Plan of Development

Walker Ridge Wind Generation Facility

August 2, 2019

Prepared for:

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Prepared by:

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Sign-off Sheet

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Prepared by 

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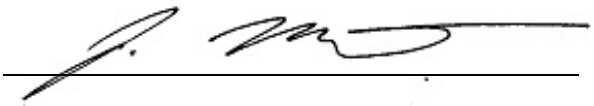
Katelyn Peterson, Planner/Biologist

Reviewed by 

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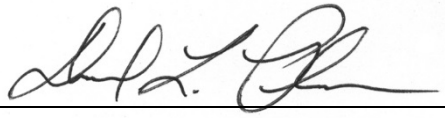
Jason Minton, Senior Biologist

Approved by 

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David Plumpton, Principal

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Acronyms and Abbreviations

ACEC	Areas of Critical Environmental Concern
APE	Area of Potential Effect
APM	Applicant Proposed Measure
APUC	Algonquin Power and Utilities Corp.
BLM	Bureau of Land Management
BMP	Best management practices
BRBNA	Blue Ridge Berryessa Natural Area
CalEPA	California Environmental Protection Agency
CAISO	California Independent System Operator
CARB	California Air Resources Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CMP	corrugated metal pipes
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DBRS	DBRS Limited
DOI	Department of the Interior
DOD	Department of Defense
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESCP	Erosion and Sediment Control Plan
FAA	Federal Aviation Authority
FO	Field Office
FLPMA	Federal Land Policy and Management Act
kV	Kilovolt
KTR	Key Travel Routes
KOP	Key Observation Points
LGIA	Large Generator Interconnection Agreement
LPCo	Liberty Power Company
LWCF	Land and Water Conservation Fund
MW	Megawatt
MET	Meteorological Towers
NRC	National Response Center
NEPA	National Environmentally Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System

O&M	Operations & Maintenance
OHV	Off-highway vehicle
PG&E	Pacific Gas and Electric Company
P&H	Patrick and Henderson
RMPROW	Resource Management Plan Right of Way
RPS	Renewable Portfolio Standard
ROD	Record of Decision
S&P	Standard & Poor's
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SPCC	Spill Prevention, Control, and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
TPP	Tribal Participation Plan
UDP	Unanticipated Discovery Plan
USFWS	United States Fish and Wildlife Service
VIA	Visual Impacts Analysis
VRM	Visual Resource Management
WTG	Wind turbine generators

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

Colusa Wind, LLC (hereinafter Colusa), a subsidiary of Algonquin Power Co., requests a Right-of-Way (ROW) grant to construct, operate, maintain, and decommission a wind energy generation facility in the unincorporated areas of Lake and Colusa counties, California. The proposed project (hereinafter the Project) would be located on approximately 2,272 acres (hereinafter the project site) within the 7,971 acre ROW (hereinafter the project ROW) on federal land under the jurisdiction of the Bureau of Land Management (BLM) within the Ukiah Field Office (FO) (Figure 1).

1.1.1 Type of Facility, Planned Uses, Generation Output

Colusa proposes to construct a wind energy generation facility that would produce up to 144.4 megawatt (MW) of renewable energy using up to 42 wind turbine generators (WTGs). The Project would be located on lands under the jurisdiction of the BLM and as a potential alternative the use of limited private land will be considered for infrastructure such as point of interconnection, Operation and Maintenance (O&M) building, and access road (which would be used as an emergency access).

1.1.2 Applicant's Proposed Schedule for the Project

The schedule for the project is summarized below, with key milestones for permitting, construction, and operation.

1.1.2.1 Permitting

- National Environmental Policy Act (NEPA) review conducted between June 2019 and September 2019
- Permits obtained September 2019 – December 2019
- ROW grant issued June 2020

1.1.2.2 Construction

- Pre-construction activity begins December 2019.
- Civil construction starts July 2020.
- Access roads complete September 2020.
- WTG foundations complete November 2020.
- Transmission line testing November 2020.
- Interconnect energized December 2020.
- Substantial completion December 2020.
- Completion December 2020.

1.2 PROPONENT'S PURPOSE AND NEED FOR THE PROJECT

1.2.1 Purpose

Colusa proposes to help the federal government meet the requirements of various federal mandates for using federal lands to produce energy from renewable sources by developing a wind energy generation facility in Lake and Colusa

counties, California, on BLM-administered lands. Additionally, Colusa proposes to help the state of California meet its Renewable Portfolio Standard (RPS) program goals. The RPS program is a state commitment to increase the proportion of energy generated from renewable sources to 20% by 2010, 33% by 2020, and 50% by 2030.

1.2.2 Need for the Proposed Action

In accordance with the Federal Land Policy and Management Act (FLPMA) (Section 103 [c]), public lands are to be managed for multiple-use that takes into account the long-term needs of future generations for renewable and nonrenewable resources. The Secretary of the Interior is authorized to grant ROWs on public lands for systems of generation, transmission, and distribution of electric energy (Section 501 [a][4]). Considering the BLM's multiple-use mandate, Colusa proposes to construct, operate, maintain, and decommission a wind energy generation facility and associated infrastructure on public lands administered by the BLM, in compliance with the FLPMA, BLM ROW regulations, and other applicable federal laws and policies.

If approved, the Project would assist the BLM in addressing the management objectives in the Energy Policy Act of 2005 (Title II, Section 211), which established a goal for the Secretary of the Interior to approve at least 10,000 MW of electricity from non-hydropower renewable energy projects located on public lands by 2015. While this goal was achieved in 2012, some of the approved projects may not be built, and others will require additional transmission to be constructed before they could deliver energy to the grid. Accordingly, the BLM continues to review applications for renewable energy projects.

Additionally, the Project would also further the purpose of Secretarial Order 3285AI (February 22, 2010) that established the development of environmentally responsible renewable energy as a priority for the Department of the Interior. Finally, the Project would respond to California's continual advancement of environmental laws and regulations enacted to reduce anthropogenic climate change through the development of renewable energy projects. Specific laws that pertain to the project include:

- Senate Bill (SB) 1078, passed in September 2002, which set an RPS of 20% by 2020;
- SB 107, passed in September 2006, which accelerated the RPS of 20% timeline from 2020 to 2010;
- Executive Order S-21-09, issued September 16, 2009, which set an RPS of 33% by 2020;
- SB X1-2, passed in 2011, which set an RPS of 33% by 2020; and,
- SB 350, passed in 2015, which set an RPS of 50% by 2030.

The BLM can respond in one of three ways to the application: (1) deny the proposed ROW; (2) grant the ROW; or (3) grant the ROW with modifications. Modifications may include changes to the proposed use or the route or location of the proposed facilities (43 Code of Federal Regulations (CFR) 2805. 10 [a][1]).

