APPENDIX T

Hydrology and Water Quality: *Draft Water Supply Assessment, Humboldt Wind Energy Project*

Draft Water Supply Assessment
Humboldt Wind Energy Project

February 22, 2019

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This document entitled the Humboldt Wind Energy Project was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Humboldt Wind, LLC. (the "Client"). The material in it reflects Stantec's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

All information, conclusions, and recommendations provided by Stantec in this document regarding the Draft Water Supply Assessment have been prepared under the supervision of and reviewed by the professionals whose signatures appear below.

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Abbreviations

AE	Agricultural Exclusive
af	Acre-feet
afy	Acre-feet per year
APN	Assessor's Parcel Number
BUC	Bird Use Count
CAL FIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CRPR	California Rare Plant Rank
CUP	Conditional Use Permit
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EIR	Environmental Impact Report
FAA	Federal Aviation Administration
FPP	Fire Protection Plan
General	Plan Humboldt County General Plan
Gen-Tie	Generator Tie Line
GIS	geographic information system
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
Humboldt Wind	Humboldt Wind, LLC
HWMA	Humboldt Waste Management Authority
IWMP	Integrated Waste Management Plan
kV	Kilovolts
MET	meteorological towers
mg/m3	milligrams per cubic meter
MW	Megawatt
NCUAQMD	North Coast Unified Air Quality Management District
NHPA	National Historic Preservation Act

NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NSO	northern spotted owls
NWP	Nationwide Permit
O&M	operations and maintenance
PG&E	Pacific Gas and Electric Company
PM	Particulate Matter
POI	point of interconnection
Project	Humboldt Wind Energy Project
PSI	pound-per-square-inch
PV	Photovoltaic
RWQCB	Regional Water Quality Control Board
SB 610	Senate Bill 610
SCADA	Supervisory Control and Data Acquisition
SGMA	Sustainable Groundwater Management Act of 2014
SMARA	Surface Mining and Reclamation Act
SR	State Route
SRA	State Responsibility Areas
Stormwater	Pollution Prevention Plan
SWPPP	Stormwater Pollution Prevention Plan
Timber	Production Zone
TPZ	Timber Production Zone
US 101	US Highway 101
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	US Geological Survey
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment

1.0 SUMMARY

Stantec Consulting Services Inc. (Stantec) has completed a Water Supply Assessment (WSA) for the Humboldt Wind Energy Project (Project) on behalf of Humboldt Wind, LLC (Humboldt Wind). The Project would span approximately 1,000 acres of vacant and undeveloped land in unincorporated Humboldt County, California. Project construction includes the short-term use of non-potable (recycled) water. Long-term operation and maintenance (O&M) will use potable water from a proposed on-site water-supply well. This WSA was conducted in conformance with the requirements of the California Water Code, as amended in 2003 by the passage of Senate Bill 610 (SB 610).

The Project would lie south and west of US highway 101 and the Eel River, south of the unincorporated towns of Stafford and Pepperwood and southeast of the towns of Scotia and Rio Dell (**Figure 1-1**). Humboldt Wind is seeking a Conditional Use Permit for the construction of a 155 mega-watt (MW) wind energy project on a site consisting of 124 parcels. Humboldt Wind proposes to construct and operate the Project. A 115 kilovolts (kV) generation transmission line will deliver power generated by the Project to the Bridgeville Substation via overhead and underground electrical transmission line(s).

Stantec analyzed water supplies available to serve the project, as well as the water demand anticipated during construction and through operation of the facility. According to the requirements of Water Code Section 10910(c)(4)(SB 610):

> "*If the City or County is required to comply with this part pursuant to subdivision (b), the water supply assessment shall include a discussion with regard to whether the total project water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*"

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Figure 1-1. Project Vicinity

The following are significant conclusions of the WSA:

- The project is currently under environmental review pursuant to the requirements of the California Environmental Quality Act (CEQA); therefore, the information contained in this assessment will be used to support the analysis contained in the CEQA document.
- The project meets the definition of a "project" under Water Code Section 10912(a)(5).
- The project is located in a rural setting and will not be served by a public water system. Therefore, under Water Code section 10910(b), Humboldt County is preparing this water supply assessment.
- There is no current Urban Water Management Plan (UWMP) that accounts for the project demand.
- The groundwater supply would be extracted from the Pepperwood Town Area Groundwater Basin. No groundwater sustainability agency (GSA) has been formed to serve this Basin, and management of this Basin is assumed by the County of Humboldt.
- The Pepperwood Town Area Groundwater Basin has been designated as a "very low" priority basin, and a Groundwater Sustainability Plan (GSP) is not required under the Sustainable Groundwater Management Act (SGMA).
- According to Department of Water Resources, groundwater production in the Pepperwood Town Area Groundwater Basin has been estimated to be 1,504 acre-feet per year (afy) (DWR, 2018).
- According to DWR Bulletin 118 groundwater storage in the Pepperwood Area Groundwater Basin is unknown. However, an estimate of 50,320 af has been developed based on available data (DWR, 2004).
- Water to be used for the construction of project facilities, dust control, soils compaction and concrete manufacture will consist of treated wastewater effluent (recycled water) from the Scotia CSD and Humboldt Redwood Company in the town of Scotia located about five (5) miles northwest of the Project. Other than the Project, there is no other source of demand for this effluent water.
- Estimated annual water demand for the Project is one (1) afy for operations and maintenance to serve potable water supplies for 15 full time employees, and 0.74 afy for water storage to meet Humboldt County fire flow requirements. The combined estimated water demand is less than two (2) afy and may be considered a de minimis use and there is sufficient supply to serve other sources of demand on the Pepperwood Area Groundwater Basin, including existing and planned future uses, including agricultural and manufacturing uses.
- Therefore, it is our conclusion that there is sufficient water supply available to serve the Humboldt Wind Energy Project, existing and future planned uses, as well as agricultural and manufacturing uses as proposed.

2.0 INTRODUCTION

Humboldt Wind is seeking approval of Conditional Use Permits (CUPs) for the construction of up to 60 wind turbines and ancillary facilities in Humboldt County, California for the generation of up to 155 megawatts (MW) of electricity shown on **Figure 1-1**. The Project footprint spans 124 parcels and will include ancillary facilities such as temporary staging areas, access roads, 34.5 kilovolt (kV) collection lines (collection system), an operations and maintenance (O&M) facility, a substation, utility switchyard modification, permanent Meteorological Towers (METs), and a 115 kV generation transmission line (Gen-Tie). A portion of the Gen-Tie line will cross the Eel River via underground construction. The Project will connect with Pacific Gas and Electric Company's transmission grid through the PG&E's Bridgeville Substation. Water is required during and for construction as well as for the longer-term O&M facility. Although a groundwater well is proposed for O&M facility de minimis water needs, temporary construction water will be sourced from treated effluent that is currently underutilized. The treated effluent will provide a water recycling/reuse opportunity whose initial use has already been allocated. Because this effluent water supply has been allocated prior to treatment and has no other demands for its consumption other than the Project construction, this source is not assessed further in this WSA.

