	50.0	52.4		mg/Kg		105	80 - 120	1	20
Cadmium	50.0	51.3		mg/Kg		103	80 - 120	1	20
Arsenic	50.0	52.1		mg/Kg		104	80 - 120	1	20
Chromium	50.0	52.9		mg/Kg		106	80 - 120	1	20

Lab Sample ID: 580-99593-A-1-H MS
Client Sample ID: Matrix Spike
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	9.0		39.4	56.2		mg/Kg	☼	120	80 - 120
Cadmium	0.11	J	39.4	47.4		mg/Kg	☼	120	80 - 120
Arsenic	6.2		39.4	49.2		mg/Kg	☼	109	80 - 120
Chromium	26		39.4	68.1		mg/Kg	☼	107	80 - 120

Lab Sample ID: 580-99593-A-1-I MSD
Client Sample ID: Matrix Spike Duplicate
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	9.0		39.8	49.0		mg/Kg	☼	100	80 - 120	14	20
Cadmium	0.11	J	39.8	40.1		mg/Kg	☼	100	80 - 120	17	20
Arsenic	6.2		39.8	43.8		mg/Kg	☼	95	80 - 120	12	20
Chromium	26		39.8	62.2		mg/Kg	☼	91	80 - 120	9	20

Lab Sample ID: 580-99593-A-1-G DU
Client Sample ID: Duplicate
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 345924
Prep Batch: 345820

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lead	9.0		8.90		mg/Kg	☼	1	20
Cadmium	0.11	J	0.111	J	mg/Kg	☼	5	20

QC Sample Results

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99649-1

Method: 2540G - SM 2540G

Lab Sample ID: 580-99717-A-5 DU
Matrix: Solid
Analysis Batch: 345512

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Solids	89.2		89.5		%		0.3	20
Percent Moisture	10.8		10.5		%		3	20

Sample Summary

Client: Cascade Analytical Inc
Project/Site: ANS Geo

Job ID: 580-99649-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
580-99649-1	20-C025910	Solid	12/09/20 15:00	12/10/20 10:00	

Login Sample Receipt Checklist

Client: Cascade Analytical Inc

Job Number: 580-99649-1

Login Number: 99649
List Number: 1
Creator: Vallelunga, Diana L

List Source: Eurofins TestAmerica, Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

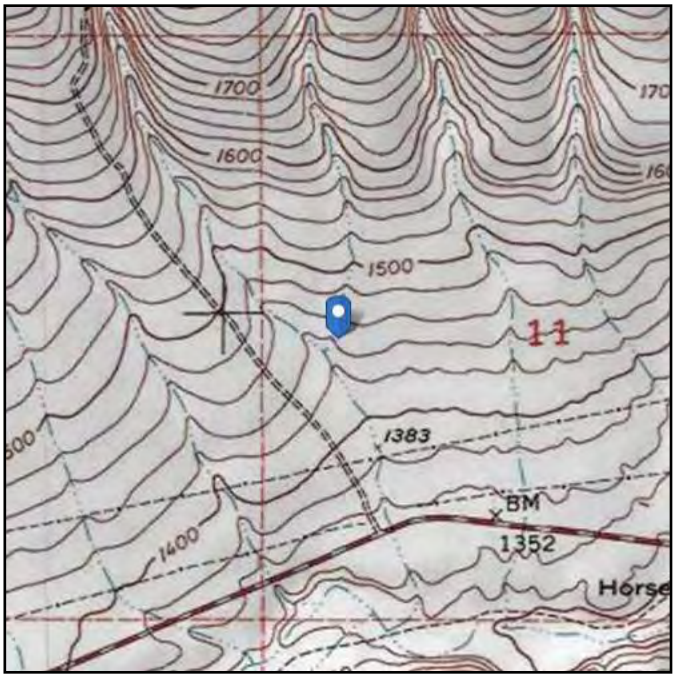
Attachment G

Seismic Support Data

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Elevation:**	1446.91 ft (NAVD 88)
Risk Category:	II	**Latitude:**	46.540793
Soil Class:	C - Very Dense Soil and Soft Rock	**Longitude:**	-119.91346



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

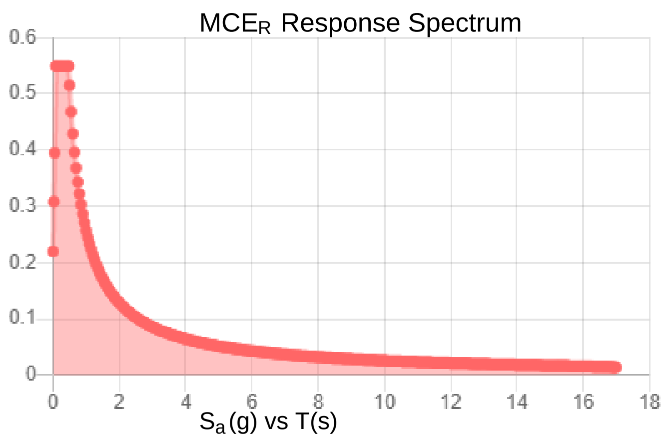
Seismic

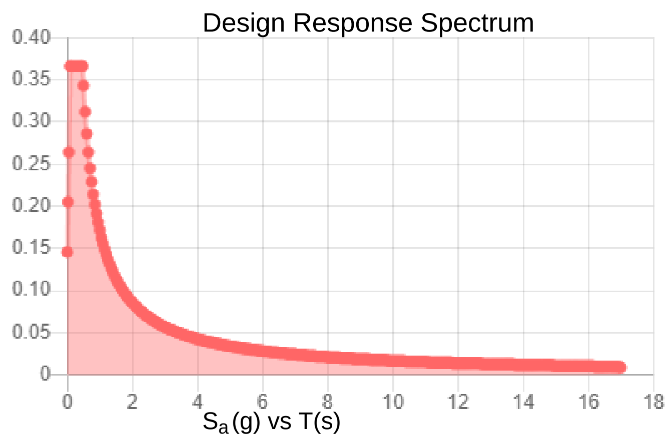
Site Soil Class: C - Very Dense Soil and Soft Rock

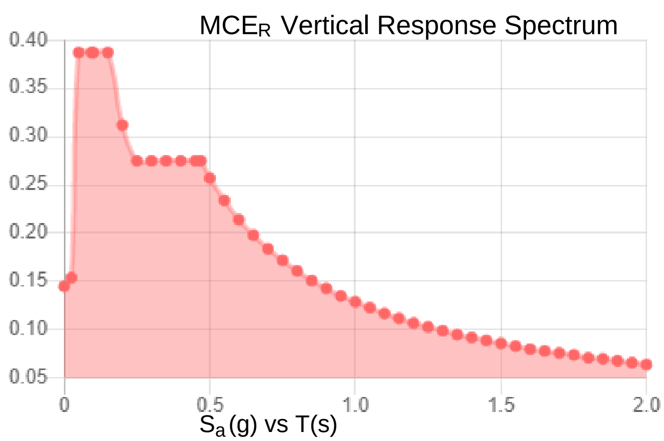
Results:

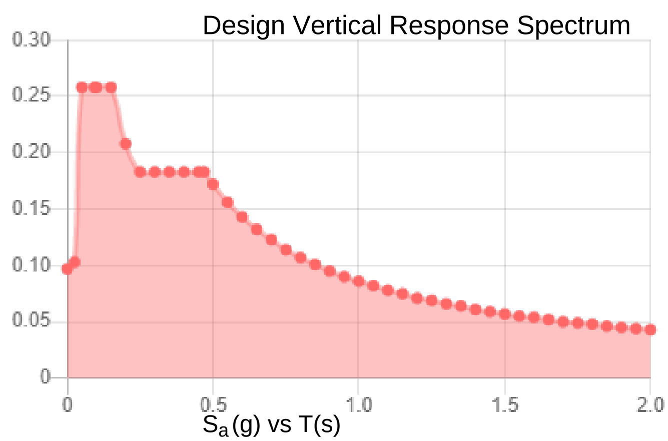
S_S :	0.422	S_{D1} :	0.172
S_1 :	0.172	T_L :	16
F_a :	1.3	PGA :	0.189
F_v :	1.5	PGA_M :	0.229
S_{MS} :	0.549	F_{PGA} :	1.211
S_{M1} :	0.257	I_e :	1
S_{DS} :	0.366	C_v :	0.882

Seismic Design Category C









Data Accessed: Wed Jan 13 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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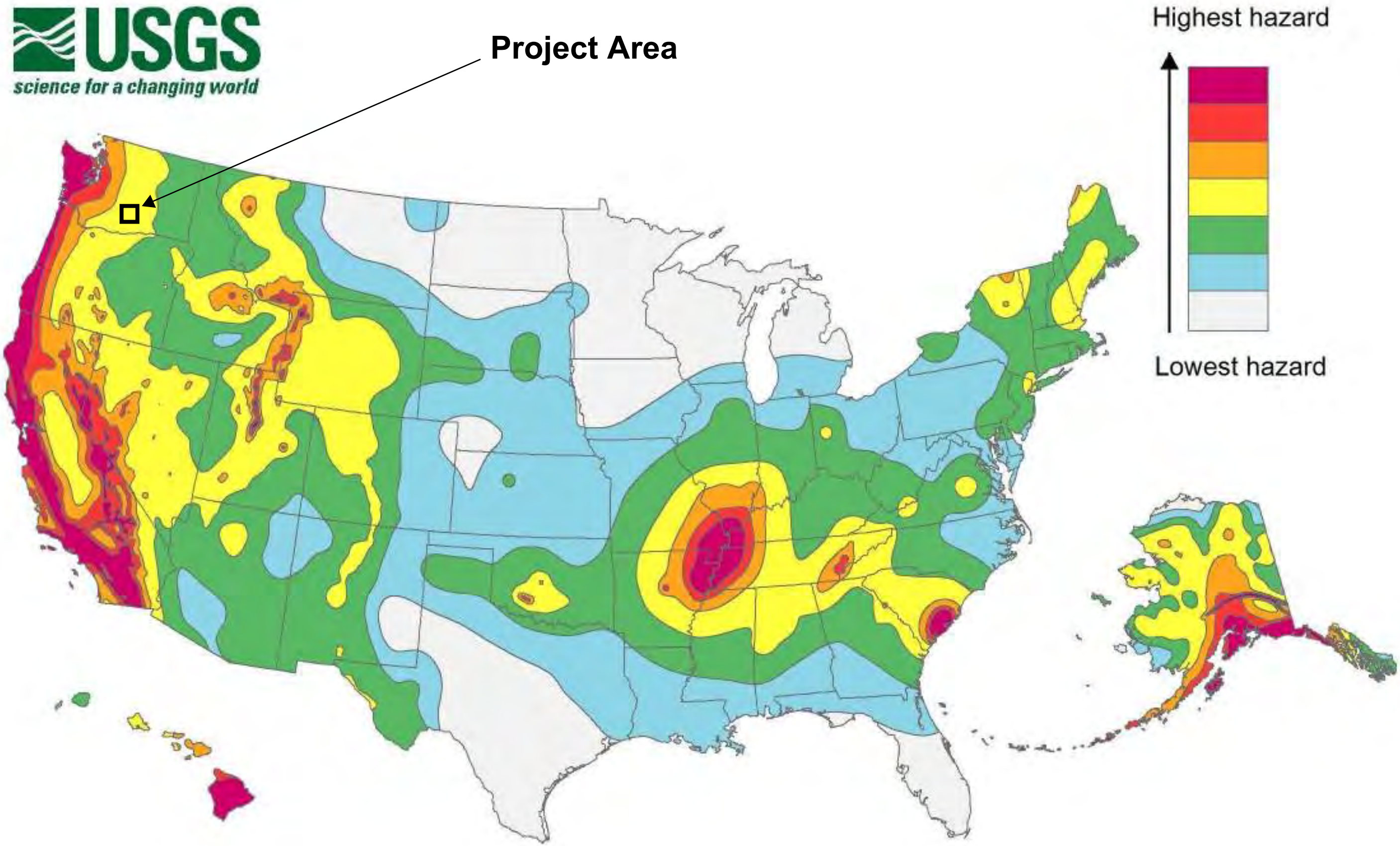
USGS
science for a changing world
Project Area
Highest hazard
Lowest hazard

Attachment H. Glint and Glare Analysis Solar Glare Report

February 25, 2022

Ostrea Solar, LLC Project

Prepared for:

Cypress Creek Renewables, LLC
3402 Pico Blvd.
Santa Monica, CA 90405

Prepared by:

TRC
Fort Collins, CO

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Table of Contents

Tables

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Appendices

Acronyms and Abbreviations

Notation	Definition
°	Degrees
AC	Alternating Current
AGL	Above ground level
ASC	Application for Site Certification
ATCT	Air Traffic Control Tower
BESS	Battery energy storage system
CCR	Cypress Creek Renewables, LLC
DC	Direct Current
DoD	U.S. Department of Defense
EFSEC	State of Washington Energy Facility Site Evaluation Council
FAA	Federal Aviation Administration
FR	Federal Register
kV	Kilovolt
MPE	Maximum Project Extent is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
M94	Desert Aire Regional Airport
min/yr	Minutes per year
MW	megawatts
OP	Observation Point
Project	Ostrea Solar, LLC Project
Project Site Control Boundary	Total of the leased areas and easements for the Project
PV	photovoltaic
SGHAT	Solar Glare Hazard Analysis Tool
SR	State Route
Study Area	Survey Area for glint and glare analysis
TCH	threshold-crossing height
TRC	TRC Environmental Corporation
VR	Visual Route
WSDOT	Washington State Department of Transportation

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). A solar glare analysis is required to be documented as part of the Application for Site Certification (ASC) to the Washington Energy Facility Site Evaluation Council (EFSEC). Under certain conditions, solar photovoltaic (PV) arrays can reflect sunlight and produce glint, a momentary flash of bright light, or glare, a continuous source of bright light. TRC Environmental Corporation (TRC) was contracted by the Project to complete the solar glare analysis.

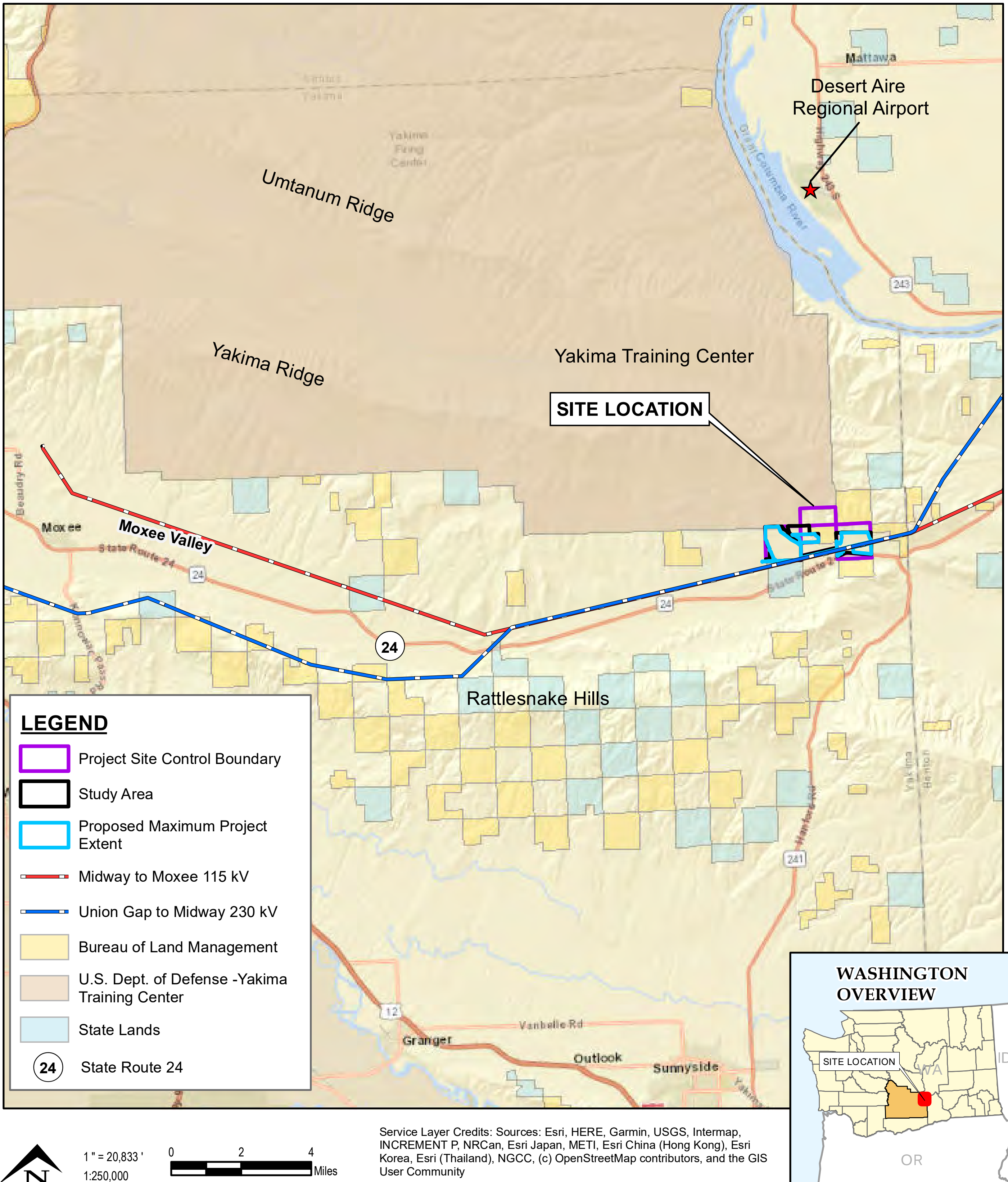
1.1 Background

The Project is situated north of Washington State Route (SR) 24, south of the Yakima Training Center, and approximately 22 miles east of the town of Moxee, in Yakima County, Washington (Figure 1-1). The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1-1). Within the Project Site Control Boundary, a smaller Study Area (1,123 acres) was defined for glint and glare analysis (Figure 1-1). The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design. (811.3 acres).

The Project will use solar photovoltaic (PV) panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts (MW) of alternating current (AC) solar capacity at the point of interconnection to the electric power grid. The Project will interconnect through a line tap to Bonneville Power Administration’s (BPA’s) Moxee to Midway 115 kV (kilovolt) transmission line that runs through the southern part of the Project. BPA’s Moxee to Midway 115 kV transmission line connects to BPA’s Moxee substation, which is approximately 23 miles west and north of the Project and BPA’s shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line located will be micro-sited based n the final approved design for the Project.

A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. If required, the BESS will be located to the west of the substation (for AC coupled) or as smaller battery cabinets collocated throughout the MPE at the inverter pad locations (for Direct Current [DC] coupled).

An Operations and Maintenance trailer, and employee parking will be located just west of the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the Operation and Maintenance trailer footprint will be used as a construction laydown yard. Access to the Project will be from SR-24 on the west side of the eastern most parcel in the MPE.



N

1 " = 20,833 '
1:250,000

0 2 4 Miles

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

TRC

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TRC - GIS

PROJECT:	CYPRESS CREEK RENEWABLES, LLC OSTREA SOLAR, LLC YAKIMA COUNTY, WASHINGTON
TITLE:	OSTREA PROJECT OVERVIEW MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE:	Fig 1-1 Ostrea Solar Project Overview Glint and Glare.mxd

FIGURE 1-1

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1-1 Ostrea Solar Project Overview Glint and Glare.mxd -- Saved By: RBLAKE on 3/13/2022, 21:10:59 PM

2.0 Permitting and Regulatory Requirements

2.1.1 Federal Aviation Administration Interim Policy

The 2013 Federal Aviation Administration (FAA) Interim Policy 78 Federal Register (FR) 63276 was originally developed for solar projects located on airport property. Use of the Solar Glare Hazard Analysis Tool (SGHAT) is recommended and approved by the FAA for on-airport solar projects (FAA 2013). However, the Interim Policy and SGHAT have been adopted by the industry for solar projects located on off-airport property. The FAA requires that on-airport solar projects meet the following standards:

1. The study is conducted with the SGHAT's default (or stricter) analysis and observer parameters (details included in Appendix A).
2. No potential for yellow glare or glare with potential for after-image for any flight path from the runway threshold extending out two miles.
3. No potential for glint or glare in the existing or planned Air Traffic Control Tower (ATCT) cab.

2.2 Summary of Consultation

Prior to conducting this study, TRC consulted with the Washington State Department of Transportation (WSDOT) and the Department of Defense (DoD) to determine if a glare study would be required to document a lack of potential glare impacts to vehicle traffic on SR 24 and military flightpaths, respectively.

TRC provided the Project footprint to Kimberly Peacher, Community Planning and Liaison Officer for the Northwest Training Range Complex (Yakima Training Center, DoD), on February 19, 2021. On February 22, 2021, Kimberly Peacher confirmed, via email correspondence and a follow-up phone call, that the military training flightpath, Visual Route (VR) 1350, passes in close proximity to the Study Area. The DoD requested that a glare study be conducted to confirm no glare impacts to air traffic traveling along this route and parameters were confirmed via email. On February 18, 2021, TRC contacted Jacob Prilucik, Transportation Engineer for the WSDOT South Central Region, to discuss study parameters and specific concerns for WSDOT. TRC submitted the Project footprint to Mr. Prilucik on March 15, 2021. Mr. Prilucik requested screening measures as necessary to mitigate the impacts from glare.

TRC also used the FAA Notice Criteria Tool to determine the location of the nearest FAA-obligated airports and to determine if notification to the FAA would be required for new construction within the Study Area. According to the FAA Tool, Notice is not expected to be required for the construction of the Project (FAA 2021a).

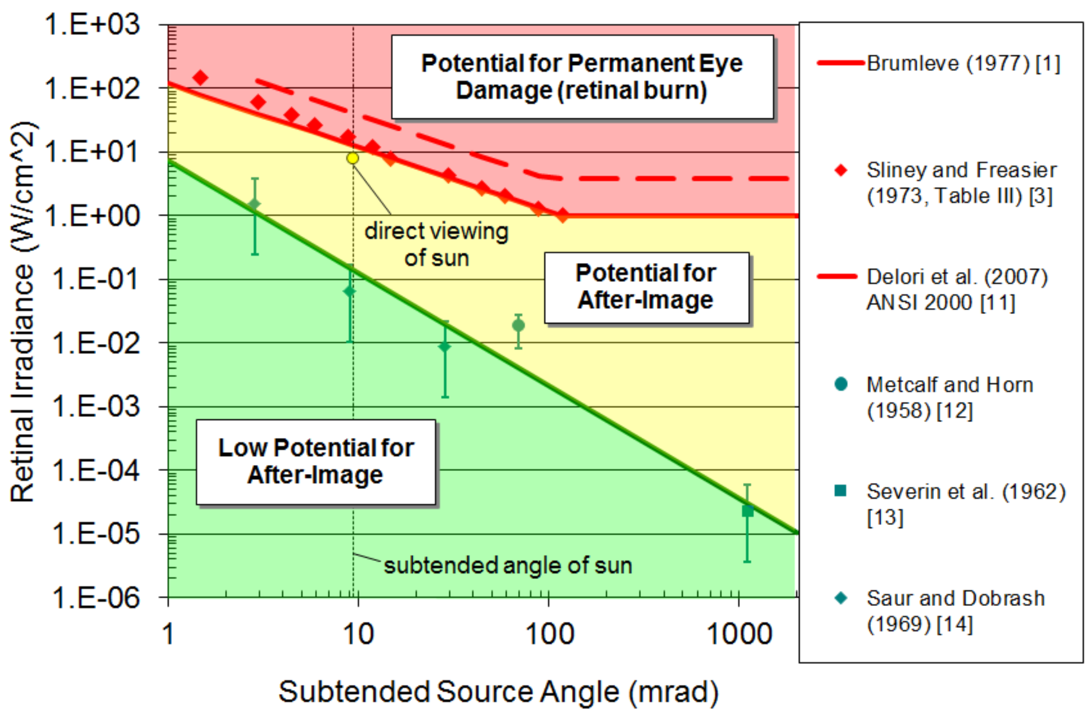
2.3 Approach/Methods

2.3.1 Glare Hazard Analysis Tool

To conduct the glint and glare analysis, TRC used methods developed by Sandia National Laboratories and described in the SGHAT User's Manual (Ho and Sims 2013). The SGHAT-compliant software used in this analysis is under license to TRC by ForgeSolar.