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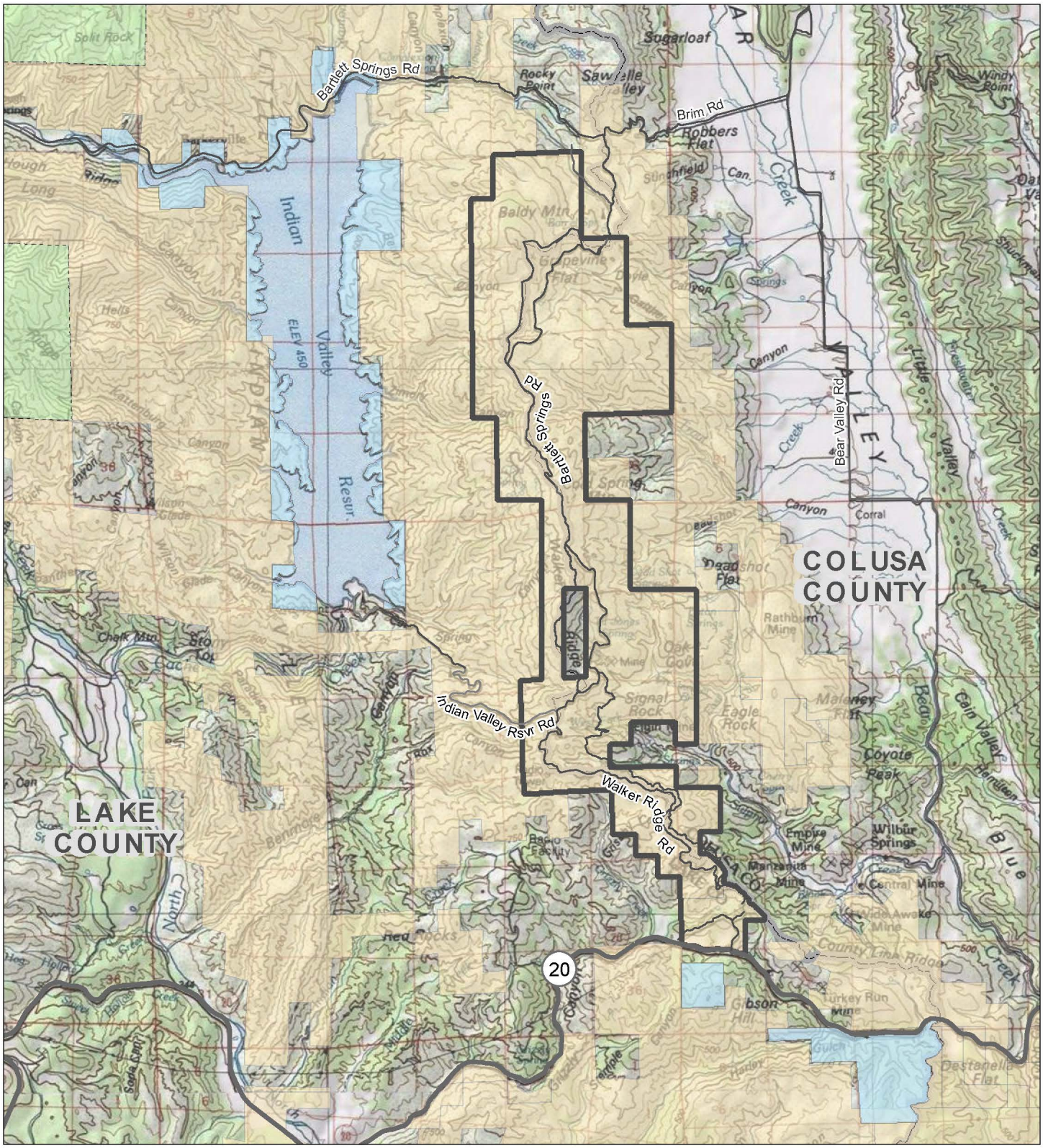

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- Existing Road
- State Highway 20
- Type II Wind Testing ROW
- BLM
- USFS (Mendocino NF)
- CDFW (Owned Land)
- County Boundary

Figure No.
1

Title
Project Vicinity Land Use

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 1 2 Miles

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Based on the policies outlined above, and California's continued demand for renewable energy, Colusa's Project has been designed with two objectives: 1) to develop a commercially viable wind energy generation facility that will support commercially available financing; and, 2) to construct and operate a wind energy generation facility with a capacity of up to 144.4 MW of electricity on federal lands.

1.3 PROJECT SCREENING ANALYSIS

1.3.1 Site Evaluation Criteria

The Ukiah FO Resource Management Plan (RMP; BLM 2006) was developed under the regulations that implement the FLPMA to provide a land management framework for the 270,000-acre planning area. The management framework was structured to resolve conflicts among user groups and ensure that public lands are managed for multiple-use and sustained yield. The 2006 Environmental Impact Statement (EIS), written for the Ukiah FO RMP, provided an environmental analysis of each management action and specifically evaluated wind energy potential and the development of wind energy infrastructure in each of the nine management areas identified in the RMP.

Through the adoption of the Ukiah FO RMP, the BLM excluded wind energy development in three of the nine management areas and created a development scenario for four of the management areas. Each development scenario was produced in a joint BLM and National Renewable Energy Laboratory process that evaluated the potential wind resource of each management area; determined the range of development both in number of turbines and maximum output; evaluated the existing infrastructure that could be used; and determined which aspects of project development would likely result in adverse environmental impacts. These development scenarios were reviewed by Colusa, and Walker Ridge was determined to be the most viable location for the project. The following are the development scenarios reviewed:

- Would the site/project support a commercially viable wind energy generation facility?
- Does the site/project fulfill the purpose and need outlined in Section 1.2?
- Does the site/project reduce impacts to human or environmental resources?
- Would the site/project minimize new construction or disturbance from transmission lines, access roads, and other project features?

1.3.1.1 Proposed Project

Colusa has applied for a BLM ROW authorization to construct, operate, maintain, and decommission the Project in preference to the alternative sites identified in the Ukiah FO RMP (RMP; BLM 2006). Section 1.4 describes the components of the proposed project.

To minimize environmental impacts, the Project was designed to use existing pre-disturbed land adjacent to Walker Ridge Road, Bartlett Springs Road, and in fire breaks constructed by CalFire for siting project components to the maximum extent feasible (Figure 2). The Project site would use turbines ranging from 2 MW to 5.6 MW. Walker Ridge Road and Bartlett Springs Road would be used as the primary access roads during construction and operation