2.1 PROJECT LOCATION

The Project will be located approximately 20 miles southeast of Eureka. The footprint begins west of US Highway 101, southeast of Rio Dell and Scotia, and terminate east of US Highway 101 in Bridgeville at the PG&E substation. A portion of the Gen-Tie would cross under the Eel River and travel northeast. The Project would cross lands zoned as Agricultural Exclusive (AE) and Timber Production Zones (TPZ).

2.2 PROJECT SITE INFORMATION

The Project cross portions of 124 assessor's parcels which total 37,580 gross acres. The permanent disturbance acreage associated with the project would be about 160 acres. The wind turbines will be distributed south of State Highway 101 across 11 miles. The Project Site topography varies due to the mountainous area and ranges in elevation between 3,000 feet above mean sea level to near mean sea level. Access roads are designed to connect the wind turbines to the O&M building located just south of US Highway 101. Assessor parcel numbers (APN) and respective acreages are provided in **Table 2-1**. The Project area and plan map is presented on **Figures 2.1 and 2.2**.

Table 2-1: Assessor's Parcel Numbers and Acreages

APN	Acres
207-074-025-000	111.05
207-183-003-000	453.02
207-202-009-000	23.40
207-182-011-000	163.34
207-183-004-000	155.22
102-132-004-000	282.73
106-191-011-000	297.15
106-191-012-000	343.40
106-191-010-000	302.63
205-061-011-000	514.33
205-021-017-000	453.53
205-061-007-000	647.31
205-021-019-000	562.58
205-341-011-000	326.55
205-341-006-000	58.15
205-331-007-000	647.30
205-331-006-000	644.95
205-061-004-000	357.78
205-061-012-000	8.52
205-051-001-000	653.25
205-051-003-000	655.61
205-321-006-000	570.17
205-321-034-000	345.62
205-051-008-000	644.57
205-311-004-000	648.56
205-321-032-000	86.09
205-321-033-000	410.83
211-471-001-000	644.14
211-472-001-000	587.00
211-013-001-000	558.32
211-461-001-000	593.74
211-462-004-000	570.39
211-023-002-000	576.28
209-191-001-000	505.21
209-191-013-000	222.72
209-191-012-000	470.13
209-191-002-000	182.57
209-201-007-000	639.76
209-201-002-000	287.79
209-201-003-000	379.44
209-211-009-000	662.18
209-211-008-000	664.20

APN	Acres
207-211-002-000	557.88
207-211-001-000	34.16
209-211-010-000	205.30
207-311-002-000	3.14
207-311-001-000	2.35
207-181-016-000	80.48
207-182-010-000	179.67
207-186-009-000	89.91
207-185-002-000	563.00
207-185-003-000	38.46
207-184-006-000	111.54
207-184-004-000	38.94
207-186-005-000	81.24
207-186-007-000	16.85
207-212-002-000	458.74
207-213-001-000	150.96
207-221-001-000	81.94
207-213-003-000	305.76
207-213-002-000	74.14
205-021-023-000	392.30
209-191-003-000	649.14
205-021-021-000	53.72
205-021-014-000	260.64
205-021-005-000	79.17
207-311-006-000	0.37
207-074-027-000	72.21
207-074-028-000	30.84
205-341-013-000	4.19
205-341-008-000	642.39
205-051-010-000	539.89
205-051-009-000	123.09
207-181-005-000	119.56
207-181-019-000	61.23
207-182-009-000	93.27
205-341-018-000	603.89
205-341-019-000	143.29
205-351-026-000	297.30
205-051-011-000	647.03
205-351-030-000	599.40
205-351-012-000	7.10
Total	26405.99