The magnitude of glint and glare depends on several factors such as the sun's position, the location of the observer, and characteristics of the solar PV array including location, orientation, tilt, and optical properties of the modules used. Glare visibility from an observer's location was analyzed once glare characteristics were determined. Ocular hazard potential was estimated based on the retinal irradiance and subtended angle (size/distance) of the predicted glare (Ho 2011). Potential ocular hazards range from temporary after-image to retinal burn depending on the retinal irradiance and subtended angle, as shown in Figure 2-1. The SGHAT classifies solar glare into three categories, denoted as "green," "yellow," or "red" glare.

- Green glare is the mildest of the classifications and has low potential to cause after-image and no potential to cause retinal burn.
- Yellow glare is a moderate level of glare and has some potential for temporary after-image and no potential to cause retinal burn.
- Red glare is a serious and significant form of glare with potential to cause retinal burn and/or permanent eye damage.



Source Ho 2011

Figure 2-1. Potential Glare Impacts

Limitations of the SGHAT applicable to this Project are as follows:

- The SGHAT does not rigorously represent the detailed geometry of a solar panel array; detailed features such as gaps between modules, variable heights of the PV array, and support structures may impact actual glare results. However, the accuracy of the current approach has been validated by a number of test cases.
- The model does not consider obstacles (either natural or artificial, existing or proposed) and mitigation measures between the observation points and prescribed solar installation that may obstruct the predicted glare.
- The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain.

In general, default values given by the SGHAT in this analysis reflect the worst-case scenario. As such, the actual glare created by the Project is likely to be less than that predicted by the model.

The following additional assumptions have been used for the analysis:

- Time zone for the Project was set at UTC-8 (Pacific Standard Time).
- Subtended angle of the sun of 9.8 milliradian is assumed, as recommended by the SGHAT. This is the average angle of the sun as viewed from earth as it moves throughout the course of the day.
- The time interval for the analysis was set to run at 1-minute increments.

A more detailed explanation of assumptions is included in Appendix A.

2.3.2 Project Specifications

The Project is proposed to be mounted on a single-axis tracking system with axes that are oriented to the south (180°), and an east-west tilt angle ranging from 60° to -60°. A resting angle (also called stow angle) of 60° is proposed, with panels mounted to the tracking system at a height of 7.99 feet. The glare analysis was conducted using tracking axis tilt angles of 0° and 10° to account for variations in slope within Study Area. Panels are proposed to have a smooth-textured surface. The coating on the panels is unknown at this time. To be conservative, the glare analysis was conducted, assuming no anti-reflective coating would be used.

2.3.3 Observer Parameters

The analysis was conducted for nearby occupied residences identified via aerial imagery and Google “Street View” photos (Google Earth Pro 2021). Three residences were identified in the area surrounding the Study Area. Locations and number of stories were confirmed during site visits conducted in April 2021. All residences modeled are one-story homes. The analysis was conducted using ForgeSolar’s Observation Point (OP) tool to model glare visible from single locations. A height of six feet was used to represent an observer in the window of a single-story home.

For traffic traveling on SR 24, ForgeSolar’s Route Receptor tool was used. The tool uses a multi-line representation that can simulate observers traveling along continuous paths such as roadways. Vehicles were modeled traveling in either direction along SR 24, and a height of five feet was used to represent the average height of an observer seated in a vehicle. The Route Receptor tool was also used to simulate a military aircraft traveling along VR 1350. A floor altitude of 200 feet above ground level (AGL) was used with flights traveling south-southwest. Additional detail about the receptor parameters used is included in Appendix A.

2.3.4 Desert Aire Regional Airport

Desert Aire Regional Airport (M94) is the nearest FAA-obligated airport. Although it is not located in close proximity to the Study Area, TRC also performed the glare analysis to ensure no impacts are predicted for flights landing at M94. TRC used ForgeSolar’s Two-mile Flightpath tool to estimate glare predicted to be visible from flights descending to land at M94’s runway. The Flightpath tool simulates aircraft following a straight-line approach toward a runway, including a restricted field-of-view to filter unrealistic glare.

M94 is located approximately nine miles north-northeast of the Study Area. According to the FAA, M94 uses one asphalt runway, Runway 10/28, which has a northwest-southeast alignment. No ATCTs are identified by the FAA at this airport. For Runway 10, specific values for glide slope and threshold-crossing height (TCH) are not provided by the FAA. Thus, default values were used for aircraft landing at this runway (FAA 2021b).

Runway parameters used in this analysis are as follows:

Runway 10

- Glide slope (Visual Glide Path): 3°
- TCH: 50 feet AGL
- Runway heading (Azimuth): 115°

Runway 28

- Glide slope (Visual Glide Path): 4°
- TCH: 45 feet AGL
- Runway heading (Azimuth): 295°

Default values for the modeled pilot's viewshed were used in the Flightpath analysis. A maximum vertical field of view from the pilot of 30° and an azimuthal (horizontal) viewing angle ranging from 50° to -50°.

2.4 Results

Using the parameters specified above, no glare is modeled to be visible at the selected observation points, traffic traveling either direction on SR 24, military training flights on VR 1350, or by flights approaching either runway at M94 (Table 2-1). Detailed results are included in Appendix A.

Table 2-1. Project Glare Study Results[a]

Receptor	Green Glare (min/yr)	Yellow Glare (min/yr)	Red Glare (min/yr)
OP1	0	0	0
OP2	0	0	0
OP3	0	0	0
SR 24	0	0	0
VR 1350	0	0	0
M94 Runway 10	0	0	0
M94 Runway 28	0	0	0

[a] minutes/year = min/yr, observation point = OP

Table 2-2 below demonstrates that the parameters used in this study and lack of glare received by flights landing at M94 comply with the guidelines set forth by the FAA 2013 Interim Policy (FAA 2013). Additional detail regarding these parameters is included in Appendix A.

Table 2-2. FAA 2013 Policy Adherence.

Component	Status	Description
Analysis Parameters	PASS	Analysis time interval and eye characteristics used are acceptable.
2-mile Flight Path(s)	PASS	Flight path receptor(s) do not receive yellow glare.
ATCT(s)	N/A	No ATCT receptors designated.

In order to further ensure that no glare impacts would be expected to occur from the Project, TRC also assessed glare impacts using an additional offset angle of 10° to account for modules situated on slopes. No glare was predicted at any of the selected receptors using the additional offset angle. Results of this supplemental analysis were provided to CCR separately.

2.5 Characterization of Affected Environment

Much of the area surrounding the Study Area is currently undeveloped or used for agricultural activities, with several farm outbuildings located adjacent, and a small number of rural residences located east of the Study Area along SR 24. SR 24 runs east-west along the southern Study Area boundary and transects the southeastern corner of the Study Area. The FAA identifies one public-use airport, M94, located approximately nine miles north-northeast of the Study Area. No other public-use airports are located within 10 miles of the Study Area (FAA 2021c). In addition, the Study Area is situated just south of the Yakima Training Center, a large open-land area used for various military training exercises, including military training flights.

No existing sources of glare occur on or near the Study Area. The location of sensitive receptors, including airports, air flight routes, highways, and residences are described above.

2.6 Potential Project Impacts

Based on the results of these analyses, the Project, as currently designed is not predicted to create any potentially significant glare impacts to residences, roadways, or air traffic. This study was conducted using an intentionally conservative approach to represent the "worst-case scenario" for glare predicted. In most cases, glare predicted by this model will likely be an over-estimate of the actual glare visible by observers. However, if the Project design will change significantly, TRC recommends conducting this analysis using the revised design specifications to ensure no changes to expected impacts.

2.7 Mitigation Measures

No mitigation measures are proposed, as no glare is predicted to be visible at any of the representative receptors.

2.8 Summary of Effects and Significant Unavoidable Impacts After Mitigation

No significant unavoidable impacts from glare are expected.

2.9 References

Federal Aviation Administration (FAA). 2013 *Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports.* 78 FR 63276. Retrieved April 2021 from: https://www.federalregister.gov/documents/2013/10/23/2013-24729/interim-policy-faa-review-of-solar-energy-system-projects-on-federally-obligated-airports

FAA. 2021a. *Notice Criteria Tool.* Retrieved February 2021 from: https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp?action=showNoNoticeRequiredToolForm

FAA. 2021b. *Aeronautical Information Services – Desert Aire Rgnl, Mattawa, WA, United States.* Retrieved April 2021 from: https://nfdc.faa.gov/nfdcApps/services/ajv5/airportDisplay.jsp?airportId=M94

FAA. 2021c. *Circle Search for Airports.* Retrieved February 2021 from https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=showCircleSearchAirportsForm

Google Earth Pro. 2021. Aerial imagery of 46°31’55.32”N, 119°58’ 19.84”W Accessed May 2021.

Ho, C.K. 2011. *Summary of Impact Analyses of Renewable Energy Technologies on Aviation and Airports, Presentation to Federal Aviation Administration, Feb.* 16. Retrieved February 2021 from: https://share-ng.sandia.gov/glare-tools/references/Overview_energy_impact_analyses_glare_thermal.pdf

Ho, C.K., and C.A. Sims. 2013. *Solar Glare Hazard Analysis Tool (SGHAT) User’s Manual c 3.0.* Retrieved February 2021 from: https://www.forgesolar.com/static/docs/SGHAT3-GlareGauge_user_manual_v1.pdf

Appendix A. Ostrea Solar, LLC Solar Glare Hazard Analysis Report

FORGESOLAR GLARE ANALYSIS

Project: **Ostrea Solar**
Proposed utility-scale solar

Site configuration: **Ostrea Config 3_10 deg**
Analysis conducted by Alan Plumeau (aplumeau@trccompanies.com) at 21:50 on 22 Jul, 2021.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
2-mile flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

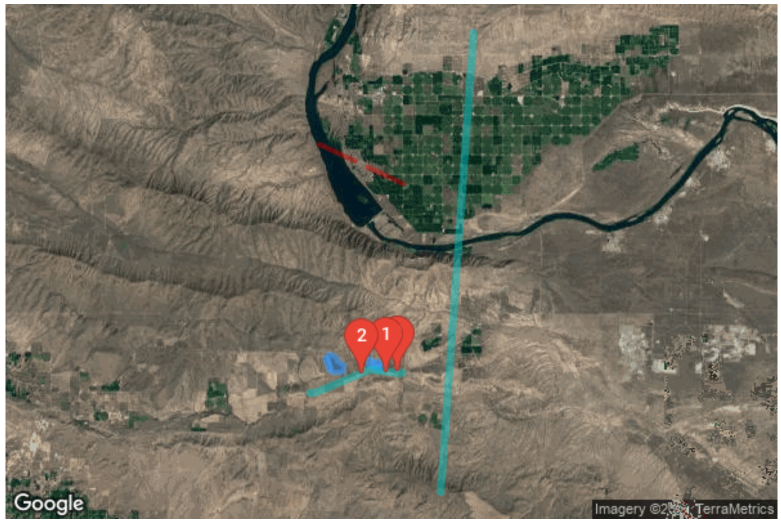
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

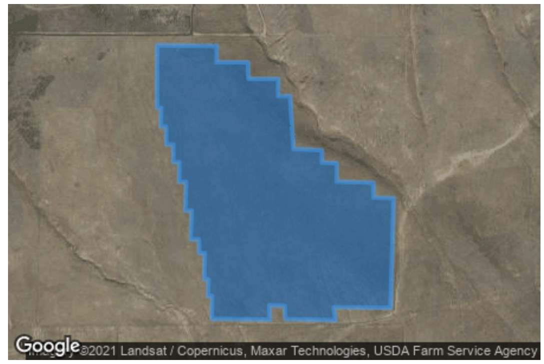
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 56577.9520



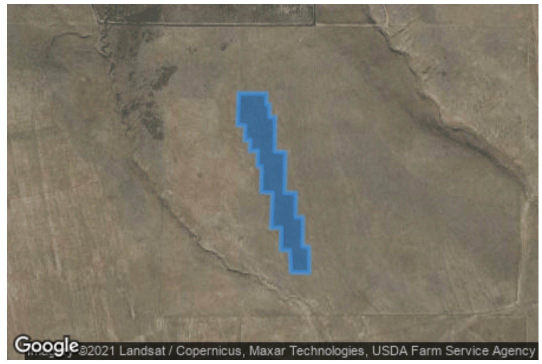
PV Array(s)

Name: PV array 1
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.534372	-119.951426	1562.54	7.99	1570.53
2	46.534328	-119.947199	1537.11	7.99	1545.10
3	46.535036	-119.947241	1550.72	7.99	1558.71
4	46.535007	-119.946126	1541.38	7.99	1549.37
5	46.534357	-119.946083	1528.75	7.99	1536.74
6	46.534298	-119.942435	1502.26	7.99	1510.25
7	46.534948	-119.942564	1513.92	7.99	1521.91
8	46.534918	-119.938444	1485.04	7.99	1493.03
9	46.538992	-119.938272	1561.83	7.99	1569.83
10	46.540379	-119.938229	1574.94	7.99	1582.93
11	46.540409	-119.939688	1602.26	7.99	1610.25
12	46.541147	-119.939688	1605.17	7.99	1613.16
13	46.541206	-119.942349	1656.55	7.99	1664.54
14	46.542121	-119.942349	1659.97	7.99	1667.96
15	46.542150	-119.943422	1680.32	7.99	1688.31
16	46.542770	-119.943422	1671.74	7.99	1679.73
17	46.542829	-119.945482	1714.45	7.99	1722.44
18	46.545456	-119.945739	1684.86	7.99	1692.85
19	46.545456	-119.946598	1715.14	7.99	1723.13
20	46.546312	-119.946598	1709.35	7.99	1717.34
21	46.546312	-119.948743	1785.55	7.99	1793.54
22	46.547139	-119.948786	1775.49	7.99	1783.48
23	46.547139	-119.951061	1862.25	7.99	1870.24
24	46.547950	-119.951039	1854.12	7.99	1862.11
25	46.547987	-119.955388	1930.76	7.99	1938.75
26	46.544873	-119.955388	1832.60	7.99	1840.59
27	46.544859	-119.955088	1831.08	7.99	1839.07
28	46.543936	-119.955120	1803.49	7.99	1811.48
29	46.543936	-119.954734	1803.47	7.99	1811.46
30	46.543043	-119.954723	1774.49	7.99	1782.48
31	46.543036	-119.954208	1774.58	7.99	1782.57
32	46.542173	-119.954219	1750.40	7.99	1758.39
33	46.542173	-119.953779	1751.06	7.99	1759.05
34	46.541184	-119.953800	1723.97	7.99	1731.96
35	46.541176	-119.953285	1723.03	7.99	1731.02
36	46.539752	-119.953350	1686.62	7.99	1694.61
37	46.539752	-119.952888	1687.41	7.99	1695.40
38	46.538335	-119.952953	1655.90	7.99	1663.89
39	46.538328	-119.952352	1652.24	7.99	1660.23
40	46.537634	-119.952341	1636.40	7.99	1644.39
41	46.537641	-119.951923	1633.60	7.99	1641.59
42	46.536342	-119.951977	1604.77	7.99	1612.76
43	46.536335	-119.951665	1602.37	7.99	1610.36
44	46.535501	-119.951698	1586.79	7.99	1594.78
45	46.535509	-119.951397	1584.04	7.99	1592.04

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
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2	46.545110	-119.956351	1844.03	7.99	1852.02
3	46.544564	-119.956351	1830.61	7.99	1838.60
4	46.544571	-119.956125	1827.73	7.99	1835.72
5	46.543944	-119.956125	1811.17	7.99	1819.16
6	46.543951	-119.955728	1804.02	7.99	1812.01
7	46.542225	-119.955750	1762.60	7.99	1770.59
8	46.542195	-119.954977	1753.48	7.99	1761.47
9	46.540173	-119.955029	1705.77	7.99	1713.76
10	46.540166	-119.954214	1700.77	7.99	1708.76
11	46.538963	-119.954235	1673.48	7.99	1681.48
12	46.538963	-119.953699	1670.99	7.99	1678.98
13	46.537509	-119.953731	1638.87	7.99	1646.86
14	46.537479	-119.953259	1633.85	7.99	1641.84
15	46.536195	-119.953237	1608.29	7.99	1616.28
16	46.536217	-119.954578	1600.69	7.99	1608.68
17	46.537310	-119.954653	1633.43	7.99	1641.42
18	46.537310	-119.955319	1626.27	7.99	1634.26
19	46.538439	-119.955286	1661.19	7.99	1669.19
20	46.538417	-119.956016	1656.64	7.99	1664.63
21	46.540158	-119.955909	1708.57	7.99	1716.56
22	46.540210	-119.956735	1711.13	7.99	1719.12
23	46.541488	-119.956703	1749.90	7.99	1757.89
24	46.541488	-119.957003	1751.17	7.99	1759.16
25	46.542263	-119.956992	1772.18	7.99	1780.17
26	46.542248	-119.957561	1774.83	7.99	1782.82
27	46.542802	-119.957539	1790.96	7.99	1798.95
28	46.542772	-119.957926	1790.59	7.99	1798.58
29	46.543518	-119.957904	1812.58	7.99	1820.57
30	46.543532	-119.958462	1814.72	7.99	1822.71

Name: PV array 2
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.544292	-119.912719	1558.47	7.99	1566.46
2	46.539746	-119.912655	1416.65	7.99	1424.64
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4	46.538801	-119.912183	1398.66	7.99	1406.65
5	46.538787	-119.909200	1388.16	7.99	1396.15
6	46.539702	-119.909200	1412.39	7.99	1420.39
7	46.539672	-119.908084	1411.73	7.99	1419.72
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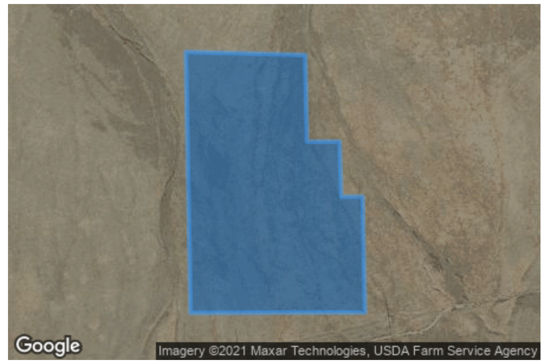
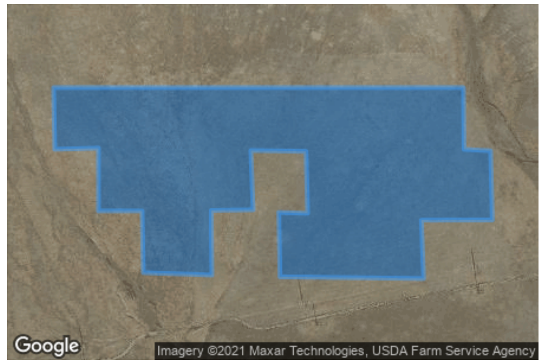
12	46.544218	-119.909629	1518.05	7.99	1526.04
13	46.544233	-119.910552	1544.30	7.99	1552.29
14	46.544971	-119.910595	1570.18	7.99	1578.17
15	46.544971	-119.911968	1596.76	7.99	1604.75
16	46.544292	-119.911968	1558.88	7.99	1566.87

Name: PV array 3
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.542733	-119.907215	1477.91	7.99	1485.90
2	46.539486	-119.907130	1409.06	7.99	1417.05
3	46.539493	-119.903965	1389.94	7.99	1397.93
4	46.540932	-119.904007	1425.98	7.99	1433.97
5	46.540932	-119.904394	1429.44	7.99	1437.43
6	46.541619	-119.904426	1450.59	7.99	1458.58
7	46.541619	-119.905016	1454.96	7.99	1462.95
8	46.542696	-119.905048	1489.42	7.99	1497.41

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.542629	-119.904057	1478.46	7.99	1486.45
2	46.542629	-119.896611	1463.42	7.99	1471.41
3	46.541861	-119.896600	1452.76	7.99	1460.75
4	46.541843	-119.896117	1448.13	7.99	1456.12
5	46.540983	-119.896085	1427.41	7.99	1435.40
6	46.540980	-119.897375	1426.24	7.99	1434.23
7	46.540253	-119.897334	1410.26	7.99	1418.26
8	46.540276	-119.899943	1393.53	7.99	1401.53
9	46.541077	-119.899965	1405.57	7.99	1413.56
10	46.541066	-119.899441	1411.82	7.99	1419.81
11	46.541835	-119.899470	1425.57	7.99	1433.56
12	46.541846	-119.900473	1420.37	7.99	1428.36
13	46.541108	-119.900430	1401.68	7.99	1409.67
14	46.541101	-119.901192	1403.43	7.99	1411.42
15	46.540297	-119.901181	1383.58	7.99	1391.57
16	46.540326	-119.902426	1393.04	7.99	1401.03
17	46.541094	-119.902447	1415.00	7.99	1422.99
18	46.541094	-119.903241	1425.70	7.99	1433.69
19	46.541876	-119.903241	1448.58	7.99	1456.57
20	46.541861	-119.904035	1454.95	7.99	1462.94

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.539627	-119.894853	1397.45	7.99	1405.44
2	46.536085	-119.894917	1324.43	7.99	1332.42
3	46.536225	-119.900357	1314.29	7.99	1322.28
4	46.537294	-119.900384	1336.71	7.99	1344.70
5	46.537292	-119.900636	1332.81	7.99	1340.80
6	46.537968	-119.900646	1344.88	7.99	1352.87
7	46.537978	-119.901086	1336.68	7.99	1344.67
8	46.538867	-119.901119	1361.00	7.99	1368.99
9	46.538859	-119.900131	1366.26	7.99	1374.25
10	46.538830	-119.898672	1375.09	7.99	1383.08
11	46.539642	-119.898715	1391.19	7.99	1399.18

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 10.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.538366	-119.906951	1385.42	7.99	1393.41
2	46.538366	-119.901425	1342.34	7.99	1350.33
3	46.536875	-119.901393	1325.95	7.99	1333.94
4	46.536949	-119.906951	1358.11	7.99	1366.10

Flight Path Receptor(s)

Name: M94 Runway 10
Description:
Threshold height: 50 ft
Direction: 115.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	46.689414	-119.926353	543.70	50.00	593.70
Two-mile	46.701633	-119.964599	488.53	658.63	1147.16

Name: M94 Runway 28
Description:
Threshold height: 45 ft
Direction: 295.0°
Glide slope: 4.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	46.685026	-119.913197	582.18	45.00	627.18
Two-mile	46.672807	-119.874955	681.42	684.23	1365.64

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	46.534476	-119.893113	1294.76	6.00
OP 2	2	46.533011	-119.919298	1379.95	6.00
OP 3	3	46.535217	-119.880692	1302.16	6.00

Route Receptor(s)

Name: Highway 24
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.534450	-119.875964	1318.42	5.00	1323.42
2	46.534007	-119.877681	1294.89	5.00	1299.89
3	46.533918	-119.879354	1280.78	5.00	1285.78
4	46.534302	-119.883603	1253.43	5.00	1258.43
5	46.535424	-119.896263	1312.57	5.00	1317.57
6	46.536015	-119.903816	1334.95	5.00	1339.95
7	46.536487	-119.909696	1353.32	5.00	1358.32
8	46.536457	-119.910725	1355.09	5.00	1360.09
9	46.536133	-119.912270	1356.44	5.00	1361.44
10	46.534391	-119.918450	1371.89	5.00	1376.89
11	46.531822	-119.927076	1413.53	5.00	1418.53
12	46.529933	-119.933514	1414.59	5.00	1419.59
13	46.526951	-119.943599	1428.85	5.00	1433.85
14	46.524057	-119.953684	1454.21	5.00	1459.21
15	46.520750	-119.965185	1533.94	5.00	1538.94
16	46.519746	-119.968833	1541.39	5.00	1546.39
17	46.519628	-119.969305	1545.40	5.00	1550.40
18	46.519598	-119.974626	1564.20	5.00	1569.20
19	46.519451	-119.974516	1562.91	5.00	1567.91
20	46.519421	-119.974602	1562.79	5.00	1567.79

Name: VR 1350
Path type: One-way (toward increasing index)
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	46.783300	-119.800000	1442.07	200.01	1642.08
2	46.446667	-119.835000	3394.17	200.01	3594.18

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 1a	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	0	0	-
PV array 5	SA tracking	SA tracking	0	0	-
PV array 6	SA tracking	SA tracking	0	0	-

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Results for: PV array 1

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
M94 Runway 10	0	0
M94 Runway 28	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
Highway 24	0	0
VR 1350	0	0

Flight Path: M94 Runway 10

0 minutes of yellow glare
0 minutes of green glare

Flight Path: M94 Runway 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Highway 24

0 minutes of yellow glare
0 minutes of green glare

Route: VR 1350

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

Latitude:	46 Deg 32 M 02.71 S N
Longitude:	119 Deg 53 M 43.09 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	1271 (nearest foot)
Structure Height :	12 (nearest foot)
Traverseway:	No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway
Is structure on airport:	(●) No ( ) Yes

Results

You do not exceed Notice Criteria.

Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

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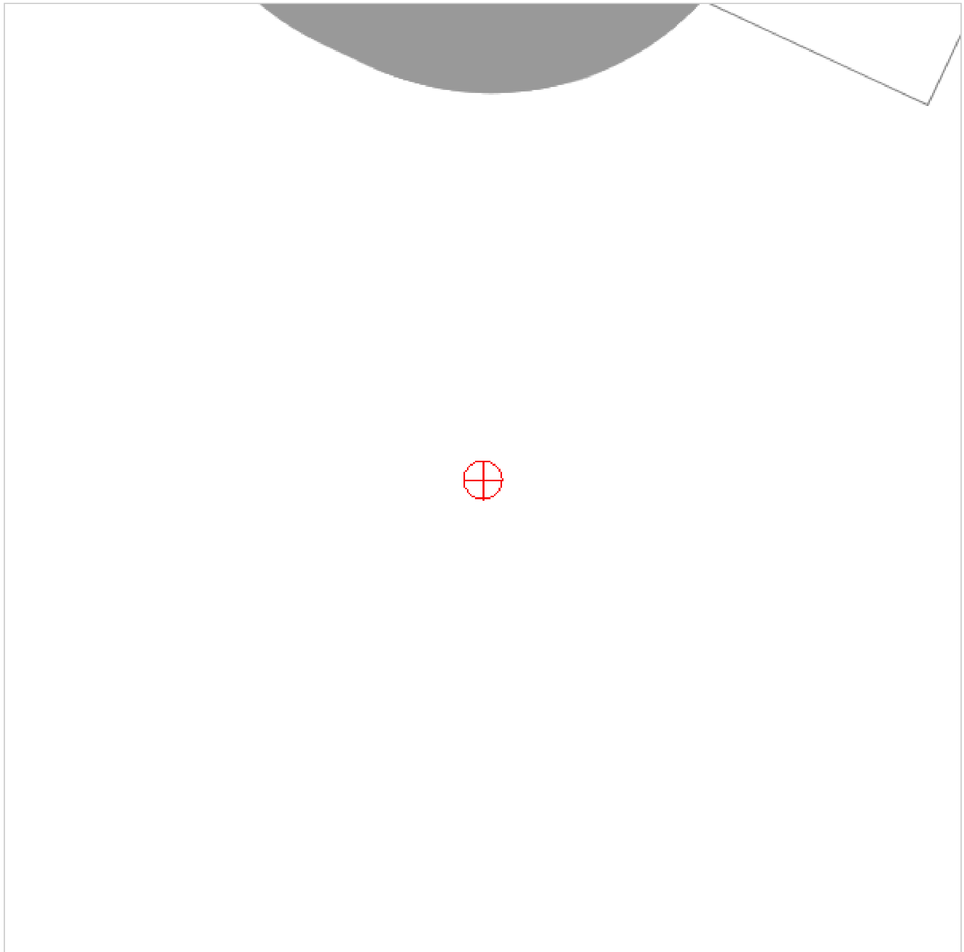
If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

Latitude:	46 Deg 33 M 20.07 S N
Longitude:	119 Deg 54 M 56 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	2083 (nearest foot)
Structure Height :	12 (nearest foot)
Traverseway:	No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway
Is structure on airport:	(•) No ( ) Yes

Results

You do not exceed Notice Criteria.



Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

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- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
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- your structure will be on an airport or heliport
- filing has been requested by the FAA

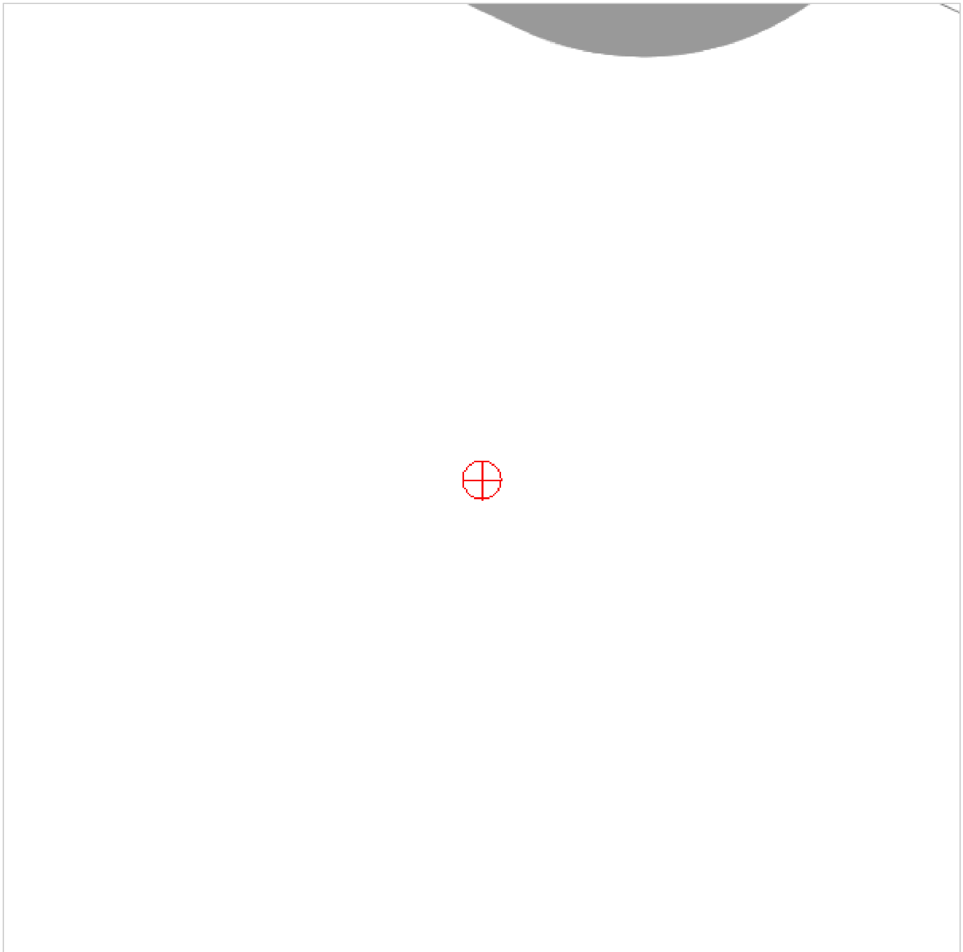
If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

Latitude:	46 Deg 32 M 54.78 S N
Longitude:	119 Deg 57 M 29.58 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	1971 (nearest foot)
Structure Height :	12 (nearest foot)
Traverseway:	No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway
Is structure on airport:	(●) No ( ) Yes

Results

You do not exceed Notice Criteria.



Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:
- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

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The tool below will assist in applying Part 77 Notice Criteria.

Latitude:	46 Deg 32 M 03.77 S N
Longitude:	119 Deg 57 M 31.44 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	1618 (nearest foot)
Structure Height :	12 (nearest foot)
Traverseway:	No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway
Is structure on airport:	(●) No ( ) Yes

Results

You do not exceed Notice Criteria.

Attachment J. Socioeconomic Report

March 11, 2022

Ostrea Solar, LLC Project

Prepared for:

Cypress Creek Renewables, LLC
3402 Pico Blvd.
Santa Monica, CA 90405

Prepared by:

TRC
Fort Collins, CO

Table of Contents

Tables

Figures

Acronyms and Abbreviations

Notation	Definition
OFM	The Washington State Office of Financial Management
Project	Ostrea Solar, LLC Project (Project)
socioeconomic study area	socioeconomic analysis study area
SR	State Route
WAC	Washington Administrative Code

1.0 Introduction

Per the requirements of Washington Administrative Code (WAC) 463-60-535 Part 1 and 2, the following socioeconomic analysis has been prepared. The socioeconomic analysis study area (socioeconomic study area) includes the cities of Sunnyside (20 miles south from the Project site), Yakima (30 miles west from the Project), and Moxee (21 miles west from the Project), as well as the County of Yakima. Data for the State of Washington is also included. The Project is located on the north side of State Route (SR) 24, approximately 0.75 miles west of the SR 241 and SR 24 interchange. Demographic data used in the analysis was sourced from the U.S. Census Bureau's 2010 and 2020 decennial reports, as well as the Census Bureau's American Community Survey 2015–2019 five-year estimates. The analysis touches upon the socioeconomic study area population, population forecasts, race and ethnicity, local area income and poverty, employment characteristics, and housing characteristics.

2.0 Population and Labor Force Impacts

2.1 Population and Growth Rate

WAC 463-60-535 (1a) Population and growth rate data for the most current ten-year period.

As shown in Table 2-1 and Figure 1 below, the City of Yakima contains the largest population in the region, making up 38 percent of the county population, followed by the City of Sunnyside. Although the City of Moxee is the smallest city in the socioeconomic study area, it recorded the largest population increase from 2010 to 2020. The region as a whole is experiencing population growth. Of the 39 Washington counties, Yakima County is the 8th largest and grew 6 percent from 2010 to 2020. The most recent census data from 2010 to 2020 indicate that the State of Washington was the 7th fastest growing state in the United States.

Table 2-1. Population and Growth Rate 2010-2020

	2010	2020	2010-2020 Change	% Change
City of Sunnyside	15,858	16,375	517	3.3
City of Moxee	3,308	4,398	1,090	33.0
City of Yakima	91,067	96,968	5,901	6.5
Yakima County	243,231	256,728	13,497	5.5
Washington	6,724,540	7,705,281	980,741	14.6

Source: U.S. Census Bureau 2020a

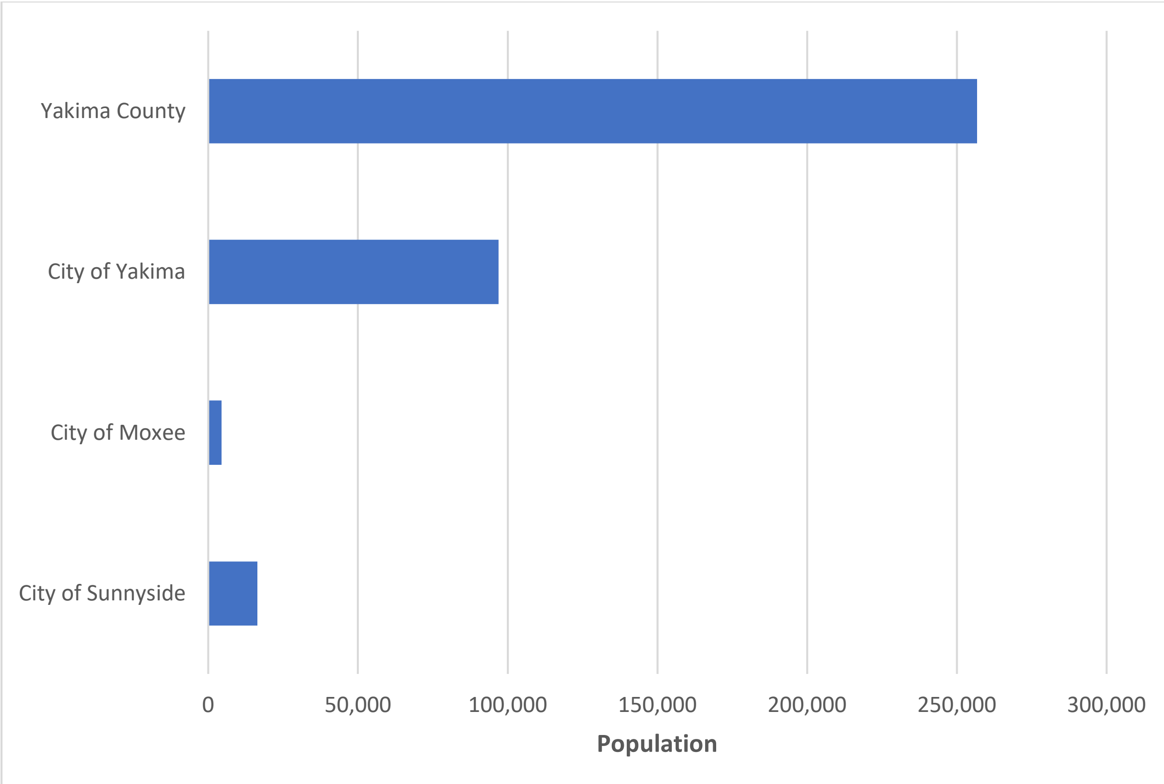

Figure 1. Socioeconomic Study Area Population (2020)

2.2 Population Forecast

WAC 463-60-535 (1b) Published forecast population figures for the study area for both the construction and operation periods.

The Washington State Office of Financial Management (OFM) provides county-level population projections for the state. These population projections occur in 5-year increments, include low, medium, and high projections, and extend to 2040. This data is portrayed in Table 2-2 and Figure 2 below. The medium level 2025 to 2040 Yakima County projection indicates a 2040 population of 307,591—an increase of nearly 12 percent at an annual rate of 0.8 percent. The Yakima County medium-projected growth rate is lower than the state-projected total growth rate of 14 percent (for 2025 to 2040), or 1 percent annually.

Table 2-2. Yakima County OFM Population Projections

	2025	2030	2035	2040	Percent Change 2025 - 2040
OFM Low Projections	241,322	243,914	250,484	252,912	4.8%
OFM Medium Projections	274,932	287,567	298,162	307,591	11.9%
OFM High Projections	326,928	347,852	367,056	385,293	17.9%

Source: State of Washington OFM 2018

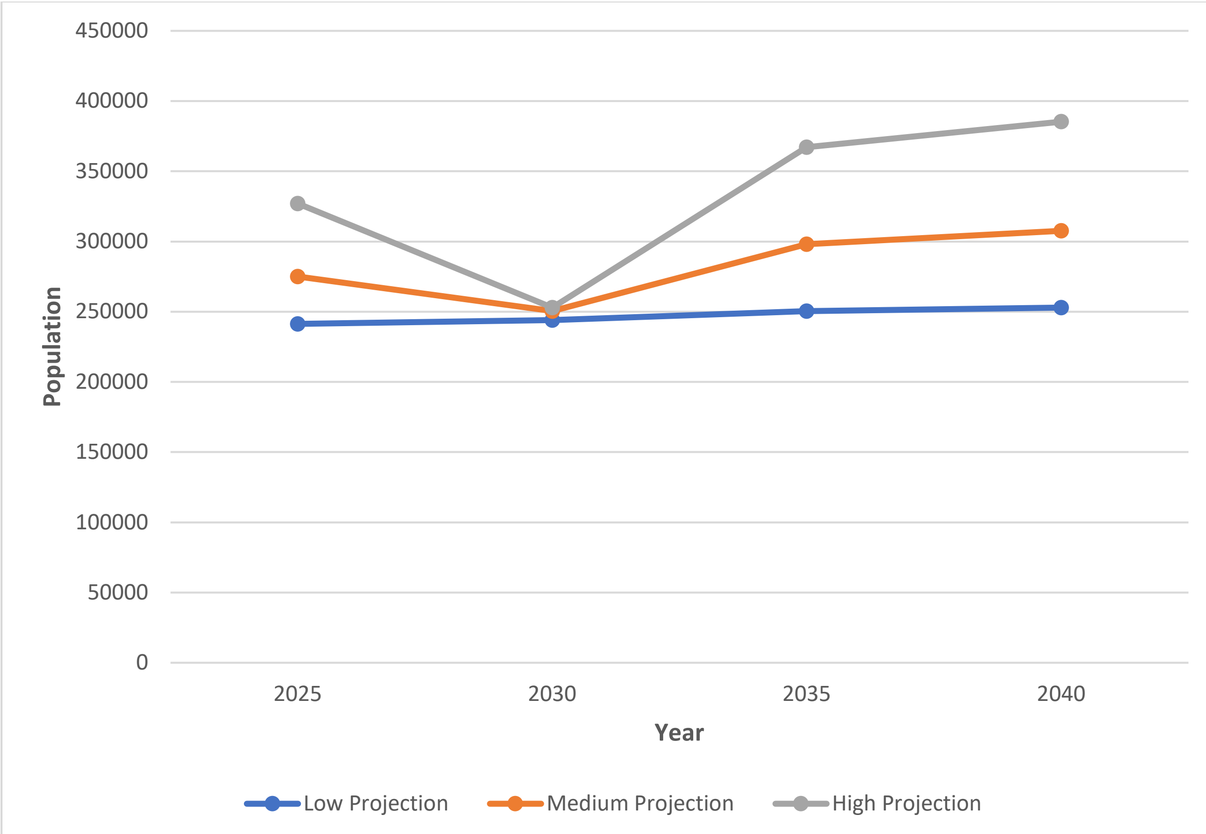

Figure 2. Yakima County 2025-2040 Projections

2.3 Race and Ethnic Composition

WAC 463-60-535 (1c) Numbers and percentages describing the race and ethnic composition.

Table 2-3 below shows that, in 2019, the cities within the socioeconomic study area and in Yakima County, as a whole, are represented by racially diverse populations. The largest racial group in the cities of Sunnyside, Moxee, and Yakima, and Yakima County, as a whole, are defined as Hispanic or Latino. The next largest racial group that is not Hispanic or Latino is White alone, followed typically by a mix of Black or African American, two or more races, American Indian and Alaska Native, or Asian. The Not Hispanic or Latino population is determined by subtracting the Hispanic or Latino Population from the Total Population. The cities of Sunnyside and Moxee contained the largest percentage of minority populations in the socioeconomic study area. The City of Yakima had the lowest percentage minority population. All the cities within the socioeconomic study area, as well as in Yakima County, reported larger minority populations as a percentage than Washington state as a whole.

Table 2-3. Population by Race Ethnicity (2019)

	City of Sunnyside (2019)	City of Moxee (2019)	City of Yakima (2019)	Yakima County (2019)	Washington (2019)
Total Population	*16,559*	*4,012*	*93,638*	*250,873*	*7,614,893*
Not Hispanic or Latino	2,426	1,961	50,556	125,057	6,623,170
White alone	2,222	1,622	41,770	105,255	5,126,694
Black or African American alone	20	91	2,455	2,612	295,239
American Indian and Alaska Native alone	9	126	1,002	7,938	86,811
Asian alone	61	48	1,369	2,790	680,421
Native Hawaiian and Other Pacific Islander alone	0	0	1,190	1,230	48,667
Two or more races	114	74	1,987	4,386	371,150
Two races including some other race	0	13	110	199	7,873
Two races excluding some other race, and three or more races	114	61	1,877	4,187	363,277
Hispanic or Latino	14,133	2,051	43,082	125,816	991,723

Source: U.S. Census Bureau 2019

Table 2-4 and Figures 3 and 4 below detail the percentage of White population and non-White population within the socioeconomic study area. The percentage of White population is calculated by dividing the White population by the total population and then subtracting 100. The greatest percentage of non-White populations occur in the cities of Sunnyside and Moxee. All the analyzed cities in the socioeconomic study area, as well as in Yakima County, contain a percentage of non-White populations that are greater than Washington state levels.

Table 2-4. Percent Minority Population (2019)[1,2]

	Percent White Population	Percent Non-white Population
City of Sunnyside	13.4	86.6
City of Moxee	40.4	59.6
City of Yakima	47.9	52.1
Yakima County	43.2	56.8
Washington	68.5	31.5

Source: U.S. Census Bureau 2019
[1] U.S. Census Bureau category: Not Hispanic or Latino: White alone.
[2] Total percent of non-white population, including Hispanic or Latino and race/ethnicity.