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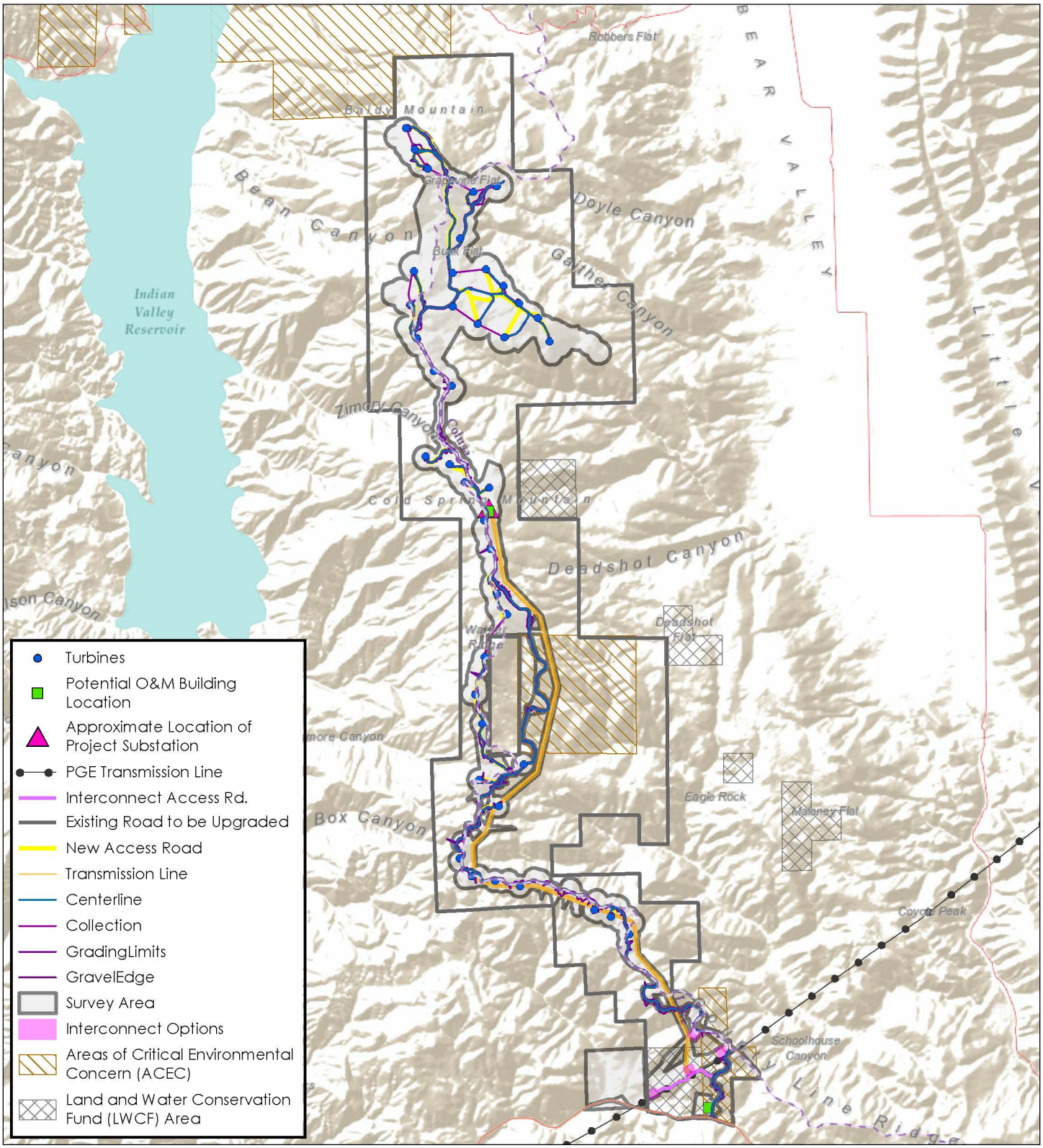

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Design is preliminary and subject to revision

Figure No.
2a

Title
Project Components - Overview

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 0.5 1 Miles

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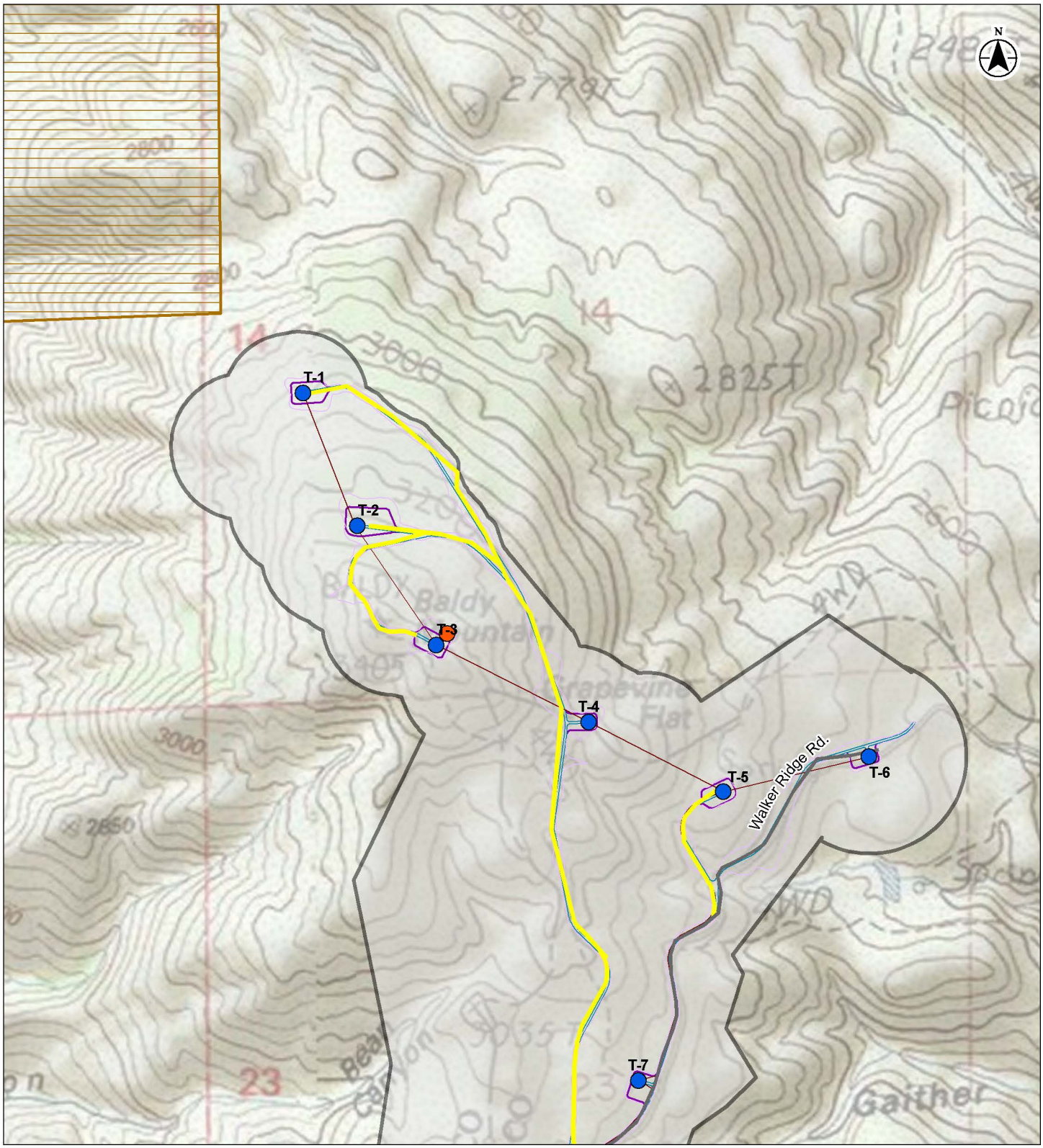

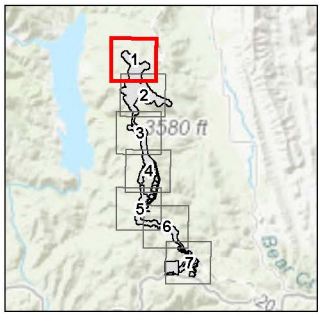

- Turbine
- MET Tower
- Existing Road to be Upgraded
- New Access Road
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area
- Areas of Critical Environmental Concern (ACEC)