Note: APN location is provided in Figures 2.1 and 2.2

Figure 2-1. Project Area and Plan

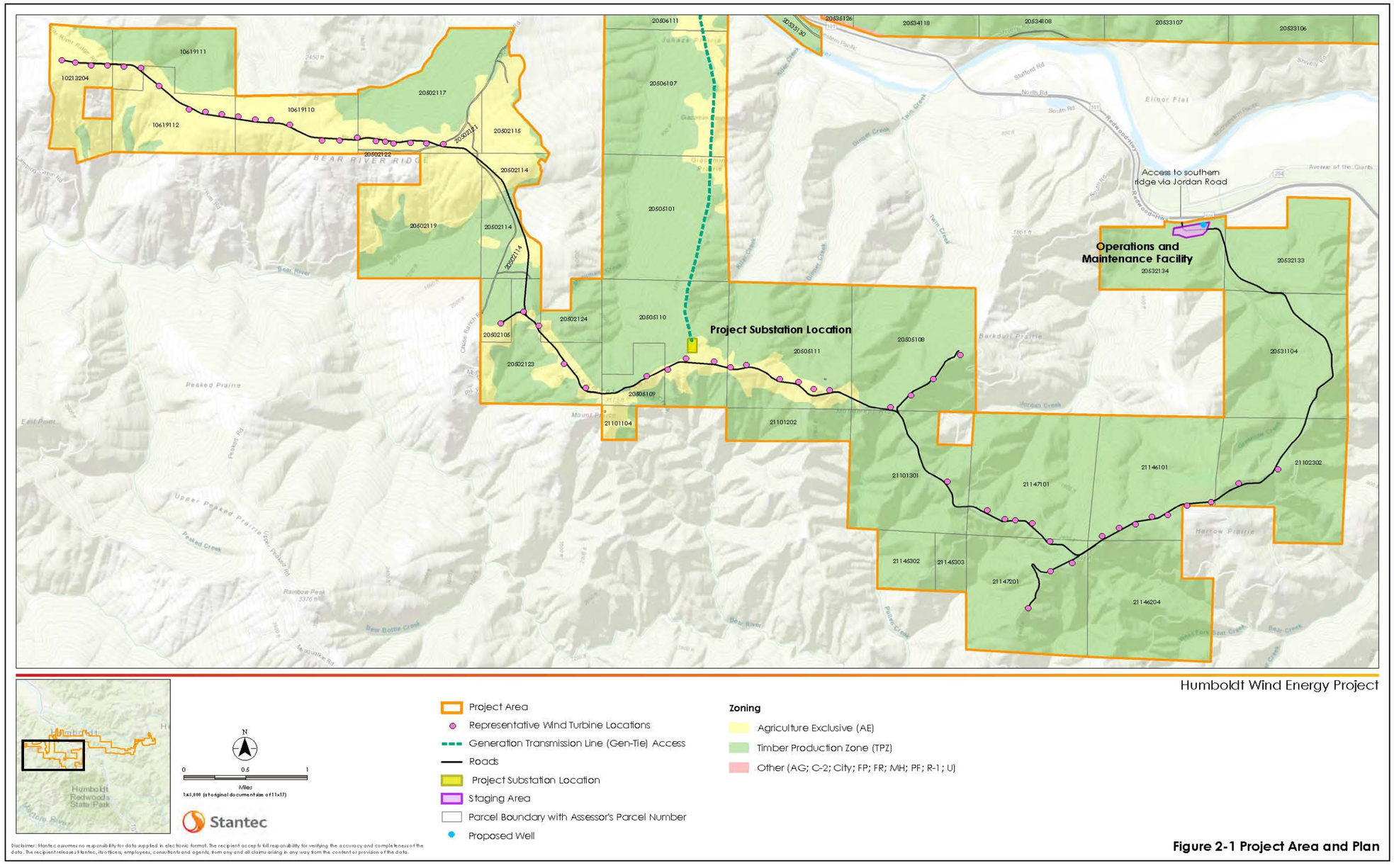


Figure 2-1 Project Area and Plan

Figure 2-2. Project Area and Plan

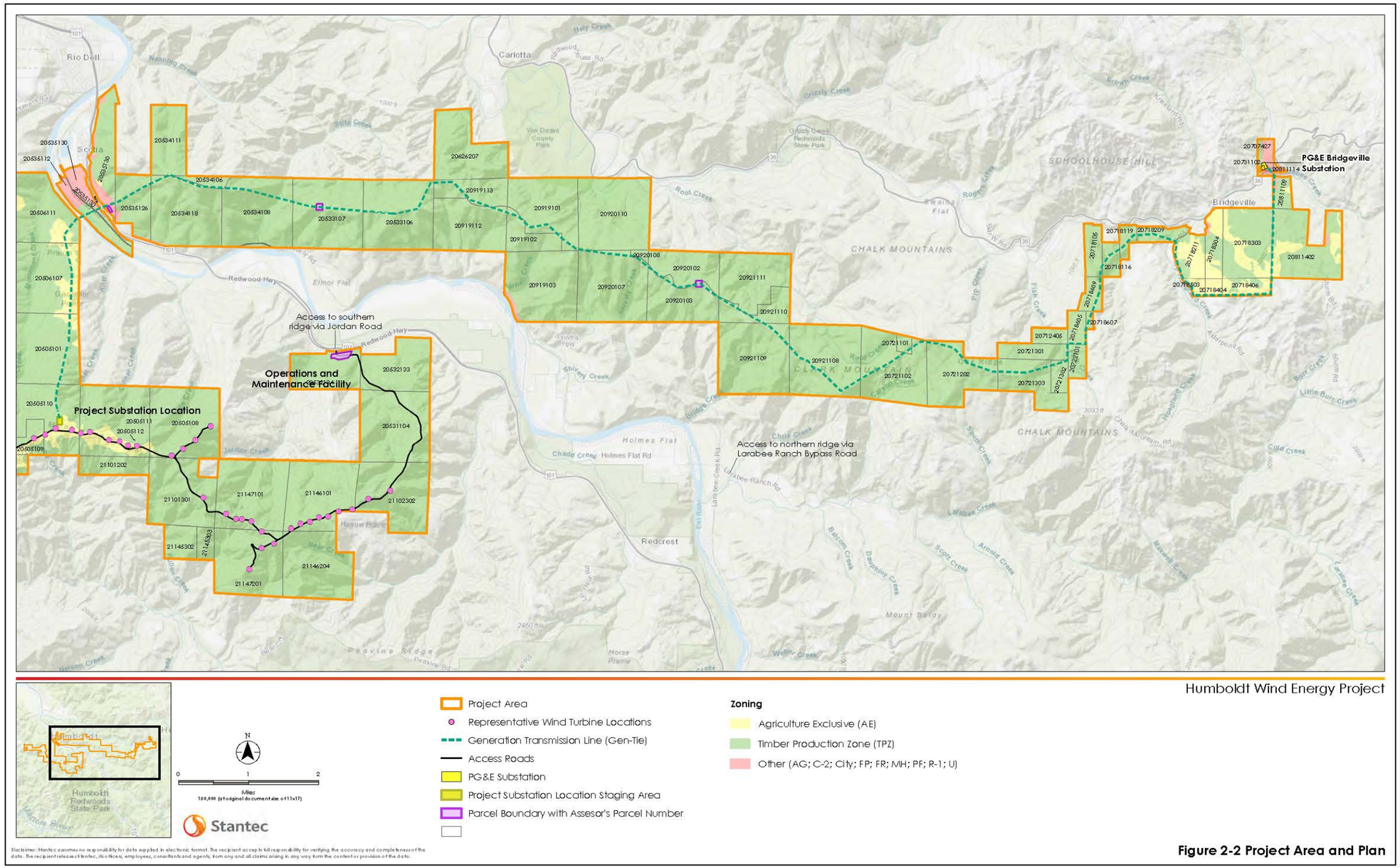


Figure 2-2 Project Area and Plan

2.3 DESCRIPTION OF THE PROPOSED PROJECT

Power generated by the up to 60-turbine Humboldt Wind Energy Project would be delivered via a 25-mile transmission line providing project interconnection with the existing PG&E's Bridgeville Substation.

A temporary 10-acre plot and parking lot will be constructed to serve as the main staging area for equipment and materials storage. The graded pad will also be developed for construction of the O&M building and water storage tank. Three separate five (5)-acre staging areas will be temporary distributed throughout the project site. One of these five (5)-acre plots will include a temporary concrete batch plant on Monument Ridge which will later serve as the foundation for the Substation.

Fifteen (15) full-time employees will operate and maintain the facility. Communication systems via an underground fiber optic cable will run adjacent to the collection system. Permanent meteorological towers (METs) will be constructed in addition to the energy project.

2.3.1 Project Components

Wind Turbine Configuration

The Project consists of up to 60 wind turbines capable of generating up to five (5) MW of electricity each. The turbines have a horizontal-axis design coated with a light gray color and non-reflective finish consistent with the Federal Aviation Administration (FAA) requirements. Each turbine is approximately 650 feet (198 meter) high and will have a rotor blade clearance of 76 feet (23 meters) at their lowest point of rotation. Each wind turbine will require a concrete pad approximately 350 feet by 350 feet, leveled to a 2 percent slope or less. The wind turbine pads will sit above a 60- to 70-foot diameter concrete foundation. Depending on the foundation specifications, each foundation could require 580 cubic yards of 5,000- to 6,150-pound-per-square-inch test concrete and 20 cubic yards of 2,000-pound-per-square-inch slurry mix, which would require up to 60 truckloads of concrete per turbine from the on-site temporary cement batch plants. Each wind turbine consists of a tower, nacelle, blades/rotor, controller, Central Supervisory Control and Data Acquisition (SCADA) system for communication, transformer, FAA lightening (where required), and lightening protection system.