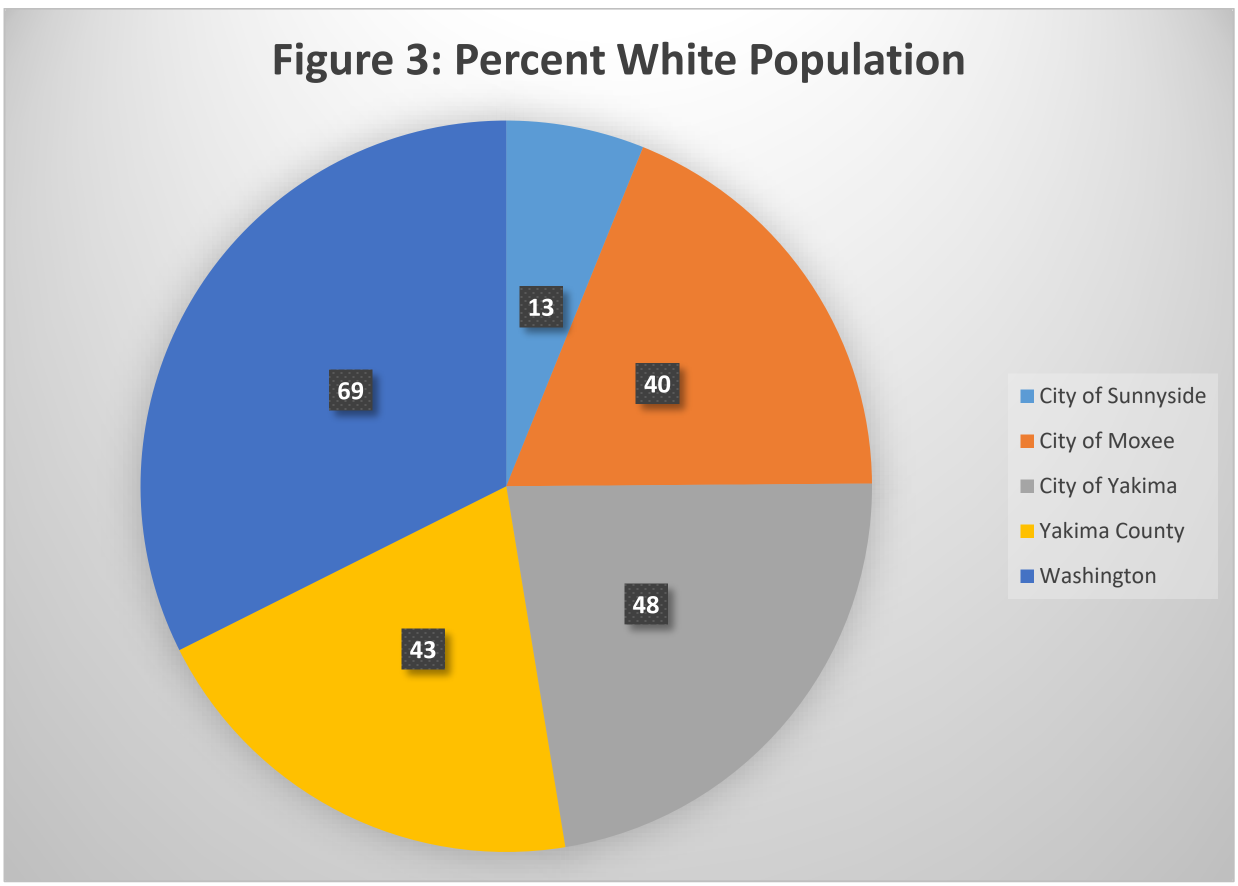

Figure 3. Percent White Population

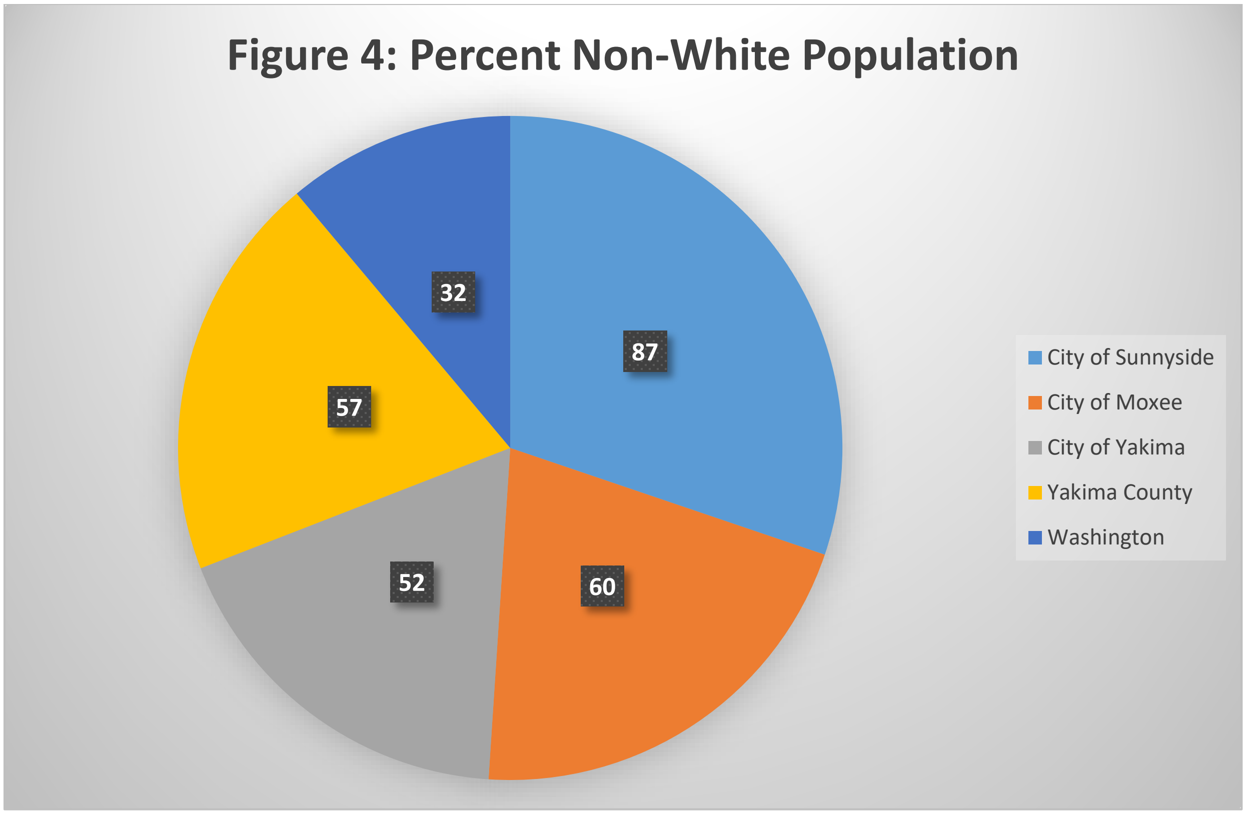

Figure 4. Percent Non-White Population

2.4 Household Income

WAC 463-60-535 (1d) Aggregate per capita and household incomes, including the number and percentages of the population below the poverty level.

Table 2-5 below represents income levels as well as poverty within the socioeconomic study area. Of the three cities analyzed, the City of Moxee reported the highest level of median household income within the socioeconomic study area as well as the lowest percentage of population living below the poverty level. All three cities, as well as Yakima County, reported median household incomes that were well below the Washington state average (30 percent lower in the case of Yakima County), and poverty levels well above those reported at the statewide level (70 percent higher in the case of Yakima County).

Table 2-5. Income and Poverty Levels (2019)

	Median Household Income	Per Capita Income	Population Below Poverty Level	Percent Below Poverty Level
City of Sunnyside	$42,780	$16,259	3,701	22.6
City of Moxee	$59,297	$20,561	770	17.5
City of Yakima	$44,950	$23,514	19,781	20.4
Yakima County	$51,637	$23,459	42,874	16.7
Washington	$73,775	$38,915	755,118	9.8

Source: U.S. Census Bureau 2019

2.5 Displacement or Disproportional Impact

WAC 463-60-535 (1e) A description of whether or not any minority or low-income populations would be displaced by this project or disproportionately impacted.

The proposed facility would not displace any residential structures or planned residential developments; therefore, no low-income or minority population will be displaced as a result of the construction, operation, or maintenance of the proposed Project. Additionally, the Yakima County Comprehensive Plan has not identified the Project location as an area of planned future residential growth. Construction of the proposed Project may provide employment opportunities for minorities or low-income populations, although positive short-term construction impacts would be minor.

2.6 Employment Numbers

WAC 463-60-535 (1f) The average annual workforce size, total number of employed workers, and the number and percentage of unemployed workers including the year that data are most recently available. Employment numbers and percentage of the total workforce should be provided for the primary employment sectors.

The County of Yakima as well as the cities of Sunnyside and Yakima all recorded employment rates that were less than those of the state, as well as unemployment rates that were greater than those of the state. The City of Moxee was the exception, noting an employment rate greater than that of the state, and an unemployment rate less than that of the state. The City of Yakima recorded the lowest employment rate, while the City of Sunnyside recorded the highest unemployment rate. This data is depicted in Table 2-6 below.

Table 2-6. Workforce, Employment, and Unemployment (2019)

	Labor Force Participation 16 Years Old and Over	Employed Population	Employment Rate	Unemployed Population	Unemployment Rate
City of Sunnyside	10,738	6,293	58.6	558	5.2
City of Moxee	2,699	1,849	68.5	82	3.0
City of Yakima	70,047	39,800	56.8	2,698	3.9
Yakima County	182,907	106,018	58.0	7,245	4.0
Washington	3,834,480	3,594,279	60.5	187,330	3.2

Source: U.S. Census Bureau 2019

As noted previously, the City of Yakima contains the largest employed labor force, followed by the cities of Sunnyside and Moxee, respectively. As described in Table 2-7 substantial sectors of employment across all the cities within the socioeconomic study area are educational services, health care, and social assistance; agriculture, forestry, fishing, hunting, and mining; and retail trade. By comparison, the largest employment sectors in the State of Washington are educational services, health care, and social assistance; professional, scientific, management, and administrative and waste management; and retail trade. Natural resources employment makes up a far greater share of regional employment within Yakima County than at the state level.

Table 2-7. Employment by Industry (2019)

	City of Sunnyside	City of Moxee	City of Yakima	Yakima County	Washington
Employed Civilian Labor Force 16+ years	6,293	1,849	39,800	106,018	3,594,279
Agriculture, forestry, fishing and hunting, and mining	1,831 (29.1%)	186 (10.1%)	4,334 (10.9%)	17,477 (16.5%)	97,710 (2.7%)
Construction	326 (5.2%)	35 (1.9%)	1,954 (4.9%)	5,768 (5.4%)	244,414 (6.8%)
Manufacturing	619 (9.8%)	170 (9.2%)	3,415 (8.6%)	9,237 (8.7%)	354,399 (9.9%)
Wholesale trade	195 (3.1%)	65 (3.5%)	1,858 (4.7%)	4,574 (4.3%)	99,426 (2.8%)
Retail trade	706 (11.2%)	304 (16.4%)	4,549 (11.4%)	10,924 (10.3%)	415,696 (11.6%)
Transportation and warehousing, and utilities	641 (10.2%)	166 (9.0%)	3,290 (8.3%)	7,853 (7.4%)	193,233 (5.4%)
Information	0 (0%)	9 (0.5%)	468 (1.2%)	912 (0.9%)	78,252 (2.2%)
Finance and insurance, and real estate and rental and leasing	49 (0.8%)	55 (3.0%)	1,254 (3.2%)	2,665 (2.5%)	190,290 (5.3%)
Professional, scientific, and management, and administrative and waste management	251 (4.0%)	139 (7.5%)	2,468 (6.2%)	6,135 (5.8%)	475,805 (13.2%)
Educational services, and health care and social assistance	1,012 (16.1%)	391 (21.1%)	9,634 (24.2%)	23,215 (21.9%)	774,361 (21.5%)
Arts, entertainment, and recreation, and accommodation and food services	257 (4.1%)	116 (6.3%)	2,913 (7.3%)	7,644 (7.2%)	330,467 (9.2%)
Other services, except public administration	320 (5.1%)	104 (5.6%)	1,922 (4.8%)	4,426 (4.2%)	165,351 (4.6%)
Public administration	86 (1.4%)	109 (5.9%)	1,741 (4.4%)	5,188 (4.9%)	180,875 (5.0%)

Source: U.S. Census Bureau 2019

2.7 Schedule and Workforce

WAC 463-60-535 (1g) An estimate by month of the average size of the project construction, operational workforce by trade, and workforce peak periods.

Table 2-8 below shows the various phases of Project development, corresponding timing, and duration, as well as the anticipated number of workers employed during each phase. Project construction is anticipated last 9 to 18 months and would employ 150 to 300 temporary construction workers. Operation and maintenance activities would include vegetation management, equipment monitoring, and equipment repairs. The facility will be continuously monitored with active operations and maintenance personnel on site regularly. The permanent workforce is anticipated to be five full-time employees. It is unknown at this time how many personnel would be required for decommissioning and site reclamation activities.

Table 2-8. Proposed Schedule and Workforce

Phase	Proposed Timing	Duration	Employee Numbers on Site and Frequency
Site Preparation and Construction	To Be Determined	9–18 months	150–300
Operation/Use	To Be Determined	25–40 years	5
Decommissioning/ Reclamation	End of Project	1 year	To Be Determined

2.8 Workforce Demand

WAC 463-60-535 (1h) An analysis of whether or not locally available workforce would be sufficient to meet the anticipated demand for direct workers and an estimate of the number of construction and operation workers that would be hired from outside of the study area if the locally available workforce would not meet the demand.

Yakima County recorded approximately 7,245 unemployed workers in 2019. With an estimated 240 workers to be hired locally, it is assumed that the local socioeconomic study area workforce would be sufficient to meet the Project needs. As a result of the low number of permanent workers needed for facility operation, it is anticipated that the entirety of the operations workforce would come from within the socioeconomic study area. The temporary nature of construction and the limited number of permanent workers required would not result in any negative impacts to the local available labor force from the proposed Project. Furthermore, CCR would make a good faith effort to procure contracts with entities that have allowed for a preferred entry local work force focusing on women, minority, or veteran-owned businesses.

2.9 Necessary Trades

WAC 463-60-535 (1i) A list of the required trades for the proposed project construction.

Trades required during the construction phase of the Project include:

- Form construction and cement workers;
- Electricians;
- Semi-tractor trailer, concrete mixing truck, dump truck, and water truck drivers;
- General laborers to operate plate compactors/jumping jacks, install fencing, pressure washers, and other material-handling equipment; and
- General laborers to maintain landscaping around the facility.

2.10 Workforce Temporary Relocation

WAC 463-60-535 (1j) An estimate of how many direct or indirect operation and maintenance workers (including family members and/or dependents) would temporally relocate.

It is anticipated that the majority of the workforce would consist of hires from the local regional area. Of the total 300 estimated peak construction workers, approximately 240 are assumed to be from the local area. It is assumed that the local area workforce person would commute approximately 30 miles east from the City of Yakima and surrounding area, or 20 miles north for the Sunnyside area. The balance of the peak construction workforce that would not be local hires, approximately 60 workers (20 percent), would find short-term accommodations that likely would consist of RV parks or campgrounds. It is not anticipated that the proposed Project would result in the permanent relocation of any workers to the socioeconomic study area.

2.11 Commuting Workforce

WAC 463-60-535 (1k) An estimate of how many workers would potentially commute on a daily basis and where they would originate.

As previously noted, commuting distances may vary but of the total 300 estimated peak construction workers, approximately 240 are assumed to be from the local Yakima County area. It is assumed that the local area construction worker would commute daily approximately 30 miles east from the City of Yakima and surrounding area, or 20 miles north from the Sunnyside area. Potentially, a small number may originate from Richland. The non-local hires may commute from Richland, Ellensburg, or the Tri-Cities, or they may acquire short-term accommodations within the socioeconomic study area.

3.0 Housing Impacts

3.1 Housing Data

WAC 463-60-535 (2a) Housing data from the most recent ten-year period that data are available, including the total number of housing units in the study area, number of units occupied, number and percentage of units vacant, median home value, and median gross rent. A description of the available hotels, motels, bed and breakfasts, campgrounds, or other recreational facilities.

As detailed in Table 3-1 below, the City of Yakima recorded the largest number of housing units within the socioeconomic study area as well as the most housing units that were vacant. The City of Moxee contained the least amount of housing units including the lowest percent of vacant units. All the cities within the socioeconomic study area, as well as Yakima County, recorded vacancy rates less than the State of Washington, as well as lower median home values and gross rents. Within the socioeconomic study area, the City of Yakima recorded the highest median home values, and the City of Moxee had the highest median gross rent. Table 3-2 below shows the same housing data for the state and socioeconomic study area from the year 2010. The comparison of the 2010 and 2019 data shows marked socioeconomic study area increases in the median gross rent and median home value. These increases were most pronounced in the cities of Sunnyside (median home value) and Moxee (median gross rent). The cities of Sunnyside and Moxee, as well as Yakima County, all recorded double-digit rent increases from 2010 to 2019.

Table 3-1. Housing Characteristics (2020)

	Total Number of Housing Units (% Change from 2010)	Number of Units Occupied (% Change from 2010)	Number and Percent of Units Vacant (% Change from 2010)	Median Home Value (owner-occupied units) (% Change from 2010)	Median Gross Rent per month (% Change from 2010)
City of Sunnyside	4,845 (1.7%)	4,637 (1.8%)	208/4.3 (-1.9%)	$129,400 (14.9%)	$722 (24.3%)
City of Moxee	1,103 (33.5%)	1,063 (32.9%)	40/3.6 (53.8%)	$171,700 (7.0%)	$1,150 (19.8%)
City of Yakima	37,192 (3.8%)	35,379 (6.7%)	1,813/4.9 (-31.7%)	$173,000 (7.2%)	$820 (8.3%)
Yakima County	90,504 (5.8%)	85,882 (7.5%)	4,622/5.1 (-18.6%)	$175,000 (9.2%)	$825 (14.9%)
Washington	3,202,241 (13.2%)	2,974,692 (15.4%)	227,549/ 7.1 (-9.7%)	$339,000 (18.8%)	$1,258 (42.6%)

Source: U.S. Census Bureau 2020b

Table 3-2. Housing Characteristics (2010)

	Total Number of Housing Units	Number of Units Occupied	Number and Percent of Units Vacant	Median Home Value (owner-occupied units)	Median Gross Rent (per month)
City of Sunnyside	4,766	4,554	212 (4.4)	$112,600	$581
City of Moxee	826	800	26 (3.1)	$160,500	$960
City of Yakima	35,824	33,168	2,656 (7.4)	$161,400	$757
Yakima County	85,552	79,875	5,677 (6.6)	$160,300	$718
Washington	2,829,352	2,577,375	251,977 (8.9)	$285,400	$882

Source: U.S. Census Bureau 2010

There are a number of lodging options within the socioeconomic study area, the majority of which are located in the City of Yakima, and to a much lesser extent, the cities of Moxee and Sunnyside. Table 3-3 below depicts a representative example of short-term lodging options available within the socioeconomic study area.

Table 3-3. Selected Hotels and Other Accommodations in Yakima County

Accommodation	Address
All Star Motel	1900 N 1st St Yakima, WA 98901
Best Western Plus	1849 Quail Ln Sunnyside, WA 98944
Best Western Plus	1614 N 1st St. Yakima, WA 98901
Comfort Suites	3702 Fruitvale Blvd Yakima, WA 98902
Days Inn	1504 N 1st St Yakima, WA 98901

Accommodation	Address
Economy Inn	1405 N 1st St Yakima, WA 98901
Econo Lodge	1104 N 1st St Yakima, WA 98901
Hilton Garden Inn	401 East Yakima Avenue Yakima, WA 98901
Holiday Inn	802 East Yakima Avenue Yakima, WA 98901
Motel 6	1010 Staff Sgt Pendleton Way Yakima, WA 98901
Oxford Inn	1603 E Yakima Ave Yakima, WA 98901
Red Apple Motel	416 N 1st St Yakima, WA 98901
Red Carpet Motor Inn	1608 Fruitvale Blvd Yakima, WA 98902
Red Lion Hotel	607 East Yakima Avenue Yakima, WA 98901
Red Roof Inn	1001 E Staff Sgt Pendleton Way Yakima, WA 98901
Rodeway Inn	408 Yakima Valley Hwy Sunnyside, WA 98944
Rodeway Inn	1223 N 1st Street Yakima, WA 98901
Quality Inn	12 E. Valley Mall Blvd Yakima, WA 98903
Sunnyside Inn Bed & Breakfast	800 E Edison Ave Sunnyside, WA 98944
Suntides RV Park	201 Pence Rd Yakima, WA 98908
Trailer Inns RV Park of Yakima	1610 North First Street Yakima, WA 98901
Travel Inn	724 Yakima Valley Hwy Sunnyside, WA 98944
Western Motel	1202 W Fruitvale Blvd Yakima, WA 98902
Yakima Inn	1022 N 1st St Yakima, WA 98901
Yakima Sportsman State Park	904 University Parkway Yakima, WA 98907
Yakima Valley Inn	120 E Yakima Ave Yakima, WA 98901

Source: Yakima Chamber of Commerce 2020, RVshare 2021

3.2 Workforce Housing

WAC 463-60-535 (2b) How and where the direct construction and indirect workforce would likely be housed. A description of the potential impacts on area hotels, motels, bed and breakfasts, campgrounds, and recreational facilities.

The majority of peak construction workers, approximately 240, are anticipated to originate and commute from within the socioeconomic study area. The estimated 60 workers that would not be from within the socioeconomic study area would temporarily relocate to the area, using short-term accommodations outlined in Table 3-3. The construction workforce from outside the socioeconomic study area would likely not permanently relocate to the region. The small permanent workforce is expected to be from the within the socioeconomic study area and not require short-term lodging. As a result of the small number of temporary short-term construction workers needed for Project development, it is not anticipated that a negative impact would occur to local area accommodations. Modest positive impacts from increased Project construction worker use of local area accommodations would include an increase in tax revenue and local area income.

3.3 Housing Constraints

WAC 463-60-535 (2c) Whether or not meeting the direct construction and indirect workforce's housing needs might constrain the housing market for existing residents and whether or not increased demand could lead to increased median housing values or median gross rents and/or new housing needs for these direct and indirect workforces.

As previously noted, the number of workers from outside the socioeconomic study area looking for accommodations would be limited and short-term in nature. It is anticipated that the construction workforce from outside the socioeconomic study area would not permanently relocate to the socioeconomic study area. This small and short-term increase from the construction workforce is not anticipated to have an impact on median housing values or median gross rents or new housing construction within the socioeconomic study area.