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Figure No.
2b

Stantec

Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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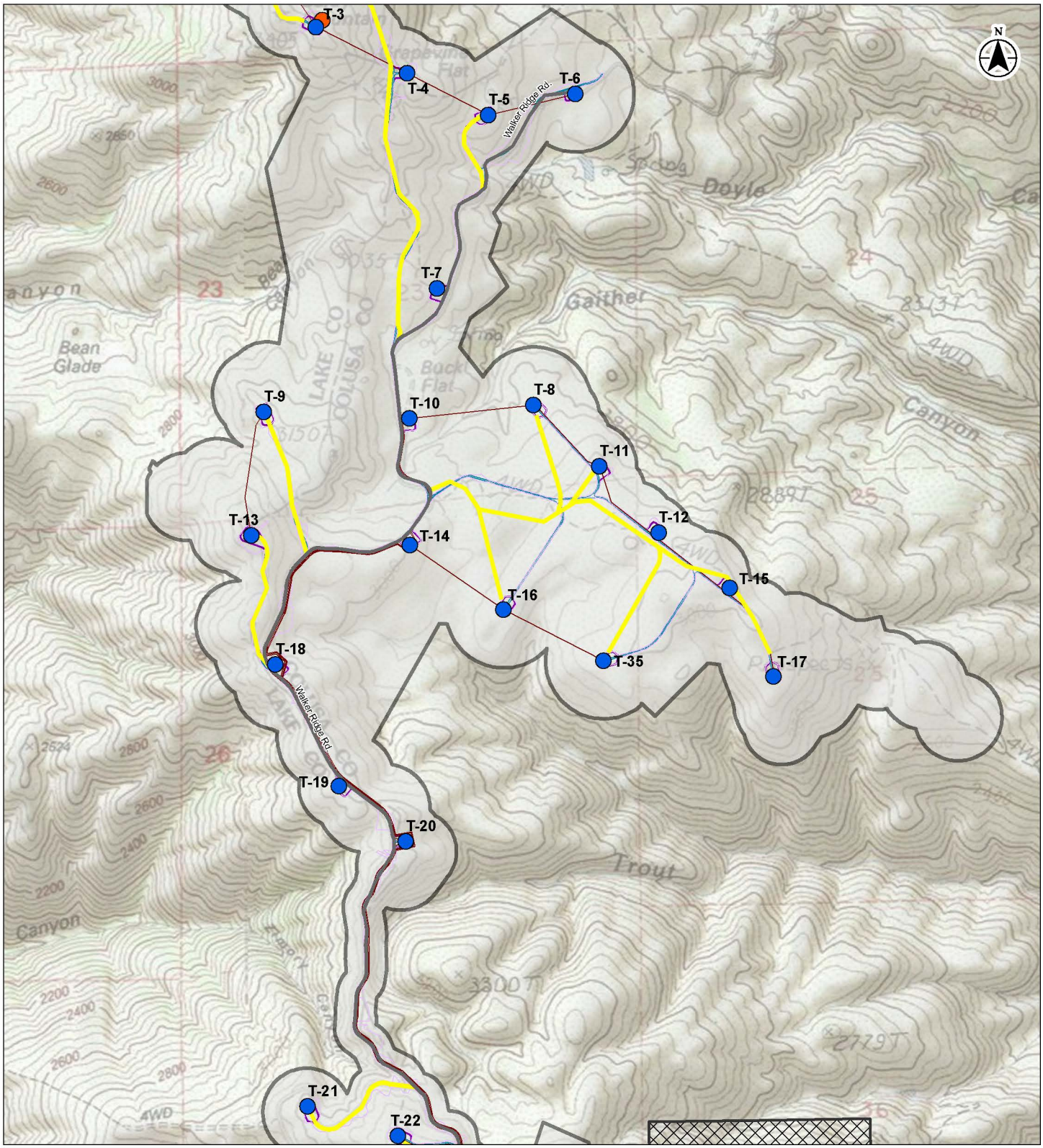

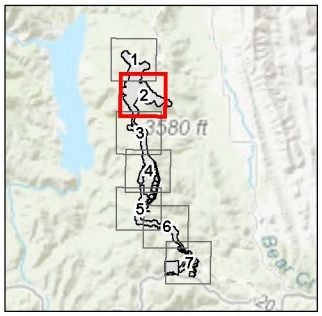

- Turbine
- MET Tower
- Existing Road to be Upgraded
- New Access Road
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area
- Land and Water Conservation Fund (LWCF) Area

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Stantec

Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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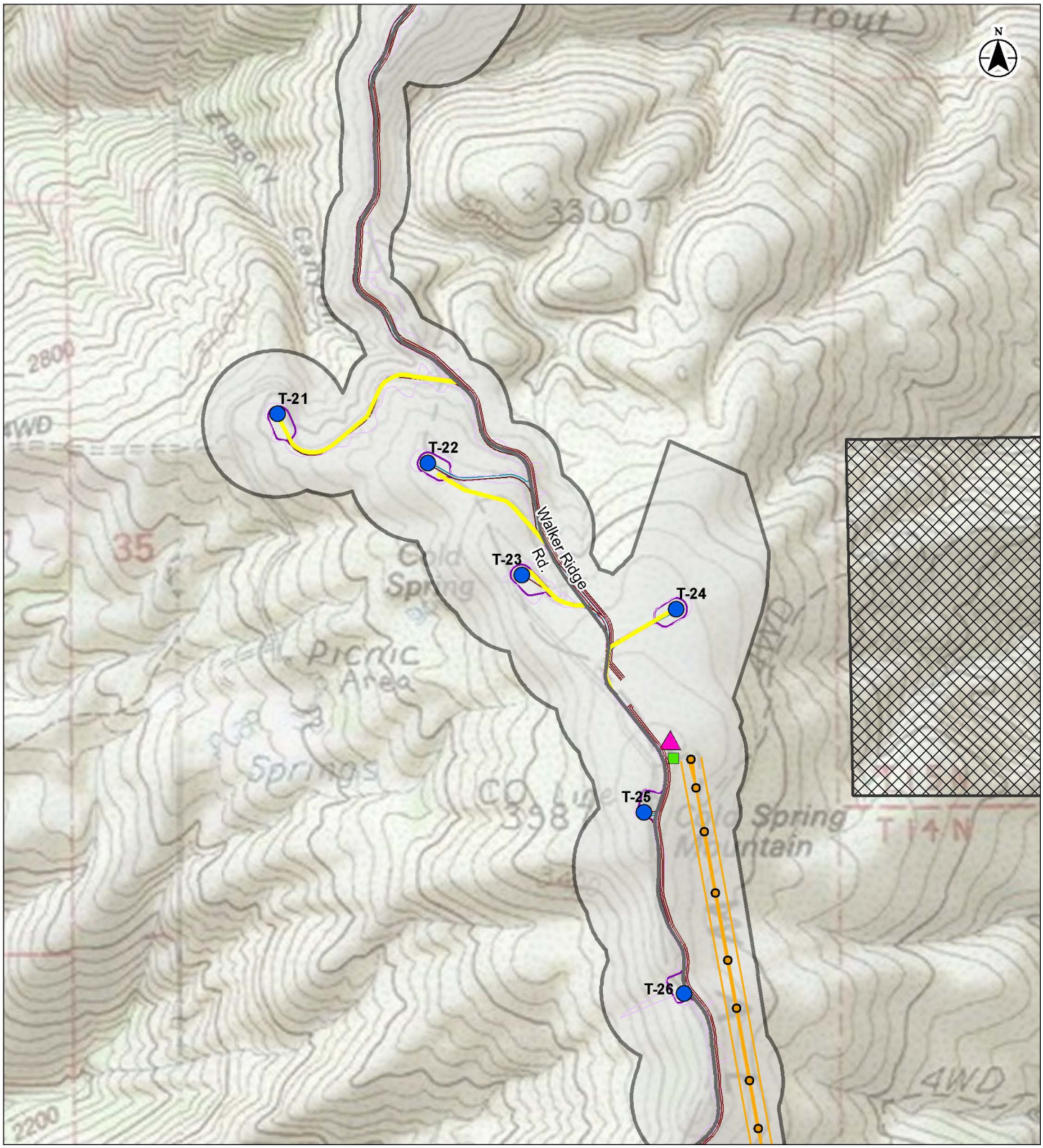