Substation

A Substation will be constructed on the foundation built for a temporary staging area. The Substation will be located near Monument Ridge and will serve as a connection to the Gen-Tie linked by an electrical collection system. The main power transformer will increase electricity voltage from the collection system for transmission to PG&E's Bridgeville Substation from 34.5 kV to 115 kV, respectfully. The Substation will result in the permanent disturbance of five (5)-acres and will include a fence, graveled area, and parking area.

Collection System

The collection system will consist of 34.5 kV lines which connect the turbines to the substation. The lines will be buried within 4-foot deep trenches and include power cables, a ground wire, and a fiber optic communication cable (SCADA). Aboveground, markers will be placed to provide information before any potential digging in the adjacent areas.

Controller/Communications

A centralized SCADA system will communicate between the controller to the central O&M system via underground fiber optic lines. The SCADA system will transmit wind turbine operational conditions such as startup, shutdown, pitch control, yaw control, and safety monitoring. The system will further monitor data input to facilitate centralized operation and maintenance.

Gen-Tie

The Project will connect to the PG&E Bridgeville Substation through a 25-mile long Gen-Tie. The corridor is designed to be up to 100 feet wide and will utilize existing roads.

Operations and Maintenance Building

O&M facilities will be built on up to five (5) acres of land with a building footprint of 5,000 to 6,000 square feet. The O&M facilities will be sited on a construction staging area at lower elevations near US Highway 101.

The O&M facilities will include:

1. Offices
2. SCADA system
3. Control room
4. Outdoor storage area
5. Restroom
6. Shop area
7. Outdoor parking

The O&M facility will include a water storage tank that will supply the building with potable water and contain sufficient water to meet Humboldt County fire flow requirements (Humboldt County, 2016; California Code of Regulations, 2016, 2016 Fire Code, Title 24 Part 9). Potable water will be delivered to the O&M facility via an on-site water well located near the O&M building and within the alluvial deposits of the Pepperwood Town Area Groundwater Basin. The wellhead will be above-ground in accordance with Humboldt County Department of Health and Human Services Division of Environmental Health and DWR Well Standards for potable water wells (DWR, 1981, 1991), as the well will be located within a Federal Emergency Management Area (FEMA) 100-year flood zone (FEMA, 2016, Flood Insurance Rate Map [FIRM] 06023C1435F, effective November 4, 2016). On-site generated wastewater will either be temporarily stored in an underground vault for off-site disposal or discharged to an appropriately-sized on-site septic system.

Meteorological Towers (METs)

Sonic detection and ranging units have been deployed on the project site since April 2017. METs and/or light detection and ranging units allow meteorological data to be collected in the project site to optimize turbine layout.

The 12 METs measure between 262 to 394 feet (80 to 120 meters) in height and comply with FAA lighting regulations. All METs are subject to remain on the project site after project construction.

2.4 PROJECT CONSTRUCTION

Project construction is expected to last for approximately 16 to 18 months.

Construction of the facility will include the following activities:

- Site preparation
- Grading and earthwork
- Tree clearing
- Access road construction
- Concrete foundations
- Substation Construction
- Collection system installation
- Gen-Tie installation
- Switchyard installation
- Turbine installation
- O&M facilities installation
- Water storage tank installation
- Electrical and instrumentation work
- Collector line installation
- Cleanup and restoration

Construction traffic will access a 10-acre construction area from US Highway 101. It is estimated that up to 300 workers per day (during peak construction periods) will be required during construction. Earthmoving activities are limited to tree clearing, access road construction, installation of turbine and O&M building foundations, collection system installation, and Substation construction. Up to two on-site, temporary, portable concrete batch plants will be used for foundation installations. The plants are anticipated to operate 24 hours a day for up to 18 months.

Upon construction completion, all temporary impact areas will be restored and to a native state appropriate to the Project site in accordance with Humboldt County requirements or permits and authorizations issued by other regulatory agencies. All waste and debris from the operations will be hauled off-site and disposed of at appropriate locations in accordance with all applicable laws and regulations. Typical hazardous materials associated with wind energy projects include diesel, gasoline and/or propane fuel, lubricating agents such as oil, grease, hydraulic fluids, and/or gear oils.

2.5 CLIMATE

Humboldt County is located in Northern California where the area is of moderate temperatures ranging from mild to generally warm and temperate with considerable precipitation. The coastal environment provides a 10-degree variance between the summer and winter seasons with greater variance towards the inland areas. Precipitation in the area can exceed 100 inches but drops significantly during the summer and is considered negligible from June through August. **Table 2-2** provides average monthly precipitation and temperature in the vicinity of the project.

Table 2-2: Project Area Climate Summary – SCOTIA Station, Scotia, California

Month	Average Total Precipitation (in)	Average Total Precipitation (mm)	Average Temperature (°F)	Average Temperature (°C)
January	7.95	202	49.98	10
February	7.58	193	50.99	11
March	6.60	168	52.25	11
April	3.94	100	53.88	12
May	1.45	37	57.18	14
June	0.54	14	60.29	16
July	0.12	3	62.76	17
August	0.07	2	63.62	18
September	0.62	16	62.87	17
October	2.79	71	59.26	15
November	5.09	129	53.55	12
December	9.30	236	49.06	9
Annual	46.05	1169.64	56.31	13.50
Source: NOAA				

3.0 WATER SUPPLY PLANNING

3.1 PROJECT WATER SUPPLY AND DEMAND

Most of the water to be used by the Project will be during wind turbine, transmission line, substation and related facilities construction, for dust suppression, soil backfill compaction, and concrete manufacture. An estimated sixty-two (62) acre feet (af) of water will be required for construction-related activities. Construction water for dust suppression, soil backfill compaction, and concrete manufacture will consist of treated wastewater effluent from the nearby Scotia Community Services District wastewater treatment and cogeneration facilities and Humboldt Redwood Company discharges into the "log Pond" located in the town of Scotia. Treated effluent will be delivered to the Project site via water truck. The water used for Project construction, therefore, does not constitute a groundwater extraction or a surface water diversion, and is therefore a de minimis water use.