4.0 References

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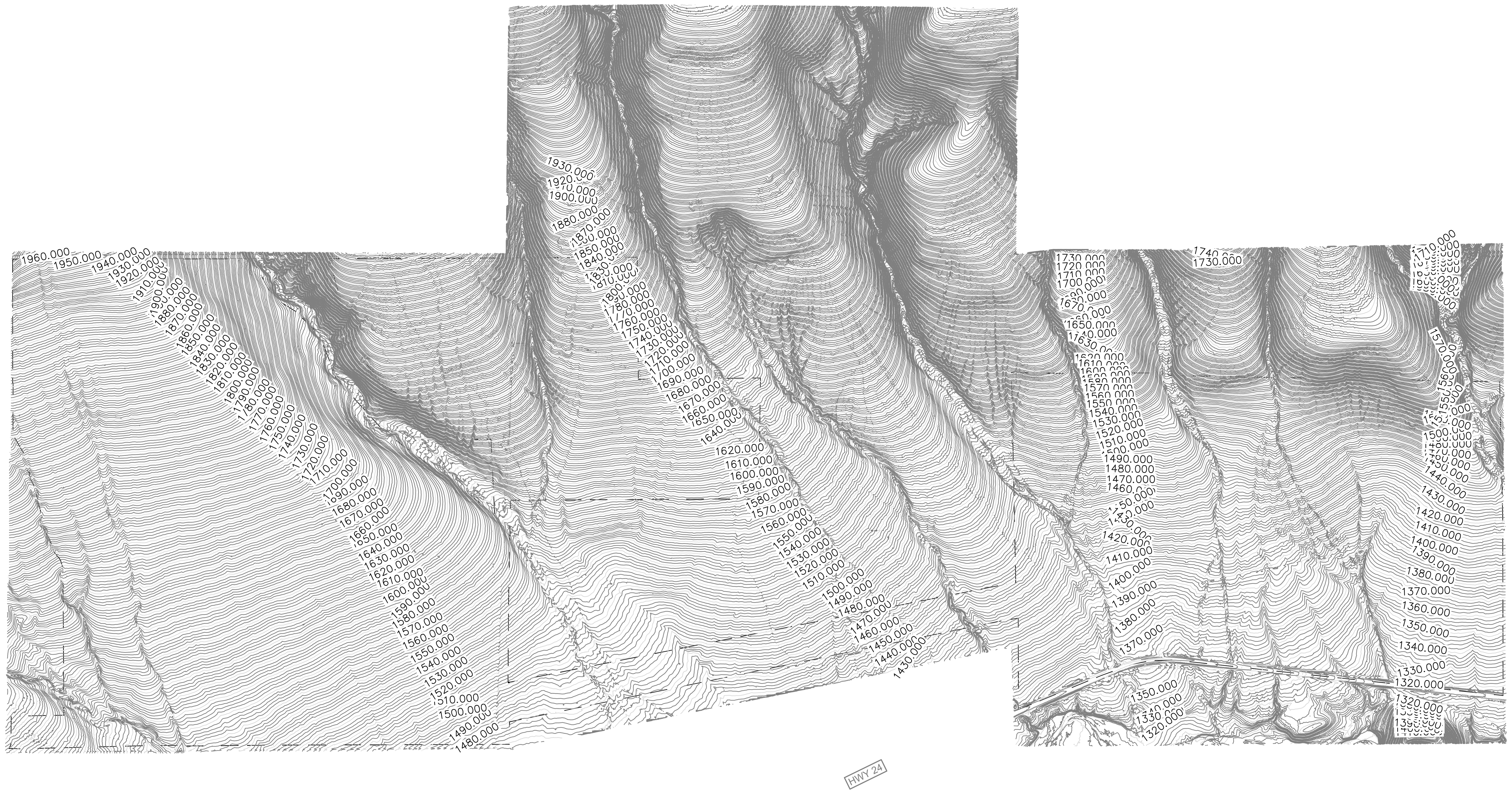
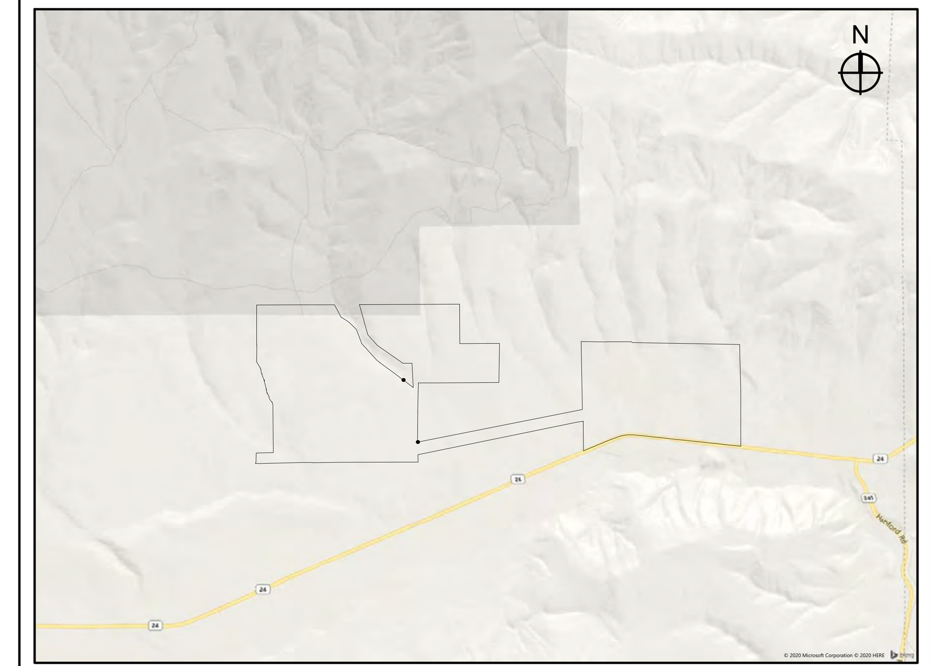


VICINITY MAP



SCALE 1" = 5000'

SITE DATA

PIN #
231209-11001
231211-11001
231210-22002
231210-23001
231210-24001

PROPERTY OWNER
BADISSY, ZINE A

MICHAEL D. FINNEY

SITE ADDRESS
HWY 25
MOXEE, WA 98936

ZONING
AG

ACRES
± 1362.86 AC

PROPOSED USE
SOLAR ENERGY SYSTEM

PRELIMINARY
DISTURBED AREA
± 969 AC

PRELIMINARY
SOLAR AREA
± 907.6 AC

PRELIMINARY ARE SUBJECT TO CHANGE

GENERAL NOTES

1. THE PURPOSE OF THIS PLAN IS FOR ZONING REVIEW AND APPROVAL BY YAKIMA COUNTY TO CONSTRUCT A SOLAR ENERGY SYSTEM.
2. THIS PLAN WAS PRODUCED UTILIZING GIS RESOURCES AND INFORMATION FROM MULTIPLE SOURCES, INCLUDING YAMIKA COUNTY AND BING IMAGES.
3. A PORTION OF THE SUBJECT PROPERTY DOES LIE WITHIN A SPECIAL FLOOD HAZARD AS SHOWN ON THE FLOOD INSURANCE RATE MAP (COMMUNITY PANEL 53077C1175D, DATED 11/18/2009) PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).
4. THE LOCATIONS OF PROPOSED IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO: FENCING, SOLAR ARRAY RACKING, INVERTER/TRANSFORMER PADS, OVERHEAD POLES AND LINES, ETC., SHOWN ARE APPROXIMATE AND ARE SUBJECT TO MODIFICATION DUE TO SITE CONDITIONS, ADDITIONAL PERMITTING REQUIREMENTS, EQUIPMENT SPECIFICATIONS, AND/OR OTHER CONSTRAINTS.
5. PROJECT AREA, INCLUDING CONSTRUCTION STAGING AREAS, WILL BE CLEARED AND GRUBBED AS NECESSARY, RETAINING PRE-DEVELOPMENT DRAINAGE PATTERNS TO THE BEST EXTENT POSSIBLE. CONSTRUCTION STAGING AND AREAS SUBJECT TO RUTTING DURING CONSTRUCTION WILL BE TEMPORARILY STABILIZED WITH GRAVEL. SOIL CONDITIONS AND EQUIPMENT LOADS WILL DETERMINE FINAL DESIGN.
6. ALL DIMENSIONS SHOWN ARE AT 90 DEGREES UNLESS OTHERWISE NOTED.

LEGEND

EXISTING CONDITIONS	PROPOSED CONDITIONS
100 YEAR FLOOD ZONE	EASEMENTS
BUILDING SETBACK	EQUIPMENT PAD
EASEMENTS	LIMIT OF DISTURBANCE
ELECTRICAL (OVERHEAD)	ELECTRICAL (OVERHEAD)
DELINEATED STREAM	ELECTRICAL (UNDERGROUND)
PROPERTY LINES	PROJECT AREA
WETLAND	SECURITY FENCE
	SITE ACCESS

GRAPHIC SCALE

375' 0 375'
1" = 750'

NORTH

N

CYPRESS CREEK RENEWABLES
3402 PICO BOULEVARD :: SANTA MONICA, CA 90405
5310 SOUTH ALSTON AVE. :: BLDG. 300 :: DURHAM, NC. 27713

SEAL

PERMIT DRAWING - NOT RELEASED FOR CONSTRUCTION

SEAL

CONSULTANT

REVISIONS

NO.	DATE	DESCRIPTION

PLT STAMP

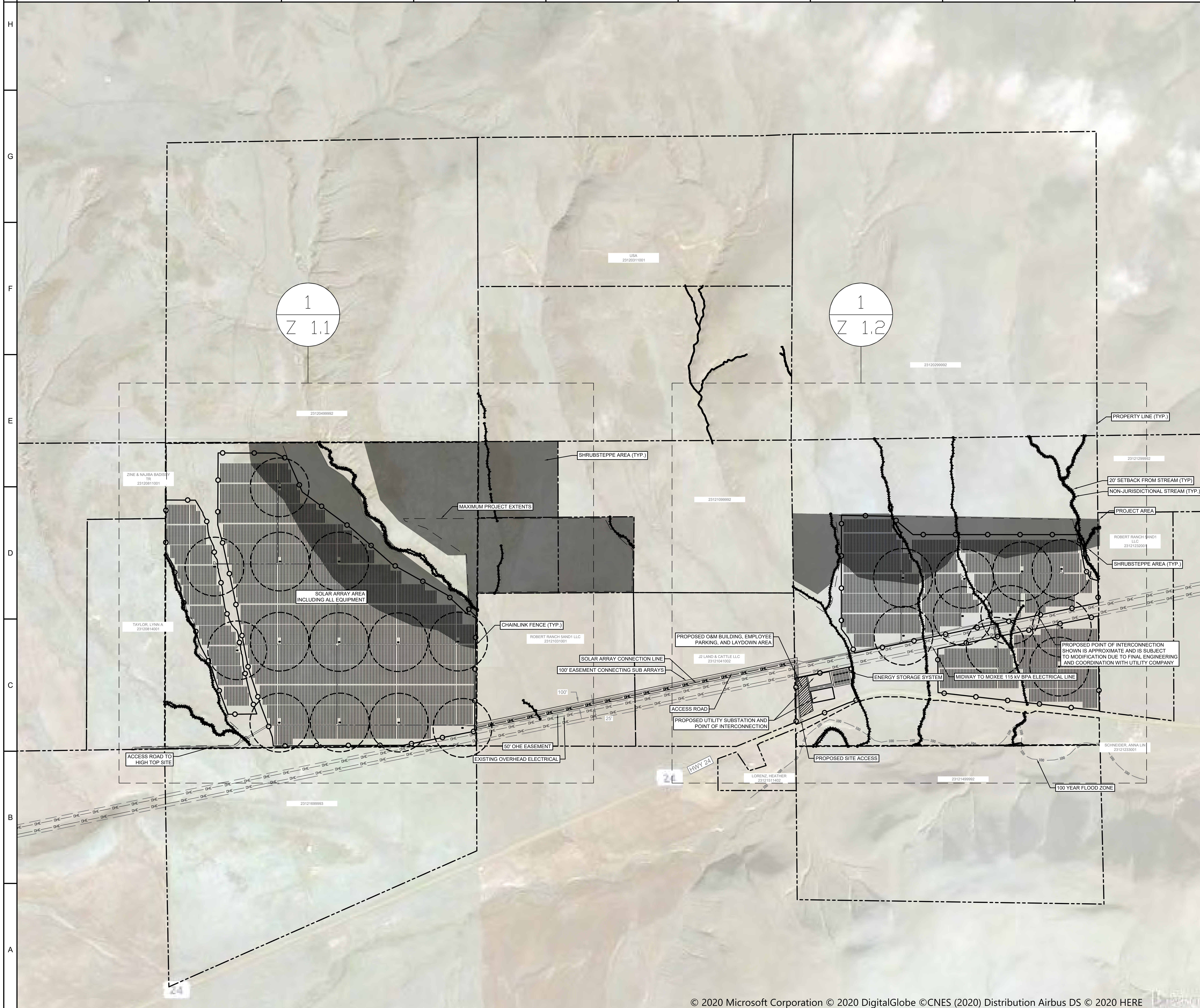
PROJECT

OSTREA SOLAR, LLC
YAKIMA
PA

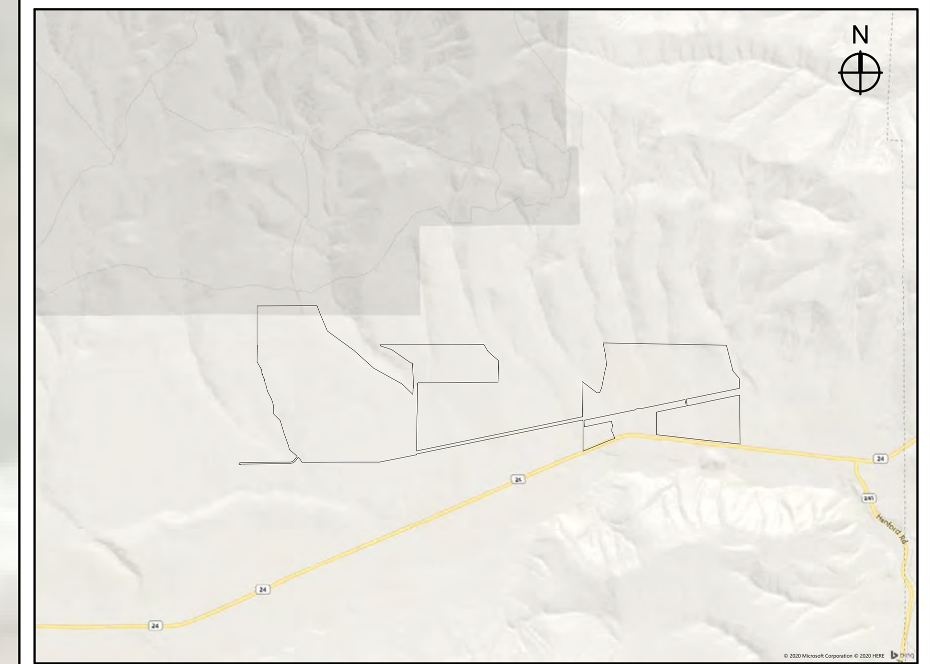
DATE:	12-10-20
DRAWN BY:	AR
CHECKED BY:	--

TOPOGRAPHY PLAN

Z 2.0



VICINITY MAP



SCALE 1" = 5000'

SITE DATA

PIN #	PROPERTY OWNER	SITE ADDRESS
231209-11001	BADISSY, ZINE A	HWY 25
231211-11001		MOXEE, WA 98936
231210-22002		
231210-23001		
231210-24001	MICHAEL D. FINNEY	
ZONING	ACRES	
AG	± 1362.86 AC	
PROPOSED USE	PRELIMINARY DISTURBED AREA	PRELIMINARY SOLAR AREA
SOLAR ENERGY SYSTEM	± 969 AC	± 907.6 AC

PRELIMINARY ARE SUBJECT TO CHANGE

GENERAL NOTES

1. THE PURPOSE OF THIS PLAN IS FOR ZONING REVIEW AND APPROVAL BY YAKIMA COUNTY TO CONSTRUCT A SOLAR ENERGY SYSTEM.
2. THIS PLAN WAS PRODUCED UTILIZING GIS RESOURCES AND INFORMATION FROM MULTIPLE SOURCES, INCLUDING YAMIKA COUNTY AND BING IMAGES.
3. A PORTION OF THE SUBJECT PROPERTY DOES LIE WITHIN A SPECIAL FLOOD HAZARD AS SHOWN ON THE FLOOD INSURANCE RATE MAP (COMMUNITY PANEL 53077C1175D, DATED 11/18/2009) PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).
4. THE LOCATIONS OF PROPOSED IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO: FENCING, SOLAR ARRAY RACKING, INVERTER/TRANSFORMER PADS, OVERHEAD POLES AND LINES, ETC., SHOWN ARE APPROXIMATE AND ARE SUBJECT TO MODIFICATION DUE TO SITE CONDITIONS, ADDITIONAL PERMITTING REQUIREMENTS, EQUIPMENT SPECIFICATIONS, AND/OR OTHER CONSTRAINTS.
5. PROJECT AREA, INCLUDING CONSTRUCTION STAGING AREAS, WILL BE CLEARED AND GRUBBED AS NECESSARY, RETAINING PRE-DEVELOPMENT DRAINAGE PATTERNS TO THE BEST EXTENT POSSIBLE. CONSTRUCTION STAGING AND AREAS SUBJECT TO RUTTING DURING CONSTRUCTION WILL BE TEMPORARILY STABILIZED WITH GRAVEL. SOIL CONDITIONS AND EQUIPMENT LOADS WILL DETERMINE FINAL DESIGN.
6. ALL DIMENSIONS SHOWN ARE AT 90 DEGREES UNLESS OTHERWISE NOTED.

LEGEND

EXISTING CONDITIONS	PROPOSED CONDITIONS
100 YEAR FLOOD ZONE	EASEMENTS
BUILDING SETBACK	EQUIPMENT PAD
EASEMENTS	LIMIT OF DISTURBANCE
ELECTRICAL (OVERHEAD)	ELECTRICAL (OVERHEAD)
DELINEATED STREAM	ELECTRICAL (UNDERGROUND)
PROPERTY LINES	MAXIMUM PROJECT EXTENTS
WETLAND	SECURITY FENCE
	SITE ACCESS

GRAPHIC SCALE

1" = 750'

NORTH

N

CYPRESS CREEK RENEWABLES

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5310 SOUTH ALSTON AVE. :: BLDG. 300 :: DURHAM, NC. 27713

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CONSULTANT

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT

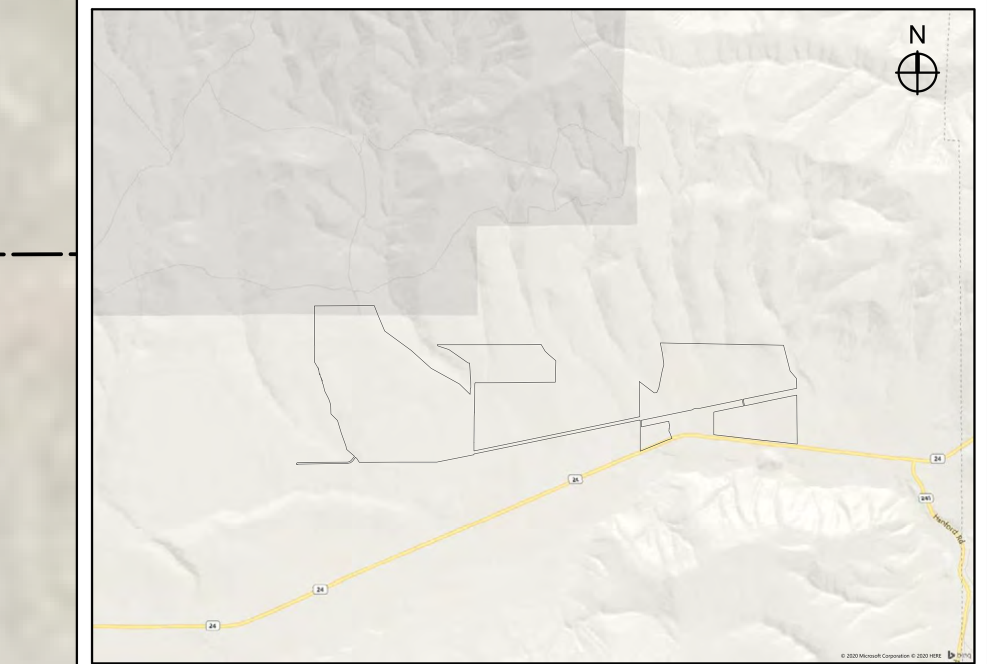
OSTREA SOLAR, LLC
YAKIMA
PA

DATE:	04-05-22
DRAWN BY:	AR
CHECKED BY:	--

ZONING SITE PLAN

Z 1.0

VICINITY MAP



SCALE 1" = 5000'

LEGEND

EXISTING CONDITIONS	PROPOSED CONDITIONS
100 YEAR FLOOD ZONE	EASEMENTS
BUILDING SETBACK	EQUIPMENT PAD
EASEMENTS	LIMIT OF DISTURBANCE
ELECTRICAL (OVERHEAD)	ELECTRICAL (OVERHEAD)
DELINEATED STREAM	ELECTRICAL (UNDERGROUND)
PROPERTY LINES	MAXIMUM PROJECT EXTENTS
WETLAND	SECURITY FENCE
	SITE ACCESS

GRAPHIC SCALE

375' 0 375'

1" = 750'

NORTH

N

CYPRESS CREEK RENEWABLES

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CONSULTANT

REVISIONS

NO.	DATE	DESCRIPTION

PLT STAMP

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PROJECT

OSTREA SOLAR, LLC

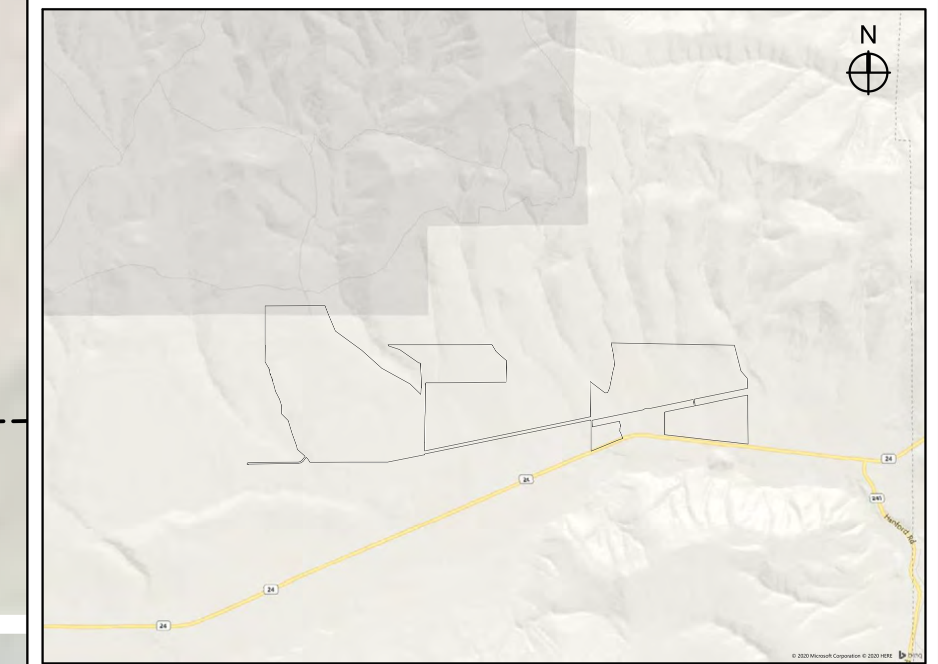
YAKIMA
PA

DATE:	04-05-22
DRAWN BY:	AR
CHECKED BY:	--

EASTERN SECTION SITE PLAN

Z 1.1

VICINITY MAP



SCALE 1" = 5000'

LEGEND

EXISTING CONDITIONS	PROPOSED CONDITIONS
100 YEAR FLOOD ZONE	EASEMENTS
BUILDING SETBACK	EQUIPMENT PAD
EASEMENTS	LIMIT OF DISTURBANCE
ELECTRICAL (OVERHEAD)	ELECTRICAL (OVERHEAD)
DELINEATED STREAM	ELECTRICAL (UNDERGROUND)
PROPERTY LINES	MAXIMUM PROJECT EXTENTS
WETLAND	SECURITY FENCE
	SITE ACCESS

GRAPHIC SCALE

150' 0 150'

1" = 300'

NORTH

N

CYPRESS CREEK RENEWABLES

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5310 SOUTH ALSTON AVE. :: BLDG. 300 :: DURHAM, NC. 27713

SEAL

PERMIT DRAWING - NOT RELEASED FOR CONSTRUCTION

SEAL

CONSULTANT

REVISIONS

NO.	DATE	DESCRIPTION

PLT STAMP

PROJECT

OSTREA SOLAR, LLC
YAKIMA
PA

DATE:	04-05-22
DRAWN BY:	AR
CHECKED BY:	--

EASTERN SECTION SITE PLAN

Z 1.1

Attachment L. Vegetation Management Plan

March 24, 2022

Ostrea Solar, LLC Project

Prepared for:

Cypress Creek Renewables, LLC
3402 Pico Blvd
Santa Monica, CA

Prepared by:

TRC
Fort Collins, CO

Table of Contents

Figures

Attachments

Acronyms and Abbreviations

Notation	Definition
BESS	Battery Energy Storage System
BMP	Best Management Practice
BPA	Bonneville Power Authority
CCR	Cypress Creek Renewables, LLC
EFSEC	Washington Energy Facility Site Evaluation Council
MPE	Maximum Project Extent; defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.
O&M	Operations and Maintenance
kV	kilovolt
Project	Ostrea Solar, LLC Project
RCW	Revised Code of Washington
SR	State Route
Study Area	A smaller area within the Project Site Control Boundry that was defined for biological, cultural, and physical resource surveys.
TRC	TRC Environmental Corporation

1.0 Introduction

Cypress Creek Renewables, LLC (CCR) proposes to construct and operate the Ostrea Solar, LLC Project (Project). TRC Environmental Corporation (TRC) and CCR have developed the Vegetation Management Plan in support of siting and permitting for an Application for Site Certification to the Washington State Energy Facility Site Evaluation Council (EFSEC) for the proposed Project.