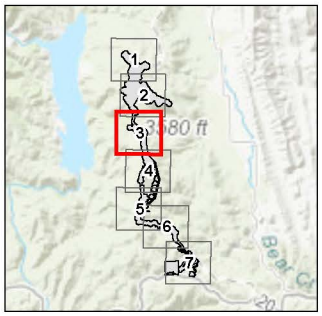

- Turbine
- Potential O&M Building Location
- Approximate Location of Project Substation
- Transmission Line Pole
- Existing Road to be Upgraded
- New Access Road
- Transmission Line
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area
- Land and Water Conservation Fund (LWCF) Area

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Figure No.
2b

Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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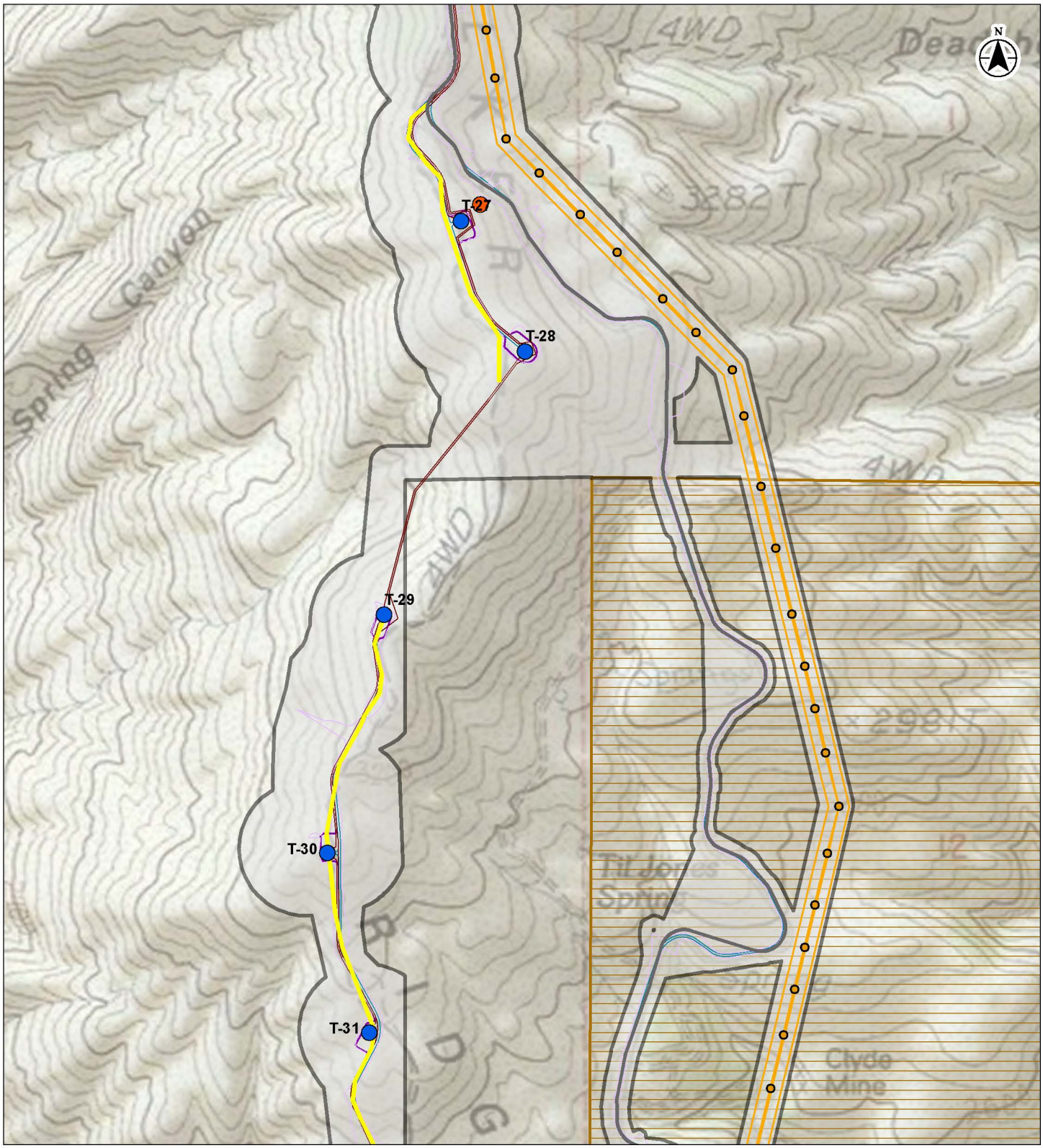

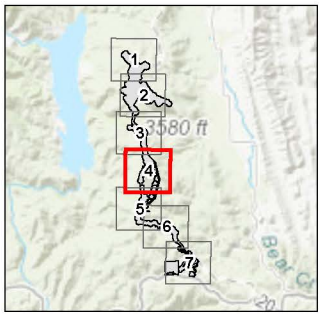

- Turbine
- MET Tower
- Transmission Line Pole
- Existing Road to be Upgraded
- New Access Road
- Transmission Line
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area
- Areas of Critical Environmental Concern (ACEC)

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Figure No.
2b

Stantec

Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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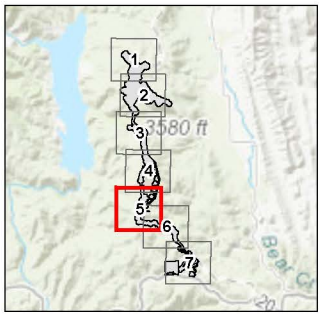

- Turbine
- MET Tower
- Transmission Line Pole
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- Transmission Line
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Project Location
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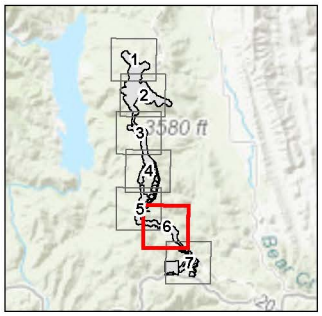