Estimated O&M annual water demand for the Project is one (1) afy to meet the potable water demands for 15 fulltime employees, assuming approximately 60 gpd per capita water use and occupancy 365 days per year. In addition, the fire flow requirement for the Project is approximately 0.74 afy for on-site water storage to meet Humboldt County Fire Safe Regulations Ordinance No. 2540 (2016) and 2016 California Fire Code (California Code of Regulations Title 24 Part 9) fire flow requirements, conservatively assumed to be 2,000 gpm for 2 hours or 240,000 gal. The combined estimated O&M water demand is less than two (2) afy and is considered a de minimis use and will be supplied by an on-site groundwater well installed near the O&M facility. Procurement and delivery of off-site water for construction, and construction and operation of the on-site well for long-term O&M activities will comply with all federal, state, and local laws and ordinances and will be in conformance with applicable mitigation measures for this Project.

3.2 WATER SUPPLY ASSESSMENT

Senate Bill 610 (SB 610) was passed into law on January 1, 2002. This legislation identified the need to incorporate water supply and demand analysis at the earliest possible stage in the planning process. SB 610 amended portions of the California Water Code (Water Code), including Section 10631, which contains the Urban Water Management Planning (UWMP) Act, as well as adding Sections 10910, 10911, 10912, 10913, and 10915, which describe the required elements of a WSA.

3.2.1 “Is It a Project Under SB 610?”

The first step in the WSA process is determining whether the project is subject to CEQA. SB 610 amended Public Resources Code Section 21151.9 to read: *Whenever a city or county determines that a project, as defined in Section 10912 of the [California] Water Code, is subject to this division [i.e., CEQA] it shall comply with part 2.10 (commencing with Section 10910 of Division 6 of the Water Code).* The proposed project is currently under environmental review pursuant to the requirements of CEQA; therefore, the information contained in this assessment will be used to support the analysis contained in the CEQA document.

The second step in the SB 610 process is to determine if a project meets the definition of a "Project" under Water Code Section 10912(a) and (b). Under this section,

(a) "Project" means any of the following:

1) A proposed residential development of more than 500 dwelling units.

2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.

3) A proposed commercial building employing more than 1,000 persons or having more than 250,000 square feet of floor area.

4) A hotel or motel with more than 500 rooms.

5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

6) A mixed-use project that includes one or more specified in this subdivision.

7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.

(b) If a public water system has fewer than 5,000 service connections, then "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase in 10 percent or more in the number of the public water system's existing service connections.

The proposed Humboldt Wind Energy Project would be considered to be a project pursuant to Section 10912(a)(5) of the Water Code because it is an industrial plant occupying more than 40 acres of land. Parcels crossed for turbine installation and conveyance are zoned as Agricultural Exclusive (AE) and Timber Zones (TPZ). Proposed permanent O&M building will be less than 6,000 square feet within a 5-acre parcel.

3.2.2 "Is There a Public Water System?"

The second step in the WSA process is determining if there is a "public water system" to serve the project. Section 10912(c) of the California Water Code (Water Code) states: *"[A] public water system means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections."*

The proposed project is not within the service area of a public water system. The closest public water system to the proposed Project is the Scotia Community Services District (CSD) located approximately

five (5) miles northwest of the proposed O&M facility in the unincorporated town of Scotia. The Scotia CSD provides water and wastewater services to approximately 850 residents in an estimated 282 residential dwelling units (US Census Bureau, 2017).

Scotia CSD also operates an approximate 0.72 mgd wastewater treatment facility (WWTF). Discharges from the WWTF are regulated by the North Coast Regional Water Quality Control Board (NCRWQCB) under a National Pollutant Discharge Elimination System (NPDES) permit and Waste Discharge Requirements (WDR). Treated effluent discharges from the WWTF are limited to the following:

- During the period October 1 through May 14 of each year, discharges of treated wastewater to the Eel River shall not exceed one percent of the flow in the Eel River based on the most recent daily flow measurement as measured at the Scotia gauging station (United States Geological Survey [USGS] station 11477000);
- The total volume of treated wastewater discharged to the Eel River in a calendar month shall not exceed one percent of the total volume of the Eel river in the same calendar month;
- The WWTF is prohibited from discharging treated wastewater to the Eel River during the period May 15 to September 30 of each year.

Based on the above discharge requirements excess treated wastewater is discharged to a nearby Humboldt Redwood Company log pond for temporary storage, recharge and evaporation. In the Detailed Engineering Analysis (SHN, 2009), projected treated wastewater flows to the log pond during the May 15 to September 30 prohibition period were estimated to range between 139,000 gpd in July, August and September and 174,000 gpd in May and June. “Has an Assessment Already Been Prepared That Includes This Project?”

Step three in the WSA process involves determining if an assessment (i.e., WSA) has already been prepared that includes the Project. In reference to Water Code Section 10910 (h), a WSA has not been prepared by a public water system, a city or county entity. The Project is not served by a public water system, nor is the Project located in a City or incorporated area that would take responsibility for the preparation of a WSA. Likewise, Therefore, under section 10910(b), Humboldt County must prepare the WSA as part of the CEQA documentation.

3.2.3 “Is There a Current UWMP That Accounts for the Project Demand?”

Step four in the WSA process involves determining if there is a current UWMP that considers the projected water demand for the project area.

The Project is not within the service area of a public water system and there is no current UWMP that accounts for project demand. Water used by the Project during construction for dust suppression, soil backfill compaction, and concrete manufacture will be provided by treated effluent. Construction water demands are estimated to be approximately sixty-two (62) acre feet (af).

Estimated O&M annual water demand for the Project is one (1) afy to meet the potable water demands for 15 fulltime employees, assuming approximately 60 gpd per capita water use and occupancy 365 days

per year. In addition, the fire flow requirement for the Project is estimated to be 0.74 afy for on-site water storage to meet Humboldt County Fire Safe Regulations Ordinance No. 2540 (2016) and 2016 California Fire Code (California Code of Regulations Title 24 Part 9) fire flow requirements, conservatively assumed to be 2,000 gpm for 2 hours or 240,000 gal. The combined estimated water demand is less than two (2) afy. Annual O&M water will be supplied by an onsite groundwater well.

3.2.4 "Is Groundwater a Component of the Supplies for the Project?"