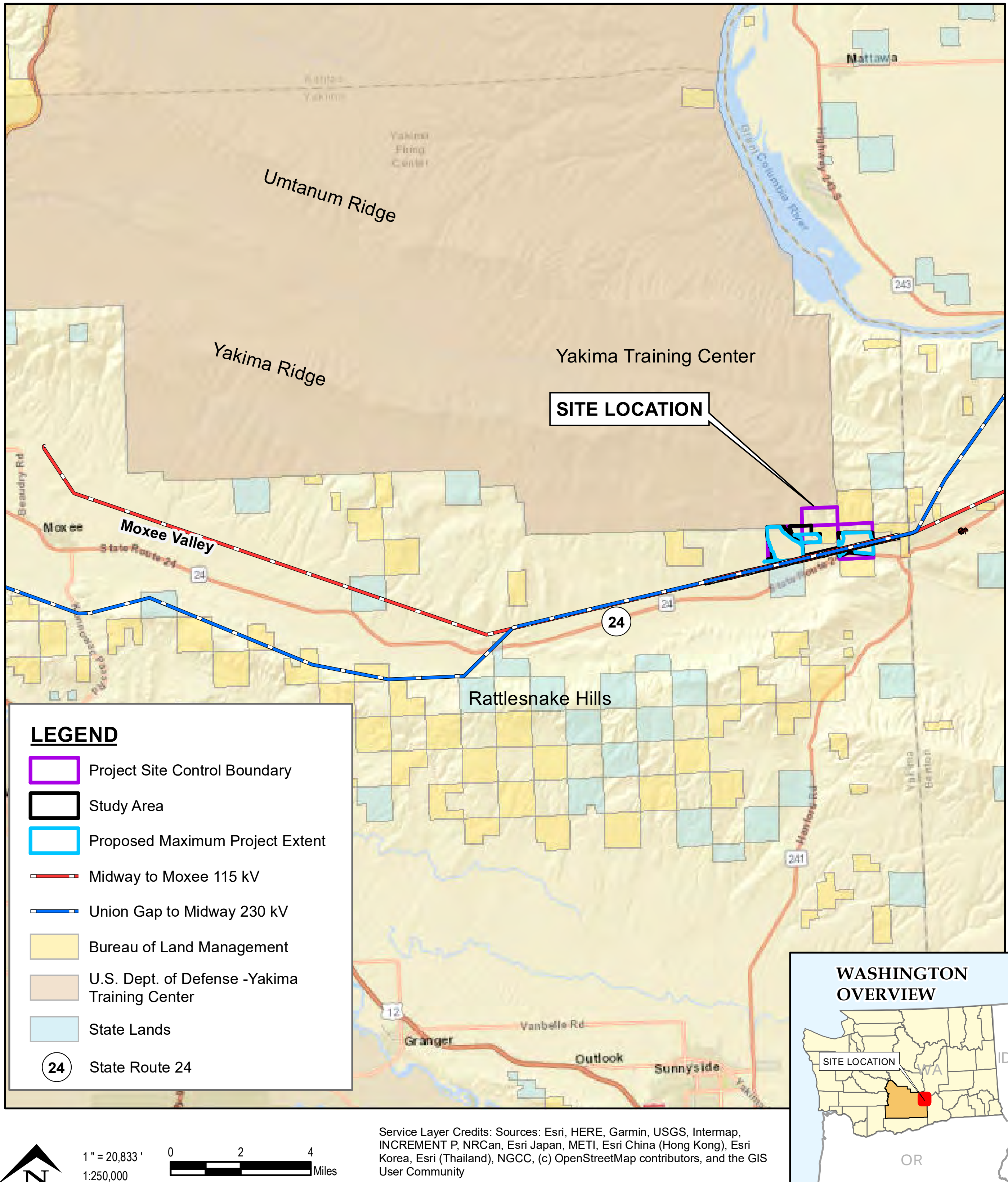
1.1 Project Description

The Project is situated north of Washington State Route 24 (SR-24), south of the Yakima Training Center, and approximately 22 miles east of the town of Moxee, in Yakima County, Washington (Figure 1). The Project Site Control Boundary (~1,699 acres) is defined as the total of the leased areas and easements for the Project (Figure 1). Within the Project Site Control Boundary, a smaller Study Area was defined for biological, cultural, and physical resource surveys. The Maximum Project Extent (MPE) is defined as the area that contains the Project Footprint and additional construction areas. The larger extent of the MPE will allow for the shifting of project components, known as micro-siting, based on a final approved project design.

The Project will use solar photovoltaic panels organized in arrays and aggregated to an injection capacity limited to 80 megawatts of alternating current solar capacity at the point of interconnection to the electric power grid. It will interconnect through a line tap to the Bonneville Power Authority's Bonneville Power Authority's (BPA's) Moxee to Midway 115 kilovolt (kV) transmission line that runs through the southern part of the Project Area. BPA's Moxee to Midway 115 kV transmission line connects to BPA's Moxee substation, which is approximately 23 miles west and north of the Project and BPA's shared Midway substation, which is approximately nine miles east and north of the Project. A security fence will be installed within 20 feet of the final approved locations of the panel arrays. The exact fence line location will be micro-sited based on the final approved design for the Project.

A Battery Energy Storage System (BESS) is required for the Project. The BESS system will store energy from the Project or grid, which will be supplied to the electrical grid when needed. The BESS on the Project will be located to the west of the substation.

An Operations and Maintenance (O&M) trailer and employee parking will be located next to the Project substation. The trailer will be permanently located during the life of the Project and will include a bathroom. During construction, the employee parking area and the O&M trailer footprint will be used as a construction laydown yard for the Project. Access to the Project will be from SR-24 on the west side of the easternmost parcel in the Project Area. The life of the Project is anticipated to be 40 years.



N

1 " = 20,833 '

1:250,000

0 2 4 Miles

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

TRC

11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

TRC - GIS

PROJECT:

CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:

OSTREA PROJECT OVERVIEW MAP

DRAWN BY:	R. BLAKE
CHECKED BY:	P. LORENZ
APPROVED BY:	E. BERGQUIST
DATE:	MARCH 2022
PROJ. NO.:	422984
FILE: Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd	

FIGURE 1-1

S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 1-1 Ostrea Solar Project Study Area Land Use.mxd -- Saved By: RBLAKE on 3/13/2022, 20:08:49 PM

2.0 Purpose of this Plan

The vegetation management plan has been prepared to avoid or mitigate impacts to vegetation resources in the MPE and Project Footprint anticipated to result from construction and operation of the Project. The vegetation management plan provides best management practices (BMPs) and objectives for the construction and operation activities. The vegetation management plan also includes noxious weed control methods to be implemented.

3.0 Existing Project Conditions

The Project is currently active rangeland. Four habitats were identified within the Project Area: cheatgrass dominated pasture and mixed environs, shrub-steppe, disturbed/reclaimed, and crested wheatgrass-dominated grassland (Figure 3-1).

The cheatgrass dominated pasture and mixed environs habitat is the dominant habitat type in the MPE. The cheatgrass dominated pasture and mixed environs is located in previous cropland areas. Dominant vegetation includes weedy invasive forb and grass species such as cheatgrass (*Bromus tectorum*), flixweed (*Descurainia sophia*), tumblemustard (*Sisymbrium altissimum*), and Russian thistle (*Salsola tragus*).

The shrub-steppe habitat is located outside areas that have been historically plowed in the Project Area. These areas have a higher cover of native grass, forb, and shrub species. This community is grazed and has a high cover of non-native invasive and weedy species including cheatgrass, blue mustard (*Chorispora tenella*), and bindweed (*Convolvulus arvensis*).

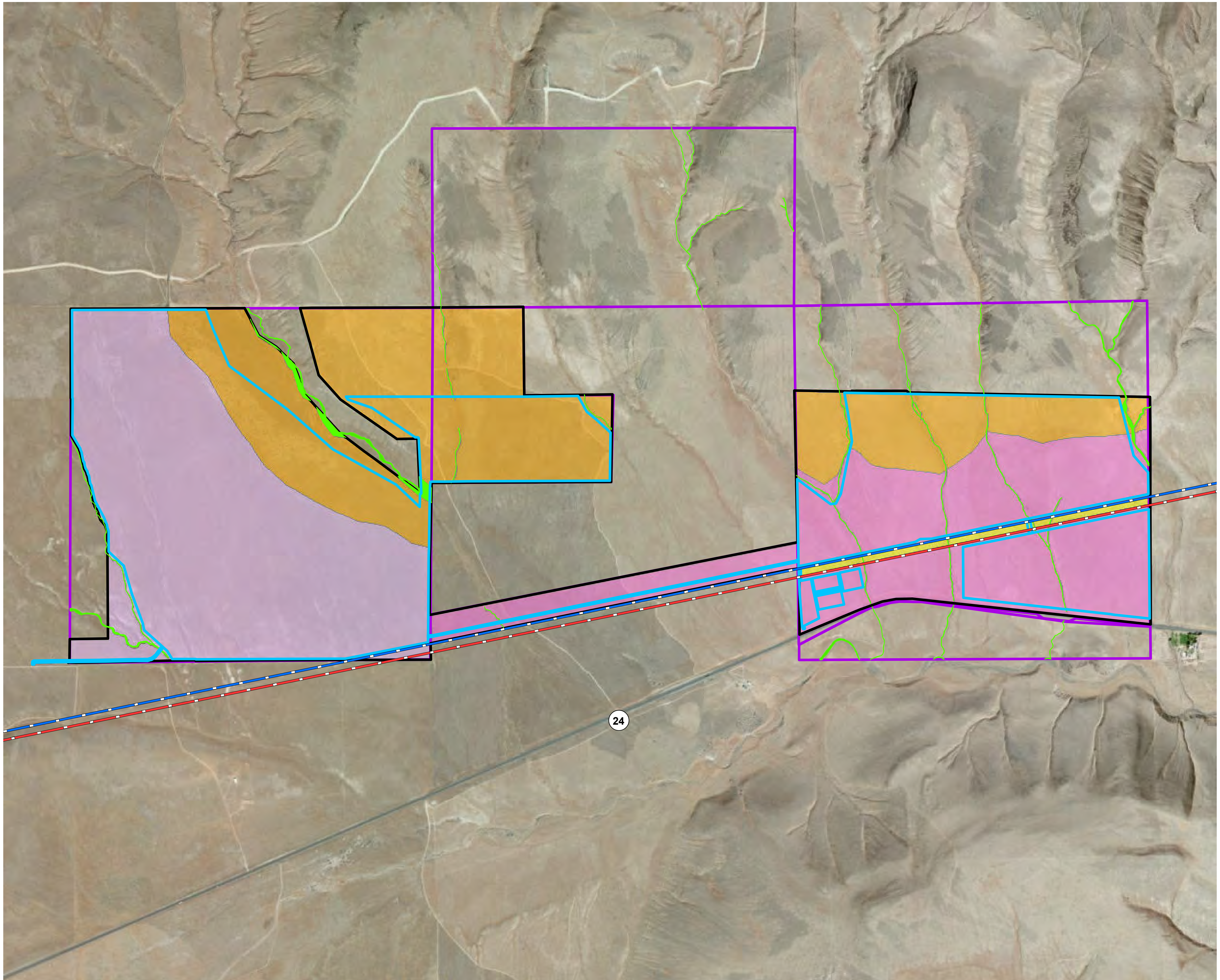
The disturbed/reclaimed vegetation area is located along the existing transmission line route and its associated access road. This area is dominated by non-native invasive species including crested wheatgrass (*Agropyron cristatum*), cheatgrass, flixweed, and bulbous blue grass (*Poa bulbosa*).

The crested wheat-dominated grassland is found on the flatter portions of the Project Area. This vegetation community does not appear to have been plowed. Cattle grazing occurs in this area, and the transmission line and two track access roads are located in this habitat.

As noted in the draft Geotechnical Report (ANS 2020, ASC Attachment G), topsoil in the Project Area is approximately 4 to 12 inches throughout the Project Site Control Boundaries. Below the topsoil, the most common subsurface layer was a light brown silt with varying amounts of sand, gravel, and clay. Dense silty gravel and/or cobbles were frequently beneath the silt layer. A strong, slightly weathered basalt bedrock was found between one to 7.5 feet below grade.

3.1 Noxious Weeds

Noxious weeds are regulated pursuant to the Plant Protection Act (Pub. L. 106-224; superseded Federal Noxious Weed Act of 1974); Federal Executive Order 13751; Revised Code of Washington (RCW) 17.10 (Noxious Weeds – Control Boards); Washington Administrative Code Chapter 16-750 (State Noxious Weed List and Schedule of Monetary Penalties); RCW 17.04 (Weed Districts); and RCW 17.06 (Intercounty Weed Districts). The Washington State Noxious Weed Control Board advises the Washington State Department of Agriculture about noxious weed control, and coordinates and supports the Yakima County Weed Control Board, who enforces the control of noxious weeds on private and public lands (Washington State Noxious Weed Control Board 2021a).



LEGEND

- Project Site Control Boundary
- Study Area
- Proposed Maximum Project Extent
- Midway to Moxee 115 kV
- Union Gap to Midway 230 kV
- Cheatgrass Dominated Pasture and Mixed Environs
- Crested Wheatgrass Dominated Pasture and Mixed Environs
- Disturbed/Reclaimed
- Ephemeral Channel
- Shrub-steppe
- 24 State Route 24

NOTES

1. BASE MAP IMAGERY FROM ESRI/ MAXAR 2019.

0 1,000 2,000 Feet

1 " = 1,417 '
1:17,000

PROJECT:
CYPRESS CREEK RENEWABLES, LLC
OSTREA SOLAR, LLC
YAKIMA COUNTY, WASHINGTON

TITLE:
HABITAT TYPES PRESENT IN THE OSTREA STUDY AREA

DRAWN BY:	R. BLAKE	PROJ. NO.:	427473
CHECKED BY:	P. LORENZ	**FIGURE 3-1**	
APPROVED BY:	E. BERGQUIST		
DATE:	MARCH 2022		

TRC
11180 NW Maple St. Suite 310
Issaquah, WA 98027
425-395-0010
www.trccompanies.com

FILE NO.: Fig 3-1 Ostrea Habitats Veg Management.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2022, 21:21:06 PM by RBLAKE -- LAYOUT: ANSI B(11"x17")
Path: S:\GIS\1-PROJECTS\CCR\Northwest\427473-Ostrea\Fig 3-1 Ostrea Habitats Veg Management.mxd

The Washington State Noxious Weed Control Board categorizes noxious weed species into three classes; Class A, Class B, and Class C. Class A noxious weeds (totaling 38 species) are non-native species whose distribution in Washington State is still limited.

Class B noxious weeds (totaling 66 species) are non-native species whose distribution is limited to portions of Washington State but may be widespread in other parts. Class B noxious weeds are designated for mandatory control in regions where they are not yet widespread. Prevention of new infestations in these areas is the primary goal. In regions where a Class B species is already abundant, control is decided at the local level. Containment of these weeds is the primary goal so that they do not spread into uninfested regions. The Washington State Noxious Weed Board or Yakima County Noxious Weed Board can designate a Class B noxious weed for mandatory control.

Class C noxious weeds (totaling 51 species) are either already widespread in Washington or are of special interest to the agricultural industry. The Class C status allows a county to enforce control if it is beneficial to that county, whereas other counties may choose to provide education or technical support for the removal or control of these weeds (Washington State Noxious Weed Control Board 2021b). Control is defined as the prevention of the dispersal of all propagating parts capable of forming new plants, including seeds. If the landowner does not control noxious weeds after receiving several notifications, the Yakima County Weed Board may control the weeds and bill the landowner or issue a civil infraction (Washington State Noxious Weed Control Board 2021a).

The 2019 Yakima County Noxious Weed List and Control Policy for all Class A, B, and C species is presented in Appendix A. Appendix A further identifies the noxious weed species known to occur in Yakima County, and which species require mandatory control or require education only (i.e., control not mandatory) (Yakima County Noxious Weed Control Board 2019). Appendix B lists only those noxious weed species known to occur in Yakima County and their associated control requirements.

The Washington State and Yakima County Noxious Weed Control Boards require that noxious weeds are actively managed on private lands. Species present in the MPE were recorded during the rare plant surveys. Based on the list of species observed, one invasive species was observed within the MPE: kochia (*Bassia scoparia*, Class B). Kochia is present throughout the MPE, but predominantly is found in the cheatgrass dominated pasture and mixed environs.

4.0 Vegetation Management

4.1 Construction

Actions will be taken to minimize impacts during construction including implementing best management practices (BMPs) and erosion control measures. Grading will be restricted to access roads (as needed), concrete pads, and facility footprints. Vegetation clearing will occur in construction areas, areas that are graded, and access roads. Vegetation clearing will be minimized to extent feasible to minimize surface disturbance and maintain existing vegetation communities. Erosion control measures will be implemented to avoid, minimize, or mitigate effects from surface-disturbing activities. Once surface disturbance activities have been completed, permanent stabilization measures will be initiated.

To the extent feasible, construction will maintain existing topography, natural drainage patterns and infiltration across the MPE. To restore the temporarily disturbed areas as a result of construction activities, reclamation measures will be implemented. If required, disturbed areas will be re-seeded with a native seed mix developed in consultation with Washington Department of Fish and Wildlife. Timing of reseeding will be dependent on the seed mix, site conditions, and weather. Additional reclamation measures will be determined at the end of construction and will be dependent on site conditions.

5.0 Operations & Maintenance

Vegetation management during (O&M) will be minimal and will predominantly consist of vegetation clearing. Vegetation clearing including mowing or stripping will be conducted in areas of permanent disturbance including the access roads, concrete pads for inverters and transformers, and facility foundations. Vegetation clearing timing will be determined by the weather, season, and site conditions and will seek to eliminate shading of the panels, vegetation touching the panels, maintain internal access for O&M, and emergency response, limit fire risk around transformers, inverters, and collectors, and promote native vegetation communities as feasible. O&M staff will routinely monitor the vegetation on site and determine the clearing schedule, noxious weed management timing, and vegetation restoration success.

To additionally minimize fire risks, the following BMPs will be implemented:

- Exposed electrical wires will run under the solar panels at the midpoint or higher than the center of the panel, and
- Gravel will be placed around the concrete pads under the inverters and transformers.

Additional fire minimization BMPs will be identified in consultation with the Yakima Fire Marshal. Noxious weed species will be controlled as described in Section 6.0 Noxious Weed Management.

6.0 Noxious Weed Management

An integrated approach to noxious weed management is critically important to the effective control of noxious weeds (Dewey et al. 2006). CCR will use an integrated noxious weed management strategy, using a combination of cultural, mechanical, and chemical controls throughout all phases of Project implementation, as applicable. Focus will be preventing the spread of noxious weeds as this most effective measure in controlling weed infestations (Dewey et al. 2006). Appropriate species- and site-specific treatments will be implemented in accordance with Yakima County Weed Board, the Washington Department of Agriculture, the Washington Department of Ecology requirements, and landowner agreements. A summary of species-specific treatment recommendations is included in Appendix C.

The following preventive measures will be implemented during construction to minimize the spread and establishment of noxious weeds:

- Project construction personnel will undergo training on the identification of common noxious weeds in the region, weed management measures, and the importance of prevention prior to beginning work on the Project.
- Noxious weed locations will be marked prior to the start of site clearing activities.
- Cleared vegetation will not be placed or stored within known noxious weed locations.

- Stabilization and/or reclamation of disturbed ground will be implemented immediately after construction, or as soon as practicable during construction.
- Chemical or mechanical weed control measures may be implemented prior to construction, during construction, following surface disturbance, or during operation based on the noxious weed species and its associated growth habit and phenology.
- Appropriate species- and site-specific treatments will be implemented in accordance with Washington Department of Agriculture and Yakima County Board requirements and recommendations and landowner agreements.

6.1 Cultural Weed Controls

Cultural weed controls refer to any technique that involves maintaining field conditions such that noxious weeds are less likely to become established or spread. Cultural controls include soil stabilization, maintaining good soil fertility, selection of native seed mixes appropriate for various site conditions (including selection of well-adapted competitive forage species), over-seeding of desirable species, avoiding over-grazing to the extent practicable, and quarantines for identified noxious weed locations (Oregon State University 2020).

6.2 Mechanical Weed Controls

Mechanical weed controls refer to physical measures to remove noxious weeds, including mowing, chopping, and discing. These are effective as short-term measures for controlling noxious weeds and are especially effective when used repeatedly and in concert with other measures (Dewey et al. 2006). Implementing mechanical controls early in the growing season may prevent certain species from going to seed and spreading (Connett et al. 2017). Areas treated with mechanical controls may be subsequently treated with herbicide to ensure the species does not recolonize before native species can become established.

6.3 Chemical Weed Controls

Chemical weed controls refer to herbicide application. There are many types of herbicides and no one herbicide treatment is effective for all weed species. Selection of the appropriate chemical treatment methods must take the species life cycle and timing of treatment into account. In general, herbicide treatments tailored for specific species are most effective for controlling noxious weeds, especially when integrated with other weed control methods (Dewey et al. 2006).

CCR will select herbicides and treatment strategies that will be most effective against noxious weeds and least detrimental to desirable species. The herbicides used will follow recommendations and guidance from the U.S. Environmental Protection Agency, Washington State Department of Agriculture, and the Yakima County Weed Board.

The following BMPs will be implemented for herbicide application.

- Herbicide application will be conducted by a certified pesticide applicator.
- Herbicide application will not occur during precipitation or when a precipitation event is forecasted within 24 hours.
- The use of herbicides will be limited within 200 feet of the mapped populations of Columbia milkvetch (*Astragalus columbianus*). The mapped populations are located

outside the Project Area. The mapped populations will be flagged/fenced prior to construction.