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- Transmission Line Pole
- Existing Road to be Upgraded
- New Access Road
- Transmission Line
- Collection
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- Gravel Edge
- Pad Edge
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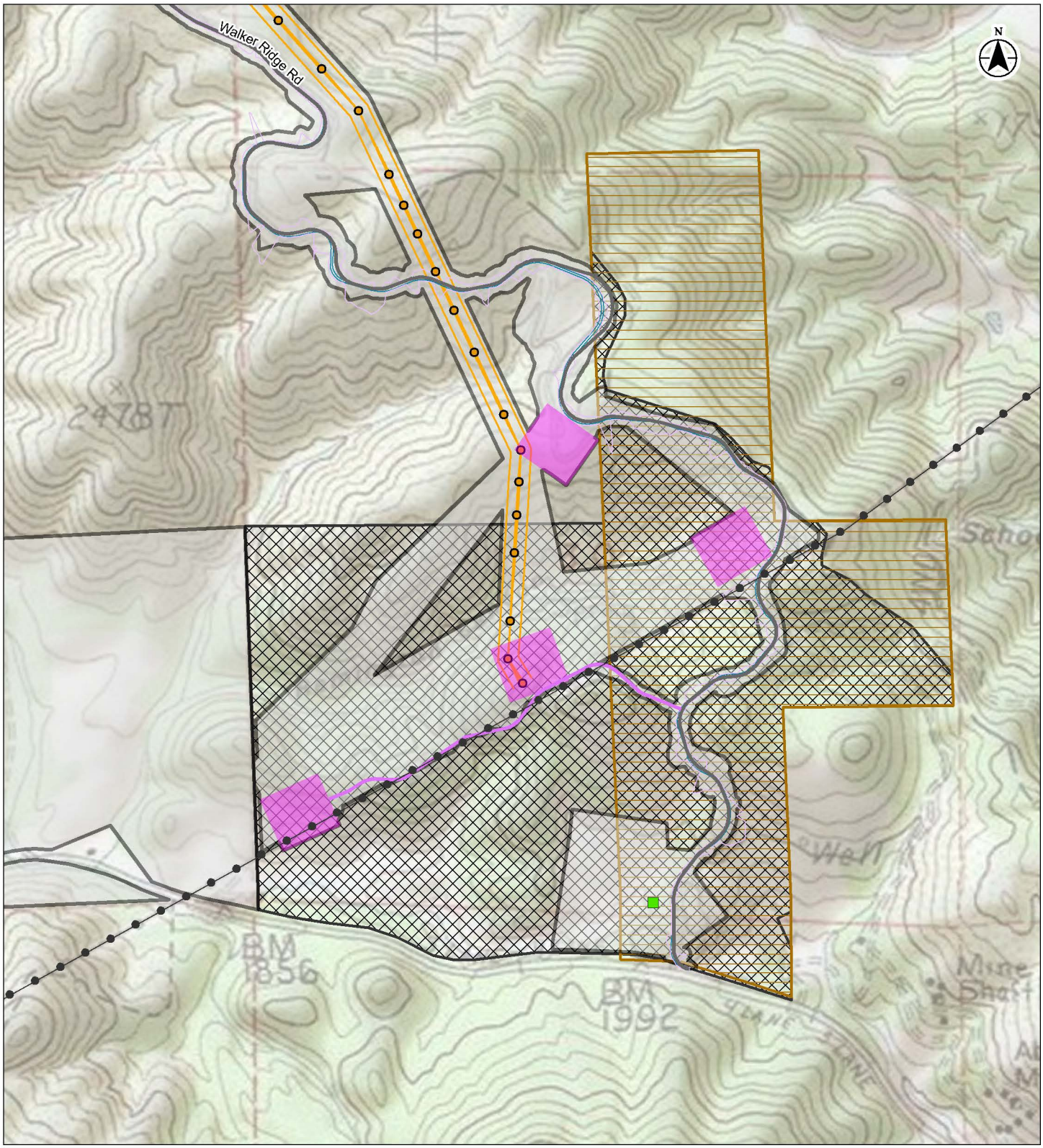

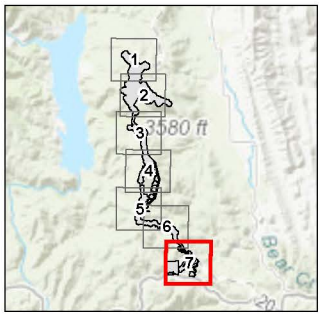

- Potential O&M Building Location
- Transmission Line Pole
- PGE Transmission Line
- Interconnect Access Rd.
- Existing Road to be Upgraded
- Transmission Line
- Grading Limits
- Gravel Edge
- Interconnect Options
- Survey Area
- Areas of Critical Environmental Concern (ACEC)
- Land and Water Conservation Fund (LWCF) Area

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Figure No.
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Stantec

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Project Components

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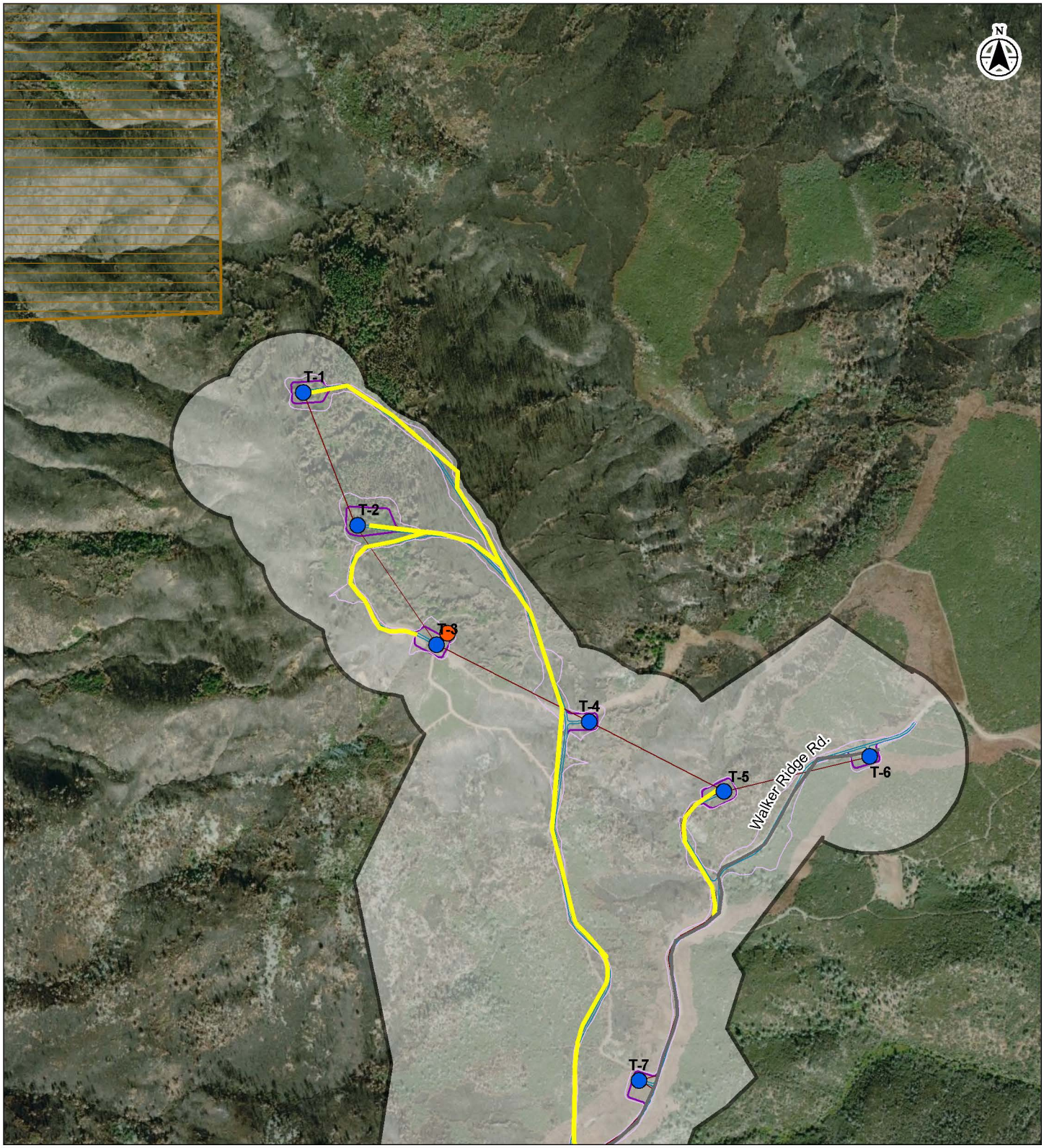