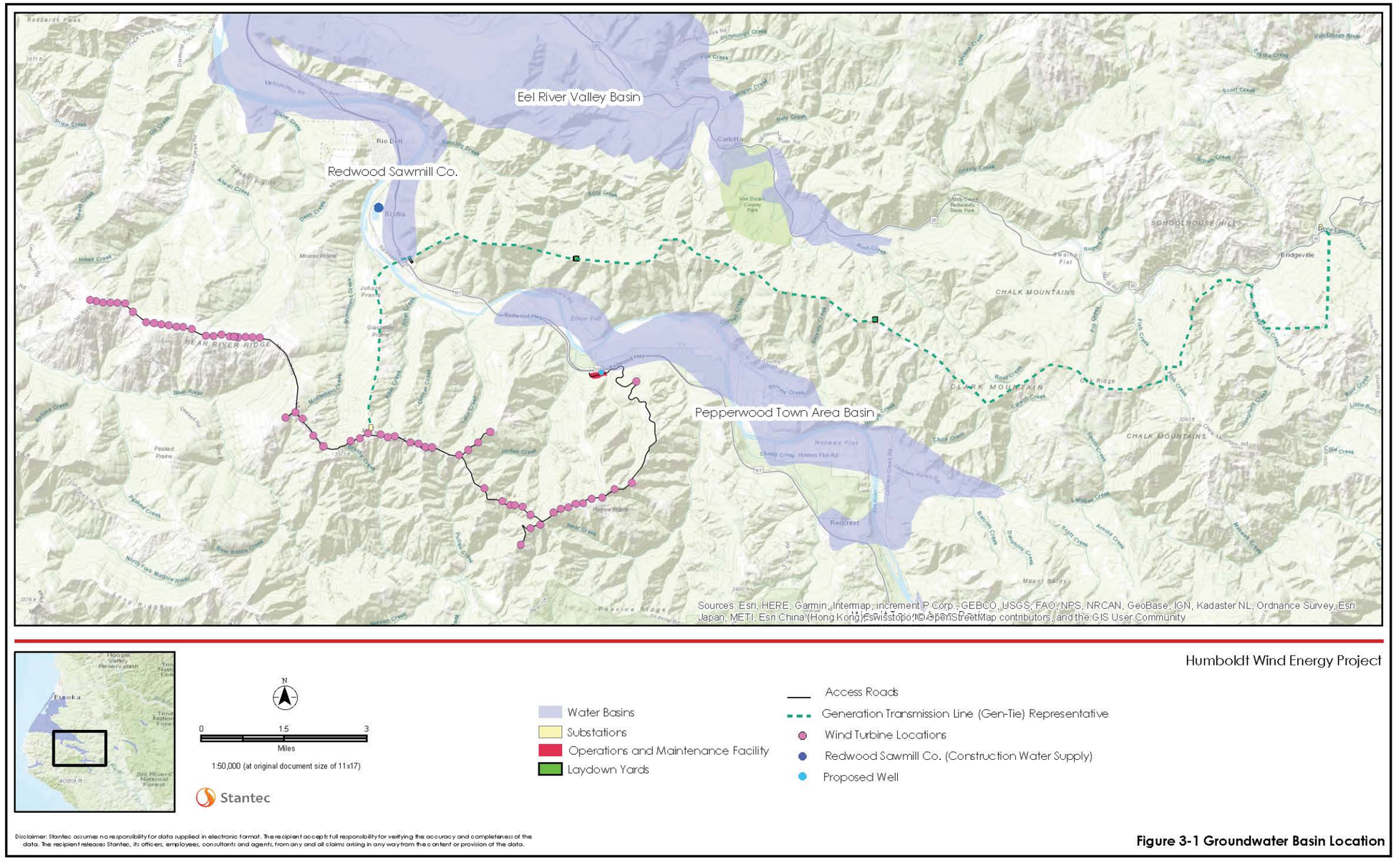
This section addresses the requirements of Water Code Section 10910(f), paragraphs 1 through 5, which apply if groundwater is a source of supply for a proposed project. Pursuant to Water Code Section 10910(f); the groundwater analysis presented in this WSA focuses on the Pepperwood Town Area Groundwater Basin (**Figure 3-1**).

3.2.4.1 Geologic and Hydrogeologic Conditions

The Project is located in the Pepperwood Town Area Groundwater Basin (Basin No. 1-30) as defined in DWR Bulletin 118 (2004) and DWR California Water Plan Update 2013, Volume 2, North Coast Hydrologic Region (DWR, 2013). The Pepperwood Town Area Groundwater Basin occupies an area of about 6,290 acres along the relatively narrow and rugged Eel River Valley between the unincorporated towns of Stafford on the north and Redcrest on the south in Humboldt County. The groundwater basin is bounded on the south and southwest by Monument Ridge and on the north and northeast by the Scotia Bluffs (Ogle, 1953). The Eel River channel is underlain by unconsolidated river channel and younger alluvial deposits (Qrc and Qal, Evenson, 1959; Qal, Ogle, 1953 and Dibblee, 2008a, b). Along the flanks of and at slightly higher elevations above the active stream channel are older alluvial and [lower] terrace deposits (Qtu, Ogle, 1953, and Evenson, 1959; Qoa, Dibblee, 2008a, b), which are also unconsolidated. The younger and older alluvial deposits including the [lower] terrace deposits constitute the principal water bearing units in the groundwater basin (Evenson, 1959; Johnson, 1978).

Underlying the alluvial sediments of the Eel River valley and the rugged mountainous terrain bordering the valley floor are from oldest to youngest, Jurassic and Cretaceous Franciscan formation, late Cretaceous to early Tertiary Yager formation, and late Tertiary Price Creek (or Wildcat) formation deposits (Ogle, 1953 and Dibblee, 2008a, b). The Yager formation has been reinterpreted by McLaughlin et al (2000) to be of Paleocene to Eocene in age. These older deposits are largely consolidated, are considered non-water bearing and do not yield significant quantities of water to wells. However, fractures in these rocks may serve as localized repositories and conduits for precipitation to collect and discharge as springs.

Figure 3-1. Groundwater Basin Location



Owing to the complex geologic history in the area and region all rocks older than the alluvial and terrace deposits have been folded and faulted to various degrees. The Franciscan formation, whose origin as an accreted oceanic terrane, is sheared and complexly folded and faulted (Ogle, 1953; McLaughlin et al, 2000). The Yager formation, also considered an accreted terrane composed of marine shale, graywacke and conglomerate (Ogle, 1953; McLaughlin et al, 2000), is also moderately to complexly folded and faulted. In the vicinity of the Project, the contact between the Franciscan and Yager formations is a fault. The Price Creek/Wildcat formation in the vicinity of the Project has been folded into an alternating series of northwest to westerly trending anticlines and synclines. Within the Pepperwood Town Area Groundwater Basin a doubly plunging syncline in the Price Creek/Wildcat formation extends from south of Larabee Creek on the east (near Redcrest) to Pepperwood on the west (Dibblee, 2008b). Another possibly related east-west trending syncline is concealed beneath the Eel River alluvial deposits between Pepperwood and the Elinor Flats, east of Stafford. North of these synclines a westerly plunging anticline extends approximately six miles along the Scotia Bluffs to the base of the hills across the Eel River from Stafford. Farther north in the Scotia Bluffs and within the Van Duzen River valley are alternating synclines and anticlines in the Pierce Creek/Wildcat formation (Ogle, 1953).