- No herbicide spraying will occur when winds are greater than 15 miles an hour.
- CCR will consider impacts of herbicide application on sensitive areas, such as those containing suitable habitat for special status species, wetlands, and waterbodies, and may elect to use mechanical control methods in these areas to provide additional short-term weed control and limit the establishment of noxious weed populations.

Species-specific preventative measures for kochia are provided in Appendix C. Monitoring of noxious weeds will also be conducted as part of ongoing operation inspections. Operations personnel will be trained in noxious weed identification and will document observations of noxious weeds during normal operations and maintenance inspections. Monitoring will be conducted at least annually. Identified noxious weed populations will be treated consistently with those measures applied post-construction.

7.0 References

ANS. 2020. *Ostrea Draft Geotechnical Report*. Prepared for Cypress Creek Renewables, Santa Monica, CA.

Connett, J.F., Latchinsky, A.V., and S.P. Schnell. 2017. *Wyoming Weed Control in Turf and Ornamentals: A Comprehensive IPM Approach for Commercial, Residential, and Schools*. B-1257. Accessed at: https://wyoextension.org/parkcounty/wp-content/uploads/2016/03/Weed-Control-in-Turf-and-Ornamentals.pdf

Dewey, S.A., Enloe S.F., Menalled, F.D., Miller, S.D., Whitesides, R.E., and L. Johnson. 2006. *Weed Management Handbook 2006-2007: Montana, Utah, Wyoming*. Accessed at: http://www.uwyo.edu/uwe/programs/weed_management_handbook_files/weed_management_handbook.pdf

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Washington State Noxious Weed Control Board. 2021a. *Washington's Noxious Weed Laws*. Accessed October 1, 2021, at: https://www.nwcb.wa.gov/washingtons-noxious-weed-laws

_____. 2021b. 2021 *Washington State Noxious Weed List.* Accessed October 1, 2021, at: https://www.nwcb.wa.gov/pdfs/2021-State-Weed-List_Common_Name-8.5x11.pdf

Yakima County Noxious Weed Control Board. 2019. *Yakima County Noxious Weed List and Control Policy*. Accessed October 1, 2021, at: https://www.nwcb.wa.gov/pdfs/2019-Yakima-County-Weed-List-Control-Policy.pdf

Appendix A. 2019 Yakima County Noxious Weed List and Control Policy

2019
YAKIMA COUNTY NOXIOUS WEED LIST
& CONTROL POLICY

The YAKIMA COUNTY NOXIOUS WEED BOARD (here in after referred to as the BOARD) shall promote weed control by personal contact with LANDOWNERS and through public media. The BOARD will also promote weed control through public seminars, hearings, demonstrations, field tours, school lectures, and at regularly scheduled board meetings. LANDOWNERS are responsible for the control of noxious weeds on their property as per RCW 17.10.140 prior to blooming stage, seed maturity and the development of a root system that would enable said weeds to propagate and spread.

The BOARD shall encourage landowners to control noxious weeds on their own property through their own means, or by means commercially available. Control is defined as stopping all seed production, and containing the noxious weeds to the current infested locations. The Weed Board Coordinator and Inspectors will assist landowners in locating and identifying noxious weeds and encourage the landowner to report to the BOARD other noxious weed infestations. The BOARD, or AUTHORIZED STAFF, has the authority to enter all property within the jurisdiction of this BOARD for the purpose of administering the weed laws of the State of Washington under R.C.W. Chapter 17.10.160.

If the property owner does not promptly act to control the noxious weeds in accordance with R.C.W. 17.10 and this policy, the YAKIMA COUNTY NOXIOUS WEED BOARD may cause their being controlled at the expense of the landowner as per R.C.W. 17.10.170. Charges for regulatory work shall be incurred by the landowner based on the cost, including labor and materials and, if necessary, legal and administrative fees. Such expenses when necessary shall constitute a lien against the property after a hearing and determination has been made on such expense and approved by the BOARD.

The W.A.C. Chapter 16.750 constitutes the Washington State Noxious Weed List, which is classified as "A", "B", and "C" weeds. The following shall constitute Yakima County's Noxious Weed List and control is required within Yakima County.

All Class "A" Weeds
Class "B" Weeds, (All designated & those listed)
Class "C" Weeds, (listed)
All underlined weeds are educational only & no control is required

The Yakima County Noxious Weed Board will conduct regularly scheduled meetings and will encourage public attendance and participation.

Resolution #55: The following requirements will be the policy for placing a weed on the County's Noxious Weed List:

A. The Weed Board shall announce the noxious weed list within the guidelines set forth in R.C.W. 17.10.090.

B. The order in which a weed be submitted to the Board for consideration to be placed on the noxious weed list, the following information must be submitted to the Noxious Weed Board.

   1. Location of weed, with an estimation of acreage.
   2. Verification that adjacent property owners have been notified on the intent to have the weed placed on the Noxious Weed List.
   3. Characteristics of the weed in consideration.

C. The Weed Board has the right to place the weed in question on a review and study list for a set period of time not to exceed one year and, at that time, make a policy statement on the weed in question.

YAKIMA COUNTY NOXIOUS WEED LIST FOR 2019

In accordance with R.C.W. 17.10 a County Noxious Weed List comprising the names of the following plants, which have been declared noxious by the State of Washington Noxious Weed Board, and Yakima County Weed Control Board. Said Board finds these plants to be weedy; highly destructive, competitive, or difficult to control by cultural or chemical practices. Said weeds shall comprise the NOXIOUS WEED LIST for Yakima County for 2019 or until another list is adopted by this Board.

YAKIMA COUNTY lies in REGION 5

ALL CLASS "A" NOXIOUS WEEDS (Mandatory Control) (** Known to be in Yakima County)

COMMON NAME:	SCIENTIFIC NAME:
common crupina	*Crupina vulgaris*
cordgrass, common	*Spartina anglica*
cordgrass, dense flower	*Spartina densiflora*
cordgrass, salt meadow	*Spartina patens*
cordgrass, smooth	*Spartina alterniflora*
dyer's woad**	*Isatis tinctoria*
eggleaf spurge	*Euphorbia oblongata*
false brome	*Brachypodium sylvaticum*
floating primrose-willow	*Ludwigia peploides*
flowering rush	*Butomus umbellatus*
French broom**	*Genista monspessulan*
garlic mustard	*Alliaria petiolata*
giant hogweed	*Heracleum mantegazzianum*
goatsrue	*Galega officinalis*
hydrilla	*Hydrilla verticillata*
Johnsongrass**	*Sorghum halepense*
knapweed, bighead**	*Centaurea macrocephala*
knapweed, Vochin	*Centaurea nigrescens*
kudzu	*Pueraria montana* var. *lobata*

COMMON NAME:	SCIENTIFIC NAME:
meadow clary	*Salvia pratensis*
oriental clematis**	*Clematis orientalis*
purple starthistle	*Centaurea calcitrapa*
reed sweetgrass	*Glyceria maxima*
ricefield bulrush	*Schoenoplectus mucronatus*
sage, clary	*Salvia sclarea*
sage, Mediterranean**	*Salvia aethiopis*
silverleaf nightshade	*Solanum elaeagnifolium*
Small-flowered jewelweed	*Impatiens parviflora*
Spanish broom**	*Spartium junceum*
Syrian bean-caper	*Zygophyllum fabago*
Texas blueweed**	*Helianthus ciliaris*
thistle, Italian	*Carduus pycnocephalus*
thistle, milk**	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
variable-leaf milfoil	*Myriophyllum heterophyllum*
wild four o'clock**	*Mirabilis nyctaginea*

CLASS "B" NOXIOUS WEEDS (**Known to be in Yakima County) (Class B designate-bd require mandatory control) (All underlined weeds are educational only & no control is required)

COMMON NAME:	SCIENTIFIC NAME:
blueweed bd	*Echium vulgare*
Brazilian elodea bd	*Egeria densa*
bugloss, annual bd	*Anchusa arvensis*
bugloss, common bd	*Anchusa officinalis*
camelthorn bd	*Alhagi maurorum*
common fennel bd, (except bulbing fennel)	*Foeniculum vulgare* (except *F. vulgare* var. *azoricum)*
common reed** bd (nonnative genotypes only)	*Phragmites australis*
Dalmatian toadflax**	*Linaria dalmatica ssp. dalmatica*
European coltsfoot bd	*Tussilago farfara*
fanwort bd	*Cabomba caroliniana*
gorse bd	*Ulex europaeus*
grass-leaved arrowhead bd	*Sagittaria graminea*
hairy willow-herb** bd	*Epilobium hirsutum*
hawkweed oxtongue bd	*Picris hieracioides*
hawkweed, orange** bd	*Hieracium aurantiacum*
hawkweeds: All nonnative species and hybrids of the meadow subgenus	*Hieracium,* subgenus *Pilosella*
hawkweeds: All nonnative species and hybrids of the wall subgenus	*Hieracium,* subgenus *Hieracium*
herb-Robert bd	*Geranium robertianum*
hoary alyssum bd	*Berteroa incana*
houndstongue** bd	*Cynoglossum officinale*
indigobush bd	*Amorpha fruticosa*
knapweed, black bd	*Centaurea nigra*
knapweed, brown bd	*Centaurea jacea*
knapweed, diffuse **	*Centaurea diffusa*
Knapweed, spotted**bd	*Centaurea stoebe*
knapweed, meadow** bd	*Centaurea x moncktonii*
knapweed, Russian **	*Rhaponticum repens*
knotweed, Bohemian	*Polygonum x bohemicum*

COMMON NAME:	SCIENTIFIC NAME:
knotweed, giant **bd	*Polygonum sachalinense*
knotweed, Himalayan bd	*Persicaria wallichii*
kochia **	*Bassia scoparia*
knotweed, Japanese** bd	*Polygonum cuspidatum*
loosestrife, garden bd	*Lysimachia vulgaris*
loosestrife, purple** bd	*Lythrum salicaria*
loosestrife, wand bd	*Lythrum virgatum*
Malta starthistle bd	*Centaurea melitensis*
parrotfeather** bd	*Myriophyllum aquaticum*
perennial pepperweed**	*Lepidium latifolium*
poison hemlock **	*Conium maculatum*
policeman's helmet bd	*Impatiens glandulifera*
puncturevine **	*Tribulus terrestris*
ravenna grass**	*Saccharum ravennae*
rush skeletonweed** bd	*Chondrilla juncea*
saltcedar **bd (unless intentionally planted pre 2004)	*Tamarix ramosissima*
Scotch broom **bd	*Cytisus scoparius*
shiny geranium bd	*Geranium lucidum*
spurge flax bd	*Thymelaea passerine*
spurge laurel bd	*Daphne laureola*
spurge, leafy bd	*Euphorbia virgata*
spurge, myrtle** bd	*Euphorbia myrsinites*
sulfur cinquefoil **	*Potentilla recta*
tansy ragwort** bd	*Jacobaea vulgaris*
thistle, musk** bd	*Carduus nutans*
thistle, plumeless bd	*Carduus acanthoides*
thistle, Scotch** bd	*Onopordum acanthium*
water primrose bd	*Ludwigia hexapetala*
white bryony bd	*Bryonia alba*
wild chervil **bd	*Anthriscus sylvestris*
yellow archangel** bd	*Lamiastrum galeobdolon*
yellow floating heart** bd	*Nymphoides peltata*
yellow nutsedge **	*Cyperus esculentus*
yellow starthistle ** bd	*Centaurea solstitialis*

CLASS "C" NOXIOUS WEEDS (All underlined weeds are educational only & no control is required)

COMMON NAME:	SCIENTIFIC NAME:
absinth wormwood **	*Artemisia absinthium*
black henbane **	*Hyoscyamus niger*
cereal rye **	*Secale cereale*
common barberry	*Berberis vulgaris*
common catsear	*Hypochaeris radicata*
English ivy 4 cultivars only:	*Hedera helix* 'Baltica', 'Pittsburgh', and 'Star', *H. hibernica* 'Hibernica'
Eurasian watermilfoil hybrid	*Myriophyllum spicatum* x *M. sibiricum*
hairy whitetop **	*Lepidium appelianum*
hoary cress **	*Lepidium draba*
Italian arum**	*Arum italicum*
jointed goatgrass	*Aegilops cylindrica*
jubata grass**	*Cortaderia jubata*
old man's beard **	*Clematis vitalba*
oxeye daisy **	*Leucanthemum vulgare*

COMMON NAME:	SCIENTIFIC NAME:
pampas grass**	*Cortaderia selloana*
perennial sowthistle **	*Sonchus arvensis ssp. arvensis*
scentless mayweed **	*Matricaria perforata*
smoothseed alfalfa dodder **	*Cuscuta approximata*
spikeweed	*Hemizonia pungens*
spiny cocklebur **	*Xanthium spinosum*
spotted jewelweed	*Impatiens capensis*
Swainsonpea **	*Sphaerophysa salsula*
thistle, Canada **	*Cirsium arvense*
Control only in T7N R20, 21,22,23E	
tree-of-heaven **	*Ailanthus altissima*
white cockle	*Silene latifolia ssp. alba*
yellow flag iris **	*Iris pseudacorus*
yellow toadflax	*Linaria vulgaris*

For a complete listing of the State Weed List go to www. nwcb.wa.gov/ or stop by the Yakima County Weed Board Office for a copy of the State Weed List.

This 2019 Yakima County Noxious Weed List and Control Policy has been adopted by:

______________________	________	______________________	________
Chairman of the Board	*Date*	*Board Member*	*Date*
______________________	________	______________________	________
Board Member	*Date*	*Board Member*	*Date*
______________________	________		
Board Member	*Date*		

Appendix B. Noxious Weed Species Known to Occur in Yakima County

Common Name[1]	Scientific Name	Species Designation	Control Requirement
Wild chervil	*Anthriscus sylvestris*	B	Mandatory Control
Absinth wormwood	*Artemisia absinthium*	C	Educational Only; No Control Required
Italian arum	*Arum italicum*	C	Educational Only; No Control Required
Kochia[1]	*Bassia scoparia*	B	Educational Only; No Control Required
Musk thistle	*Carduus nutans*	B	Mandatory Control
Diffuse knapweed	*Centaurea diffusa*	B	Educational Only; No Control Required
Bighead knapweed	*Centaurea macrocephala*	A	Mandatory Control
Yellow starthistle	*Centaurea solstitialis*	B	Mandatory Control
Spotted knapweed	*Centaurea stoebe*	B	Mandatory Control
Meadow knapweed	*Centaurea x moncktonii*	B	Mandatory Control
Rush skeletonweed	*Chondrilla juncea*	B	Mandatory Control
Canada thistle	*Cirsium arvense*	C	Mandatory Control
Oriental clematis	*Clematis orientalis*	A	Mandatory Control
Old man’s beard	*Clematis vitalba*	C	Mandatory Control
Poison hemlock	*Conium maculatum*	B	Mandatory Control
Jubata grass	*Cortaderia jubata*	C	Educational Only; No Control Required
Pampas grass	*Cortaderia selloana*	C	Educational Only; No Control Required
Smoothseed alfalfa dodder	*Cuscuta approximata*	C	Educational Only; No Control Required

Common Name[1]	Scientific Name	Species Designation	Control Requirement
Houndstongue	*Cynoglossum officinale*	B	Mandatory Control
Yellow nutsedge	*Cyperus esculentus*	B	Educational Only; No Control Required
Scotch broom	*Cytisus scoparius*	B	Mandatory Control
Hairy willow-herb	*Epilobium hirsutum*	B	Mandatory Control
Myrtle spurge	*Euphorbia myrsinites*	B	Mandatory Control
French broom	*Genista monspessulan*	A	Mandatory Control
Texas blueweed	*Helianthus ciliaris*	A	Mandatory Control
Orange hawkweed	*Hieracium aurantiacum*	B	Mandatory Control
Black henbane	*Hyoscyamus niger*	C	Mandatory Control
Dyer's woad	*Isatis tinctoria*	A	Mandatory Control
Dyers woad	*Isatis tinctoria*	A	Mandatory Control
Tansy ragwort	*Jacobaea vulgaris*	B	Mandatory Control
Yellow archangel	*Lamiastrum galeobdolon*	B	Mandatory Control
Hairy whitetop	*Lepidium appelianum*	C	Educational Only; No Control Required
Hoary cress	*Lepidium draba*	C	Educational Only; No Control Required
Perennial pepperweed	*Lepidium latifolium*	B	Mandatory Control
Oxeye daisy	*Leucanthemum vulgare*	C	Mandatory Control
Dalmatian toadflax	*Linaria dalmatica* ssp. *dalmatica*	B	Educational Only; No Control Required
Purple loosestrife	*Lythrum salicaria*	B	Mandatory Control

Common Name[1]	Scientific Name	Species Designation	Control Requirement
Scentless mayweed	*Matricaria perforata*	C	Educational Only; No Control Required
Wild four o'clock	*Mirabilis nyctaginea*	A	Mandatory Control
Parrotfeather	*Myriophyllum aquaticum*	B	Mandatory Control
Yellow floating heart	*Nymphoides peltata*	B	Mandatory Control
Scotch thistle	*Onopordum acanthium*	B	Mandatory Control
Common reed	*Phragmites australis*	B	Mandatory Control
Japanese knotweed	*Polygonum cuspidatum*	B	Mandatory Control
Giant knotweed	*Polygonum sachalinense*	B	Mandatory Control
Sulfur cinquefoil	*Potentilla recta*	B	Educational Only; No Control Required
Russian knapweed	*Rhaponticum repens*	B	Educational Only; No Control Required
Ravenna grass	*Saccharum ravennae*	B	Mandatory Control
Mediterranean sage	*Salvia aethiopis*	A	Mandatory Control
Cereal rye	*Secale cereale*	C	Mandatory Control
Milk thistle	*Silybum marianum*	A	Mandatory Control
Perennial sowthistle	*Sonchus arvensis ssp. arvensis*	C	Mandatory Control
Johnsongrass	*Sorghum halepense*	A	Mandatory Control
Spanish broom	*Spartium junceum*	A	Mandatory Control
Swainsonpea	*Sphaerophysa salsula*	C	Mandatory Control
Saltcedar (unless intentionally planted pre-2004)	*Tamarix ramosissima*	B	Mandatory Control

Common Name[1]	Scientific Name	Species Designation	Control Requirement
Puncturevine	*Tribulus terrestris*	B	Educational Only; No Control Required
Spiny cocklebur	*Xanthium spinosum*	C	Mandatory Control

1 - Noxious weed species identified within Project Area.
Source: Yakima County Noxious Weed Control Board. 2019. Yakima County Noxious Weed List and Control Policy. Accessed October 1, 2021, at: https://www.nwcb.wa.gov/pdfs/2019-Yakima-County-Weed-List-Control-Policy.pdf

Appendix C. Integrated Weed Management

Ostrea Solar, LLC Project
Integrated Weed Management

C-1.0 Kochia

C-1.1 Description

Kochia (*Bassia scoparia*) is an annual, drought-tolerant forb with a deep root. Kochia has erect, branched stems that are three to seven feet long, and typically smooth below but hairy above. The species has alternate simple leaves, one to two inches long with hairy margins, with small green flowers in late summer, which lack petals and are found in clusters. Kochia has small fruits with an oval, brown to black seed. When the species becomes mature the plant breaks off at the base and becomes a tumbleweed which assists the plant with seed dispersal (Washington Invasive Species Council 2016; USDA NRCS 2009).

Kochia was introduced to the United States in the early 1900s as a garden ornamental native to central and eastern Europe and Asia. Kochia is particularly adapted to arid and semi-arid regions and can be found in a very wide range of temperatures and climatic regions. The species is common in rangelands, pastures, cultivated fields, disturbed sites, gardens, roadsides, ditch banks, and in soils with high salinity (Washington Invasive Species Council 2016; Washington State Noxious Weed Control Board 2021a; USDA NRCS 2009).

Figure C-1 (left): Young kochia plant *(Photo courtesy of Washington Invasive Species Council)*

Figure C-2 (right): Kochia stem and flowers *(Photo courtesy of Washington Invasive Species Council)*

Figure C-3 (left): Mature kochia plants. *(Photo courtesy of Washington State Noxious Weed Control Board)*

Figure C-4 (right): Kochia infestation. *(Photo courtesy of Washington State Noxious Weed Control Board)*

According to the Washington State Noxious Weed Law, RCW 17.10, kochia is a Class B noxious weed. Yakima County chooses to provide education or technical support to facilitate the identification and control of this species. Eradication of this species is not required in Yakima County, and therefore, treatment methods are not presented for this species herein (Washington State Noxious Weed Control Board 2021b).

C-6.0 References

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2009. Plant Fact Sheet - Burningbush (*Bassia scoparia*). Available online at: https://plants.usda.gov/DocumentLibrary/factsheet/pdf/fs_basc5.pdf

Washington Invasive Species Council. 2016. Kochia (*Bassia scoparia*). Available online at: https://invasivespecies.wa.gov/wp-content/uploads/2019/07/Kochia-FactSheet.pdf

Washington State Noxious Weed Control Board. 2021a. Kochia (*Bassia scoparia*) Fact Sheet. Available online at: https://www.nwcb.wa.gov/weeds/kochia

_____. 2021b. Washington State Noxious Weed List. Available online at: https://www.nwcb.wa.gov/pdfs/2021-State-Weed-List_Common_Name-8.5x11.pdf

Mr. Zine A. Badissy and Najiba Badissy
4909 119th Place NE
Kirkland, Washington 98033

March 4th, 2022

To: Amí Hafkemeyer
EFSEC Siting and Compliance Manager
ami.hafkemeyer@utc.wa.gov
Office - 360.664.1305
Cell - 360.706.4997

RE: Ostrea Solar Project

Dear Amí Hafkemeyer,

The Ostrea Solar project is a proposed photovoltaic solar power generation facility in Yakima County on land owned by our family on tax parcels 23120911001, 23121111001, 23120331001, 23121022002, 23121023001 and 23121024001 in north of Washington State Route 24(SR-24) and south of the Yakima Training Center in Sections 3,9, and 11, Township 12 North, Range 23 East. As the landowners, we support the project and provide the following information in support of the Ostrea Solar Application for Site Certification (ASC) to the Washington Energy Facility Site Evaluation Council (EFSEC).

Since our land has limited productivity, we have chosen to lease our land for the development and construction of the Ostrea Solar project. The Ostrea Solar project will be a higher and better use of this portion of our land than the existing use for grazing. The annual lease payments from the project will provide long-term, predictable revenue while diversifying the income generated by our landholdings. The project will not adversely impact or increase the cost of farming practices near the project. We do not anticipate any changes to our ongoing operations nor those of our neighbors resulting from the construction or operation of the proposed project.