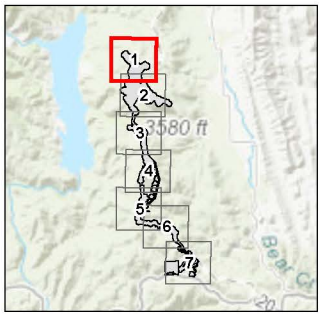

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Figure No.
2c

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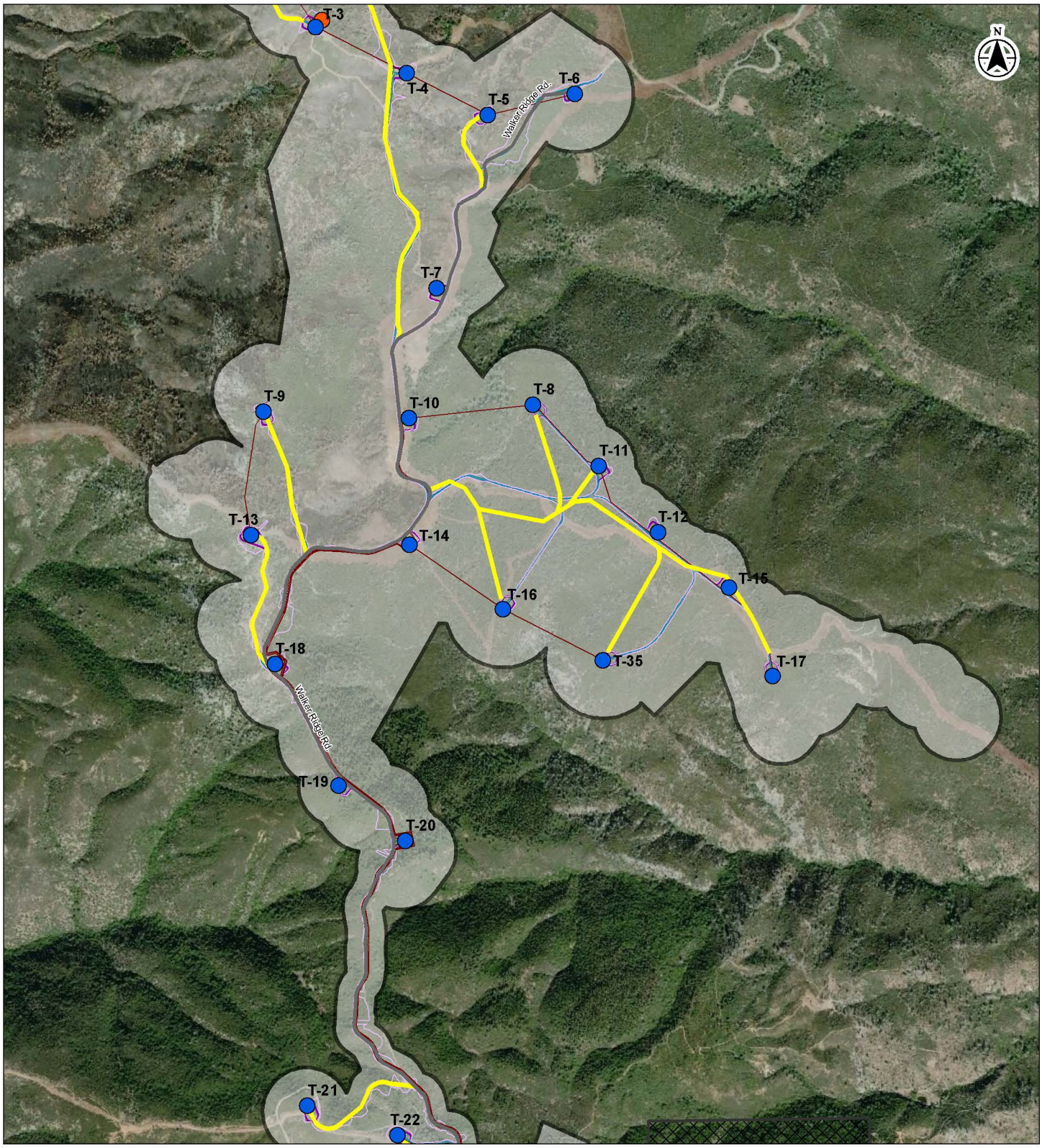