The Russ Fault Zone is in the vicinity of the Project. The Russ Fault Zone extends west-northwest from the South Fork of the Eel River east of Weott (southeast of the Project) to the Pacific Ocean with an offshore extension. In the hills immediately south of Pepperwood, the Russ Fault Zone is the contact between the Franciscan formation and Pierce Creek/Wildcat formation (Ogle, 1953).

3.2.4.2 Pepperwood Town Area Groundwater Basin Alluvial Aquifer

The thickness of the younger and older alluvial deposits in the Pepperwood Town Area Groundwater Basin has not been determined; however, farther northwest in the Eel River Valley Groundwater Basin, Evenson (1959, Table 1), estimated alluvial deposit thicknesses up to 200 ft.

Stantec reviewed 53 Well Completion Reports on the DWR Well Completion Report website application tool to assess subsurface geologic conditions in the Pepperwood Town Area Groundwater Basin. The combined data indicate that alluvial deposits consist of interbedded layers and mixtures of sand, gravel silt and clay. Blue clay or bedrock (e.g., Franciscan formation) were commonly encountered underlying the alluvial deposits. Alluvium thicknesses varied by area as follows:

Most wells were drilled for domestic and agricultural use and a few were drilled for industrial purposes. Well completion depths generally matched the drilled depth or to bedrock (i.e., base of alluvium) whenever it was encountered. Some older wells, pre-1960, were terminated in alluvial deposits at depths of less than 50 feet. Well yields varied significantly but were generally low, ranging between 2 and 80 gpm. For domestic wells, well yields were typically less than 10 gpm. Only a few wells were completed in bedrock with well yields less than 20 gpm.

Table 3-1: Pepperwood Town Area Groundwater Basin Alluvium Thickness

Area	Alluvium Thickness (ft)
Stafford	>52–96
Pepperwood	17–95
Shively	>26–82
Holmes	30–100
Larabee Creek Area	>33->100
Redcrest	>48–144

3.2.4.3 Water Supplies

According to the Humboldt County General Plan Avenue of the Giants Community Plan (Humboldt County, 2017), the North-end towns of Stafford, Pepperwood, Shively, Holmes and Redcrest, all lie within the Pepperwood Town Area Groundwater Basin. Of these towns, only Redcrest operates a community owned water system. The Redcrest water system consists of an infiltration culvert beneath Chadd Creek, a tributary to the Eel River, filtration and disinfection with chlorine, followed by storage in three water tanks: one at 10,000 gallons and two at 6,500 gallons. In 2010, and as amended in 2017, according to the Humboldt County General Plan Avenue of the Giants Community Plan (Humboldt County, 2017), there were 30 housing units in Redcrest. However, the population served is not known.

As presented in DWR's Basin Prioritization Dashboard (DWR, 2018), the population in Pepperwood Town Area Groundwater Basin in 2010 was 315 and was projected to be 317 in 2030. The dashboard indicates there are 24 wells in the groundwater basin, 23 of which are used for agricultural irrigation and/or domestic purposes. There is also one public water system well. The DWR dashboard indicates there are 565 irrigated acres in the groundwater basin and groundwater use is 1,504 afy. Groundwater use is estimated to be 70% of total water use, suggesting that surface water accounts for the other 30% of water use, or 645 afy. Thus, the total water use in the groundwater basin is estimated to be 2,149 afy. The DWR Basin Prioritization Dashboard does not provide information regarding irrigation return flow. However, in a DWR Bulletin 118 update for the Pepperwood Town Area Groundwater Basin (DWR, February 27, 2004), under Groundwater Budget, a 1996 DWR survey estimated that groundwater production for agricultural use was 850 afy and groundwater production for municipal and industrial use was 97 afy. DWR estimated deep percolation of applied water (i.e., return flow) was 230 afy. The estimate of applied water return flow is equivalent to about 24% of the total water use. If this percent return flow is calculated for the most recent DWR water use estimate as indicated on the Basin Prioritization Dashboard, deep percolation of applied water would be approximately 516 afy.

Groundwater is anticipated to provide the estimated O&M and fire flow water demands for the Project. As noted in Section 3.1, the estimated water demand is 1.74 afy. The estimated quantity of groundwater to be extracted for the proposed Project for O&M and fire flow purposes is considered a de minimus use and based on known existing and future planned demand on the Pepperwood Basin, there is sufficient water supply to serve the project and other sources of demand, including agricultural and manufacturing uses.

3.2.4.4 Groundwater Management

In January 2015, the DWR adopted the California Statewide Groundwater Elevation Monitoring (CASGEM) results for the purposes of the prioritization of compliance with the Sustainable Groundwater Management Act of 2014 (SGMA), which further amended the Water Code (Section 10721 et al.) in an effort to provide a state-wide system for groundwater management. For "medium" and "high" priority groundwater basins, SGMA requires the designation of a groundwater sustainability agency (GSA). GSAs will have broad groundwater management powers; among other things, GSAs may require: groundwater well registration, measurement of groundwater extractions, and the filing of annual extractions reports. SGMA authorizes GSAs to regulate groundwater extractions by imposing well spacing requirements, limiting extractions, and establishing extraction allocations. The legislation does not apply to adjudicated groundwater basins that are managed by the courts, or to basins deemed by DWR to be low priority. SGMA requires GSAs to adopt "Groundwater Sustainability Plans" (GSPs) for medium and high priority basins. These plans must set the basin on a course toward "sustainable management" to eliminate adverse groundwater conditions specified as "undesirable results." The law allows a single local agency that has "water supply, water management, or land use responsibilities within a groundwater basin," to elect to be a GSA. No GSA has been formed to serve the Pepperwood Town Area Groundwater Basin; therefore management is assumed by the County of Humboldt.

3.2.4.5 Governance and Local Control

To accomplish this objective, SGMA requires that all high and medium priority groundwater basins must establish governance under one or more groundwater sustainability agencies by June 30, 2017. GSAs for high and medium priority basins must adopt their groundwater sustainability plan (GSP) by Jan. 31, 2022. Low priority basins are not required to prepare a GSP. The Pepperwood Town Area Groundwater Basin has been designated as a "very low" priority basin.