Sincerely,

Zine A. Badissy and Najiba Badissy
Cell # 425 777 0553

Attachment N. Correspondence Logs

Confidential – Not for Public Distribution

Attachment O. Proposed Mitigation Measures Table

Table 1 Proposed Mitigation Measures

Mitigation Measure	Description	Expert agency participation
Earth		
Applicant will obtain all necessary permits including Building, Grading and Excavation Permits prior to construction.	The Projects' design will meet the seismic design parameters and Washington State and Yakima County Building codes to be compliant with Washington State WAC 463-62-020; 2015 International Building Code and American Society of Civil Engineers (ASCE) 7-10 and ASCE 7-16 and Yakima County Grading and Excavation Permit	Yakima Planning Department and Washington State Building Code Council
The Section 7.0 geotechnical construction recommendations provided by ANS GEO, INC.'s High Top and Ostrea Solar Project Draft Geotechnical Report (Attachment L) may be implemented as appropriate.	The Projects' design will implement the appropriate geotechnical recommendations to meet Washington State and Yakima County Building codes.	Yakima Planning Department and Washington State Building Code Council
While the Projects are in an area of low risk from seismic activity, the seismic design parameters will be incorporated as appropriate. The Projects will comply with the current codes at the time of construction, demonstrating compliance with WAC 463-62-020.	2015 International Building Code and ASCE 7-10 and ASCE 7-16 which follow the Washington State Building Codes. WAC 463-62-020.	Yakima Planning Department and Washington State Building Code Council

Mitigation Measure	Description	Expert agency participation
Pre-drilling of the pile foundations will likely be required, depending on the pile depths, unless shallow-depth footings are used.	2015 International Building Code and ASCE 7-10 and ASCE 7-16 which follow the Washington State Building Codes. WAC 463-62-020.	Yakima Planning Department and Washington State Building Code Council

Mitigation Measure	Description	Expert agency participation
Air Quality		
Best Management Practices (BMPs) – Air Quality	Washington Administrative Codes (WAC) addressing air quality include: • WAC 173-400-040(3) Fallout. • WAC 173-400-040(4–4a) Fugitive Emissions. • WAC 173-400-040(5) Odors. • WAC 173-400-040(9)(a) Fugitive Dust. To adhere to the State codes described above, the Project may implement the following BMPs and standard construction practices: • Fugitive dust-abatement measures will be used as needed to control fugitive dust generated during construction. When applied, Applicant will use an environmentally safe water-based or polymer additive dust palliative such as lignin sulfonate for dust control. All products will be acceptable for use by Ecology. • Vehicles and equipment used during construction will be properly maintained to minimize exhaust emissions. • Operational measures such as limiting engine idling time and shutting down equipment when not in use will be implemented. • Construction materials that could be a source of fugitive dust will be covered when stored. • Traffic speeds on unpaved roads will be limited to 25 miles per hour or less to minimize generation of fugitive dust. • Truck beds will be covered when transporting dirt or soil. • Carpooling among construction workers will be encouraged to minimize construction-related traffic and associated emissions. • Erosion control measures will be implemented to limit deposition of silt to roadways, to minimize a vector for fugitive dust.	Yakima Regional Clean Air Agency (YRCAA)
Emissions	Any generators used on site will be rated appropriately and be properly maintained to minimize emissions as required by the federal emission standards for stationary reciprocating internal combustion engines.	N/A
Construction Dust Policy Notification	In compliance with Section 3.2 of the YRCAA Construction Dust Control Policy, the Applicant will be required to submit an additional notification to the YRCAA, as soon as possible, prior to commencement of work that would disturb ground cover or otherwise cause fugitive dust emissions.	YRCAA

<table>
<tr><th>Mitigation Measure</th><th>Description</th><th>Expert agency participation</th></tr>
<tr><td>Master Dust Control Plan</td><td>As the Project moves forward, the Applicant will generate the Master Dust Control Plan. The Master Dust Control Plan will outline plans to mitigate fugitive dust emissions generated during construction or post-construction Operations and Maintenance (O&M) activities within the MPE.
A Master Dust Control Plan will include the following items
Identification of all anticipated fugitive dust sources including roads.
A description of the BMPs to be used for each source including schedule, rate of application, calculations, or some other means of describing how often, how much and when the BMP is to be used.
Requirements used for monitoring and recordkeeping including storage location.
Contact information for the parties responsible for implementation of the plan.
A detailed site plan identifying dust sources and best management practices.
Source and availability of water and other dust control materials.
An inspection checklist specific to the project will be developed. Using an inspection checklist during the daily report process serves as a record of efforts to minimize fugitive dust problems.</td><td>YRCAA</td></tr>
<tr><td colspan="3">Water Quality – Wetlands and Surface Waters</td></tr>
<tr><td>Avoidance and Minimization</td><td>No wetland features exist within the Project Footprints. The Projects have no impacts to wetlands and are consistent with WAC 463-62-050.

The stream features that are present are Type 5 streams, which do not require a buffer per Yakima County Code.

For High Top, the Project Footprint maintains a greater than 50-foot buffer from these streams in order to avoid, reduce, or eliminate impacts to the delineated streams. The USACE has provided a No Permit Required Letter confirming no impacts to ephemeral channels from the Project based on the current Proposed Project Footprint.</td><td>Ecology</td></tr>
</table>

Mitigation Measure	Description	Expert agency participation
	For Ostrea, during construction, four ephemeral channels will be temporarily crossed by construction traffic. BMPs will be implemented at construction crossings, including but not limited to timber mats, or other similar types of temporary products, to limit impacts to the channel crossings. The BMPs will be removed when the construction is complete. The ephemeral channels will be restored to their current topography once construction is complete. For Ostrea, a permanent access road crosses five ephemeral channels. The design of the road will seek to minimize impacts to the ephemeral channels. The crossing will be designed to minimize permanent impacts per YCC 16C.06.13, YCC 16C.06.17, and WAC 220-660-190, including: ▪ Location and alignment of the proposed road crossing to minimize impacts to the ephemeral channel. ▪ Excavated material not used to achieve the design grade shall be removed from the ephemeral channel. ▪ Site restoration and revegetation in areas disturbed by construction in the channel boundaries. ▪ Channel crossings for construction equipment and vehicles may include a variety of control measures, that could include, but would not be limited to timber mats, or other similar types of temporary products that can be removed from the Project site when construction is completed. ▪ Stage materials and equipment to prevent contamination of Waters of the State. ▪ Develop and implement a Construction Phase Stormwater Pollution Prevention Plan (SWPPP), an Erosion and Sediment Control Plan (ESCP), and a Construction Phase Spill Prevention, Control and Countermeasures (SPCC) Plan, as applicable, in compliance with 90.48 RCW.	

Mitigation Measure	Description	Expert agency participation
	▪ Installation and maintenance of temporary erosion and sediment control measures including the appropriate use of silt fencing. ▪ Complete all work in dry conditions outside of storm events when no water is present. ▪ A Nationwide Permit 14 will be acquired from the USACE as part of the Project permitting effort. A separate 401 permit will be obtained from Ecology if required.	
Water Quality--Stormwater Runoff		
BMPs - Stormwater	The construction SWPPP will outline planned BMPs to mitigate, reduce, and remove the potential for stormwater runoff from discharging from the site. BMPs from Washington State Department of Ecology's (Ecology) Stormwater Management Manual for Eastern Washington (SWMMEW) will be employed. The construction SWPPP will meet the following objectives based on S9.A of the CSWGP: • To identify BMPs which prevent erosion and sedimentation, and to reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. • To prevent violations of surface water quality, groundwater quality, or sediment management standards. • To control peak volumetric flow rates and velocities of stormwater discharges. The Vegetation Management Plan will be implemented to revegetate temporarily impacted areas to increase soil stabilization and minimize erosion.	Ecology
O&M Mitigation Measures and BMPs	The O&M SWPPP will specify the BMPs needed to prevent, control, and treat stormwater runoff. The BMPs will be consistent with the 2019 SWMMEW.	Ecology

Mitigation Measure	Description	Expert agency participation
Construction Stormwater General Permit (CSWGP)	In compliance with WAC 173-200, the Applicant will obtain a CSWGP. The CSWGP requires that a construction SWPPP that includes an ESCP be prepared and implemented for permitted construction sites. A Stormwater Plan will be provided to Yakima County in compliance with YCC 12.10.210.	Ecology
Spill Prevention	Substantial quantities of oils, fuels, and other potential contaminants are not expected to be stored on-site during construction or operation. The Projects will prepare a SPCC Plan, consistent with requirements of 40 CFR Part 112, to prevent spills during construction and to identify measures to expedite the response to a release if one were to occur. Preventive procedures and rapid response measures will address/prevent potential water quality issues. Per the requirements of CFR Part 112, Sections 311 and 402 of the Clean Water Act, Section 402 (a)(1) of the Federal Water Pollution Control Act, and RCW 90.48.080, an O&M Phase SPCC Plan will be developed in consultation with Ecology for the Projects.	Ecology
Dust Control	The Projects will employ the following BMPs as necessary related to dust control and on-site traffic. These practices will be applicable to both construction and post-construction O&M. • Construction materials that could be a source of fugitive dust will be covered when stored. • Truck beds will be covered when transporting dirt or soil. • Carpooling among construction workers will be encouraged to minimize construction-related traffic and associated emissions. • Erosion-control measures will be implemented to limit deposition of silt to roadways, to minimize a vector for fugitive dust. •	N/A

Mitigation Measure	Description	Expert agency participation
Plants		
BMPs - Special Status Plant - Columbia Milkvetch Mitigation	• Flag/fence each mapped Columbia milkvetch polygon within a 100-foot buffer of the Maximum Project Extent (MPE) for construction equipment avoidance. • Provide education training to construction and operation staff and contractors on how to recognize the Columbia milkvetch and its flowering and seed set times. • Avoid applying water-based or polymer additive dust palliative such as lignin sulfonate for dust abatement on roads and disturbed areas within 300 feet of the mapped population of the species, as needed. • Prepare an ESCP to manage construction-related ground disturbances. The ESCP will include BMPs such as the appropriate use of silt fencing to avoid or eliminate runoff of contaminants. • Projects have been designed to avoid surface disturbance in mapped populations of the Columbia milkvetch. • Implement the noxious weed control plan to limit further spread of noxious weeds in the MPE. Noxious weeds will be controlled in compliance with Revised Code of Washington (RCW) 17.10.140 and the Noxious Weed Management Plan. All herbicide and pesticide applications will be conducted in accordance with manufacturer instructions and all federal, state, and local laws and regulations including RCW 17.21. In compliance with RCW 17.10.140, weed control will only use herbicides that are approved for use in the state of Washington by the United States Environmental Protection Agency and Washington State Department of Agriculture. • Limit the use of herbicides within 200 feet of the mapped Columbia milkvetch populations and individual Columbia milkvetch. • No herbicide spraying will occur when winds are greater than 15 miles an hour.	WDFW

Mitigation Measure	Description	Expert agency participation
Habitat Restoration and Mitigation Plan	A Habitat Restoration and Mitigation Plan will be developed in consultation with WDFW and EFSEC. The Plan will detail the implementation of mitigation measures for impacts to the shrub-steppe habitat.	WDFW
Noxious Weed Management Plan	Noxious weeds will be controlled in compliance with Revised Code of Washington 17.10.140 and the Noxious Weed Management Plan. All herbicide and pesticide applications will be conducted in accordance with manufacturer instructions and all federal, state, and local laws and regulations including RCW 17.21. In compliance with RCW 17.10.140, weed control will only use herbicides that are approved for use in the state of Washington by the United States Environmental Protection Agency and Washington State Department of Agriculture. Herbicide application will be conducted by a certified pesticide applicator.	
Animals		
Avoidance Measures	Avoidance measures include 1) siting facilities predominantly on the previously plowed and disturbed areas of the MPE, wherever possible, 2) siting the substation adjacent to the interconnecting transmission line for both Projects, 3) leaving unfenced and avoiding disturbance in the ephemeral channels in the High Top MPE and the majority of the Ostrea MPE, which will provide corridors for wildlife movement and wildlife connectivity function, and for Ostrea 4) minimizing disturbance in the ephemeral channels in the MPE crossed by permanent and temporary access roads. Mitigation measures to avoid impacts to nesting migratory birds including burrowing owls, and fossorial species if required by an agency, will be developed in consultation with the WDFW and EFSEC. Details regarding the implementation of mitigation measures for impacts to the active nests and burrows, if any, will be identified prior to construction within the MPE.	USFWS WDFW
Minimization Measures	Minimization measures include: • Siting facilities predominantly on the previously plowed and disturbed areas of the MPE, wherever possible.	WDFW

Mitigation Measure	Description	Expert agency participation
	• Maintaining existing native vegetation to the extent practicable and controlling for invasive and noxious weed species present in the MPEs. • Implement the Vegetation Management Plan which will include noxious weed control measures to limit further spread of noxious weeds in each MPEs.	
BMPs - Wildlife	Unnecessary lighting will be turned off at night to limit attraction of migratory birds and bats. This includes downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights. Where applicable, above-ground collector or transmission lines are designed and constructed to minimize avian electrocution, per the guidelines outlined in Avian Power Line Interaction Committee standards (APLIC 2012). In accordance with WAC 173-60-050, construction activities will only occur between the hours of 7 a.m. and 10 p.m. Provide environmental awareness training to construction and operation staff and contractors on applicable wildlife resource protection measures, including: • Federal and state laws (e.g., those that prohibit animal collection or removal). • Awareness of sensitive habitats and bird species, potential bird nesting areas, potential bat roosting/breeding habitat, and general wildlife issues. Traffic speeds on unpaved roads will be limited to 25 miles per hour or less to minimize generation of fugitive dust and wildlife collisions. Following decommissioning, reclamation shall help to reduce the likelihood of ecological resource impacts in disturbed areas.	WDFW

Mitigation Measure	Description	Expert agency participation
Environmental Health--Hazardous Materials		
Emergency Plans	The following emergency plans would be developed and maintained onsite during the construction phase of the Projects and during the O&M phase of the project in the O&M trailer and provided to local emergency services • Construction Phase Emergency Plan • Construction Phase Fire Control Plan • Construction Phase Health and Safety Plan • O&M Phase Emergency Plan • O&M Phase Fire Control Plan • O&M Phase Health and Safety Plan	Yakima County Sheriff's Office Yakima County Fire Marshal's Office
BMPs - Fire Prevention	To minimize the risk of fire or explosions, the Projects would implement Best Management Practices including: • Construction equipment would have spark-arresting mufflers, heat shields, and other protection measures to avoid starting fires. • Fire extinguishers would be available in vehicles and on equipment and work crews would be trained in fire avoidance and response measures. • Fire suppression protocols and BMPs would be determined in consultation with the Yakima County Fire Marshal and outlined in the Fire Management Plan for each Project. • As appropriate, provide training to fire responders and construction staff on the codes, regulations, associated hazards, and mitigation processes related to solar electricity and battery storage system on a recurring basis during the life of the Facility. This training also would include techniques for fire suppression of PV and BESS technology. • The BESS options would contain a fire suppression system in accordance with fire code and National Fire Protection Association (NFPA) Standards, specifically NFPA 855 "Standard for the Installation of Stationary Energy Storage Systems." The	Yakima County Sheriff's Office Yakima County Fire Marshal's Office

Mitigation Measure	Description	Expert agency participation
	system would include monitoring equipment and alarm systems with remote shut-off capabilities.	
Environmental Health Plan	An Environmental Health Plan will be established, implemented, and maintained for the duration of the Proposed Projects. The Environmental Health Plan will address on-site temporary and permanent sanitary wastes during construction and during O&M of the Projects. In addition, the Environmental Health Plan will focus on the identification, removal, and off-site transportation and disposal of any hazardous material contamination and residuals on the property of the Proposed Projects.	Yakima County Sheriff's Office Yakima County Fire Marshal's Office
Hazardous Materials	Any hazardous materials used during construction activities will be stored and used in accordance with the manufacturer's specifications and applicable hazardous material regulations; Material Safety Data will be available to all personnel at the construction yard. Hazardous material spills will be recorded in the SWPPP and reported to the regulatory authorities as required.	
Public Safety Standards	The applicant will prepare a Construction and O&M SPCC Plan, consistent with requirements of 40 CFR Part 112, to prevent spills during construction and to identify measures to expedite the response to a release if one were to occur. Preventive procedures and rapid response measures will address/prevent potential water quality issues.	Ecology

Mitigation Measure	Description	Expert agency participation
Noise, Light, Glare and Aesthetics		
BMPs - Noise	• Maintain all construction tools and equipment in good operating order according to manufacturers' specifications. • Limit use of major excavating and earth-moving machinery to daytime hours. • To the extent practicable, schedule construction activity during normal working hours on weekdays when higher sound levels are typically present and are found acceptable. Some limited activities, such as concrete pours, will be required to occur continuously until completion. • Equip any internal combustion engine used for any purpose on the job or related to the job with a properly operating muffler that is free from rust, holes, and leaks. • For construction devices that utilize internal combustion engines, ensure the engine's housing doors are kept closed, and install noise-insulating material mounted on the engine housing consistent with manufacturers' guidelines, if possible. • Limit possible evening shift work to low noise activities such as welding, wire pulling, and other similar activities, together with appropriate material handling equipment.	N/A

Mitigation Measure	Description	Expert agency participation
Archaeological and Historical Resources, Cultural Resources		
Preconstruction Survey and Cultural Resources Avoidance Plan	If required, the Projects shall perform surveys prior to construction for any portions of the final Project footprint not yet surveyed (e.g., new or modified staging areas, or other work areas). Where operationally feasible, all National Register of Historic Places (NRHP) and Washington Historic Register (WHR) eligible resources shall be protected from direct Project impacts by Project redesign (i.e., ancillary facilities, or temporary facilities or work areas). Avoidance mechanisms shall include fencing off such areas as Environmentally Sensitive Areas for the duration of the Proposed Project, if identified. If avoidance of NRHP or WHR eligible resources is not feasible, The Projects will prepare and submit a Treatment Plan to outline the treatment of cultural resources that cannot be avoided. The Treatment Plan shall be submitted to the Department of Archaeology and Historic Preservation (DAHP) for review and approval. All treatment measures outlined in the Treatment Plan shall be implemented at least 30 days before the start of construction.	DAHP, Yakama Nation
Discovery of Archaeological Resources and Inadvertent Discovery Plan	If, during the course of construction, cultural resources (i.e., precontact sites, historic sites, or shell or bone, isolated artifacts or other features) are discovered, work shall be halted immediately within 100 feet of the discovery. The Lead Agency, and a professional archaeologist that meets the Secretary of the Interior's Professional Qualifications Standards in prehistoric or historical archaeology shall be retained to determine the significance of the discovery. Determination of impacts, significance, and mitigation shall be made by qualified archaeological professionals (in consultation with recognized Yakama Nation designees). These protocols shall be outlined within the Inadvertent Discovery Plan. This plan will include protocols for notification, evaluation, and treatment of any archaeological or human remains that might be discovered during construction.	DAHP, Yakama Nation

Mitigation Measure	Description	Expert agency participation
Worker Environmental Training Program	Prior to the initiation of construction, all construction personnel shall be trained regarding the recognition of possible buried cultural resources (i.e., precontact and/or historical artifacts, objects, or features) and protection of all archaeological resources during construction. Training shall inform all construction personnel of the procedures to be followed upon the discovery of cultural materials. All personnel shall be instructed that unauthorized removal or collection of artifacts is a violation of Federal and State laws. Any excavation contract (or contracts for other activities that may have subsurface soil impacts) shall include clauses that require construction personnel to attend the Worker Environmental Training Program so that they are aware of the potential for inadvertently exposing buried archaeological deposits. A background briefing will be given for supervisory construction personnel describing the potential for exposing cultural resources, the location of any potential Environmentally Sensitive Areas, if identified, and anticipated procedures to treat unexpected discoveries.	DAHP
Conduct construction monitoring	Archaeological monitoring shall be conducted by a qualified archaeologist familiar with the types of historic and precontact resources during all ground-disturbing activities that are located within close proximity to previously recorded archaeological sites within the MPE. A Native American monitor may be required at culturally sensitive locations specified by the Lead Agency following government-to-government consultation with Native American tribes. CCR shall retain and schedule any required Native American monitors.	DAHP, Yakama Nation

Mitigation Measure	Description	Expert agency participation
Discovery of Human Remains	In the event that any ground-disturbing or other construction activities result in the unanticipated discovery of archaeological resources, work should be halted in the immediate area, and contact made with county officials, the technical staff at DAHP, and tribal representatives. Work should be stopped until further investigation and appropriate consultation have concluded. In the unlikely event of the inadvertent discovery of human remains, work should be immediately halted in the area, the discovery covered and secured against further disturbance, and contact made with law enforcement personnel, consistent with the provisions set forth in RCW 27.44.055 and RCW 68.60.055.	DAHP, Yakama Nation
Final reporting	At the conclusion of construction and laboratory work (if needed), a final report will be prepared describing the results of the cultural resources monitoring efforts associated with the Project. The report will include a summary of the field and laboratory methods, daily field logs, correspondence, emails, an overview of the MPE, a list of artifacts recovered (if any), an analysis of artifacts recovered (if any) and their scientific significance, and recommendations. The report will be submitted to DAHP, the CTWSRO, and Yakama Nation.	DAHP CTWSRO Yakama Nation.

Mitigation Measure	Description	Expert agency participation
Traffic and Transportation		
WSDOT Permits	Per WAC 468-51, the Applicant will obtain a General Permit from Washing State Department of Transportation (WSDOT) to upgrade the portion of the approach off SR-24 that is within the WSDOT Right-of-Way. A permit will be obtained for heavy or oversized loads in accordance with WSDOT regulations including RCW 46.44 and WAC 468-38.	WSDOT
Traffic Control Plan	A Traffic Control Plan will be prepared in consultation with WSDOT for traffic management during improvement of highway access. This plan will contain measures to facilitate safe movement of vehicles in the vicinity of the construction zone and will be in accordance with 23 CFR §655 Subpart F provides for the Federal Highway Administration to maintain the Manual on Uniform Traffic Control Devices for Streets and Highways, which defines standards for traffic control.	WSDOT
General Mitigation Measure	General mitigation measures for road access and transportation include: • Development of an ESCP to minimize impacts from erosion and sedimentation from construction related ground disturbances. • Obtaining applicable building permits and grading and excavation permits as required prior to construction. • Implement the appropriate geotechnical recommendations outlined in ANS GEO, INC.'s High Top and Ostrea Solar Project Draft Geotechnical Reports. • Development and implementation of a Construction and O&M SWPPPs for both construction and O&M phases of the Project to address access roads and on-site dirt access routes, haul routes, etc.	WSDOT, Yakima County

Washington State
Department of Transportation

South Central Region
2809 Rudkin Road
Union Gap, WA 98903-1648
509-577-1600 / FAX: 509-577-1603
TTY: 1-800-833-6388
www.wsdot.wa.gov

January 6, 2022

Darwin (Chris) Fowler, PE
Principal Transportation Project Manager
TRC Companies, Inc.
2951 243rd Place SW
Brier WA 98036

RE: Conceptual Approval - Ostrea Solar Project, SR-24 MP 28.76 left

Dear Mr. Fowler:

This letter conceptually approves the Ostrea Solar Project's proposal to construct a paved approach not to exceed 30' in width. The approach shall be gated and locked when not in use. The approach is located on State Route 24 (SR 24) milepost 28.76 left. Construction of this approach requires the removal of the existing approach located at milepost 28.92 left. The access connection permit processing fee is $500.

This approval is contingent on Yakima County's and/or EFSEC's approval of the Ostrea Solar Project.

If you have any questions or to apply for the permit, please contact Mark Kaiser at (509) 577-1668.

Sincerely,

Paul Gonseth

Paul Gonseth, P.E.
Planning Engineer

PG: jjp/mnk

cc: File