3.2.4.6 Groundwater Sustainability Plans

GSP’s must include specific information, most notably, measurable objectives to achieve goal of basin sustainability within 20 years of implementation. SGMA defines the sustainability goal as the implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by ensuring the applicable basin is operated within the sustainable yield. Sustainable yield is defined as the maximum quantity of water that can be withdrawn over a period of years without causing an "undesirable result." An "undesirable result" means one or more of the following effects caused by groundwater conditions occurring throughout the groundwater basin:

- Chronic lowering of groundwater levels;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality;
- Significant and unreasonable land subsidence that substantially interferes with surface land uses; and/or
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The GSP must include monitoring and management for the basin over a 50-year planning horizon, and plans must articulate measurable objectives to be achieved every five years. DWR will review the plans and will have the power to request changes to a submitted plan. The plan must establish measurable objectives, as well as incremental milestones every five years in order to achieve the sustainability goals identified in the plan within 20 years. As noted earlier, the Pepperwood Town Area Groundwater Basin is designated as a "very low priority" basin, therefore, no GSP is required.

3.2.5 "Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?"

The next step in the WSA process is to prepare the actual assessment of the available water supplies, including the availability of these supplies in all water-year conditions over a 20-year planning horizon, and an assessment of how these supplies relate to project-specific and cumulative demands over that same 20-year period. To be consistent, the analysis horizon of this WSA extends to 2040. Water Code Section 10910(c)(4) states: *" If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses."*

An estimate of the total and usable or recoverable storage capacity may be calculated assuming the saturated thickness of alluvial deposits underlying the groundwater basin is 40 feet using estimates from Evenson (1959, Table 4 for the Upper Eel River Valley). Thus, the total storage capacity may be calculated as 6,290 acres x 40 feet = 251,600 af. The recoverable or usable storage capacity may be calculated as 251,600 af x 0.20 = 50,320 af, where the specific yield of the predominantly sand and gravel alluvial aquifer is 20% (Evenson (1959, p. 35).

As noted in Section 3.2.5.3, according to DWR's Basin Prioritization Dashboard (DWR, 2018), groundwater production in the Pepperwood Town Area Groundwater Basin has been estimated to be 1,504 afy. Groundwater use is estimated to be 70% of total water use, suggesting that surface water accounts for the other 30% of water use, or 645 afy. Thus, the total water use in the groundwater basin is estimated to be 2,149 afy. In a DWR Bulletin 118 update for the Pepperwood Town Area Groundwater Basin (DWR, February 27, 2004), under Groundwater Budget, a 1996 DWR survey estimated that

groundwater production for agricultural use was 850 afy and groundwater production for municipal and industrial use was 97 afy. DWR estimated deep percolation of applied water (i.e., return flow) was 230 afy. The estimate of applied water return flow is equivalent to about 24% of the total water use. If this percent return flow is calculated for the most recent DWR water use estimate, deep percolation of applied water would be approximately 516 afy.

3.2.5.1 Project-Site Demands

Historically, there has been little or no consumptive demand in the vicinity of the proposed Humboldt Wind Energy Project site. The project estimates an annual demand of 1.74 afy for operation and maintenance and fire flow requirements. Future anticipated water demands are assumed to remain approximately 1.74 afy for O&M and fire flow requirements.

3.2.5.2 Comparison of Available Water Supplies Versus Demand

Section 10910 (c)(4) of the Water Code states, " *If the City or County is required to comply with this part pursuant to subdivision (b), the water supply assessment shall include a discussion with regard to whether the total project water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses."* The estimated annual demand for the Project represents a de minimis use compared to existing available water supplies, and there are adequate supplies available to serve the proposed Humboldt Wind Energy Project, and existing and planned future uses. Including agricultural and manufacturing uses, under all water year conditions (**Table 3-2**).

Table 3-2: Future Water Supply Versus Demand at Build-Out

Current Source	Average Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Groundwater	1,504	1,504	1,504	1,504	1,504
Total Demand	1.74	1.74	1.74	1.74	1.74
Estimated Surplus/Shortfall	1,502.26	1,502.26	1,502.26	1,502.26	1,502.26

3.2.5.3 Other Water Supply Considerations

In developing the groundwater basin prioritization for SGMA implementation, DWR created a spreadsheet tool to analyze various parameters to produce a basin ranking score. One of the parameters is declining groundwater levels related to pumping. The overall basin ranking score for the Pepperwood Town Area Groundwater Basin was 0.0, indicating there were no significant impacts to the groundwater basin based on current groundwater use. This is largely due to the significant recharge that occurs from flow in the Eel River.

Streamflow in the Eel River at USGS Scotia gauging station (No. 11477000) has been recorded since October 1910. The range of mean monthly discharges over the period of record, in cubic feet per second (cfs), are 134 cfs (or 0.18 acre-feet per second, afs) in September and 19,600 cfs (or 26.98 afs) in January. The peak months are between December and April with the lowest discharges occurring between July and September. The discharges recorded at the Scotia gauge are representative of Eel River discharges occurring in the Pepperwood Town Area Groundwater Basin as there are no significant inflows between the groundwater basin and the streamflow gauge. The discharges recorded underscore the volume of water that is available to recharge the alluvial aquifer beneath and adjacent to the Eel River within the Pepperwood Town Area Groundwater Basin.

4.0 CONCLUSION

According to the requirements of Water Code Section l0910(c)((4) the water supply assessment *shall include a discussion with regard to whether the total project water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

In summary:

- The project is currently under environmental review pursuant to the requirements of CEQA; therefore, the information contained in this assessment will be used to support the CEQA analysis.
- The Humboldt Wind Energy project is a "project" under Water Code Section 10912(a)(5).
- The Humboldt Wind Energy project will not be served by a public water system and there is no current Urban Water Management Plan that accounts for the project water demand. Therefore Humboldt County is required to prepare this water supply assessment.
- Proposed demand will be met by local groundwater pumping in an amount that is considered a de minimis extraction under Section 10721 of the Water Code.
- The groundwater supply will be extracted from the Pepperwood Town Area Groundwater Basin. No GSA has been formed to serve the Basin, and management of the Basin is assumed by the County of Humboldt.
- The Pepperwood Town Area Groundwater Basin has been designated as a "very low" priority basin, and a GSP is not required under the SGMA.
- According to Bulletin 118, historic groundwater production in the Basin has averaged 1,504 afy. The overall recoverable storage capacity groundwater storage for the Basin is estimated at 50,320 af based on available data.
- The project estimates an annual demand of 1.74 afy for operations and maintenance activities and fire flow requirements. With respect to operational water needs, there is sufficient water in the groundwater basin to service the project, as well as existing and planned future needs, including agricultural and manufacturing uses.
- The project's construction water demands will be served by effluent water. There are no other sources of demand for this water and therefore there is sufficient water supply available to serve the Humboldt Wind Energy project.

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