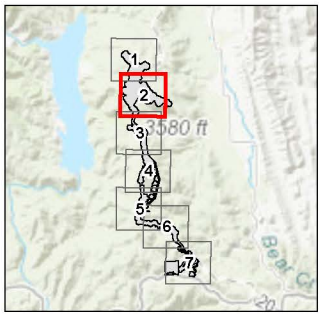

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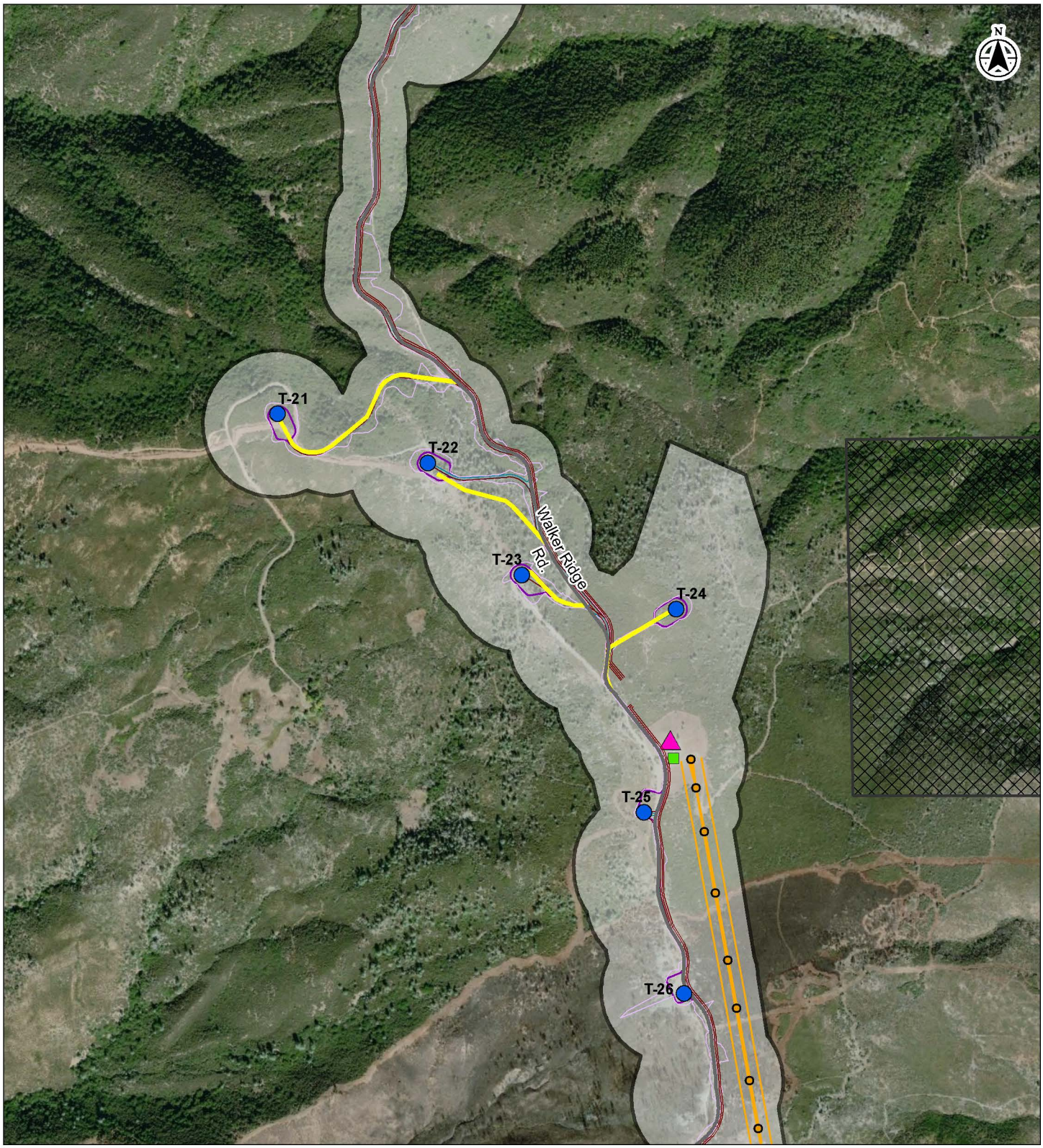

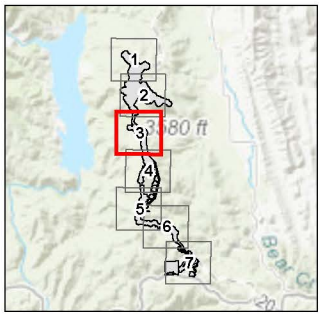

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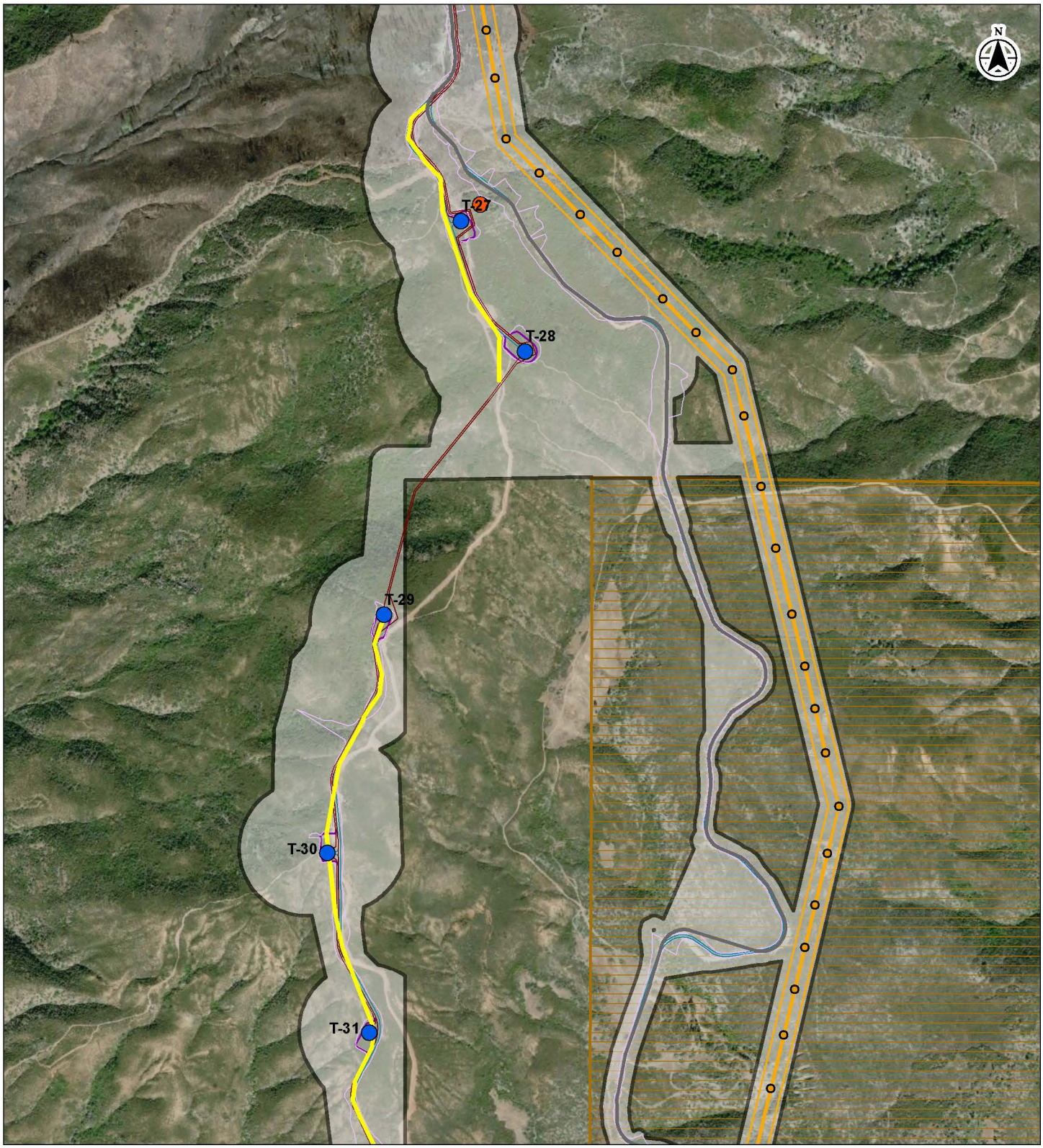

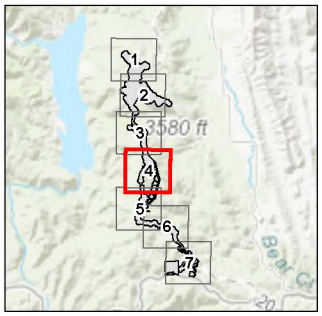

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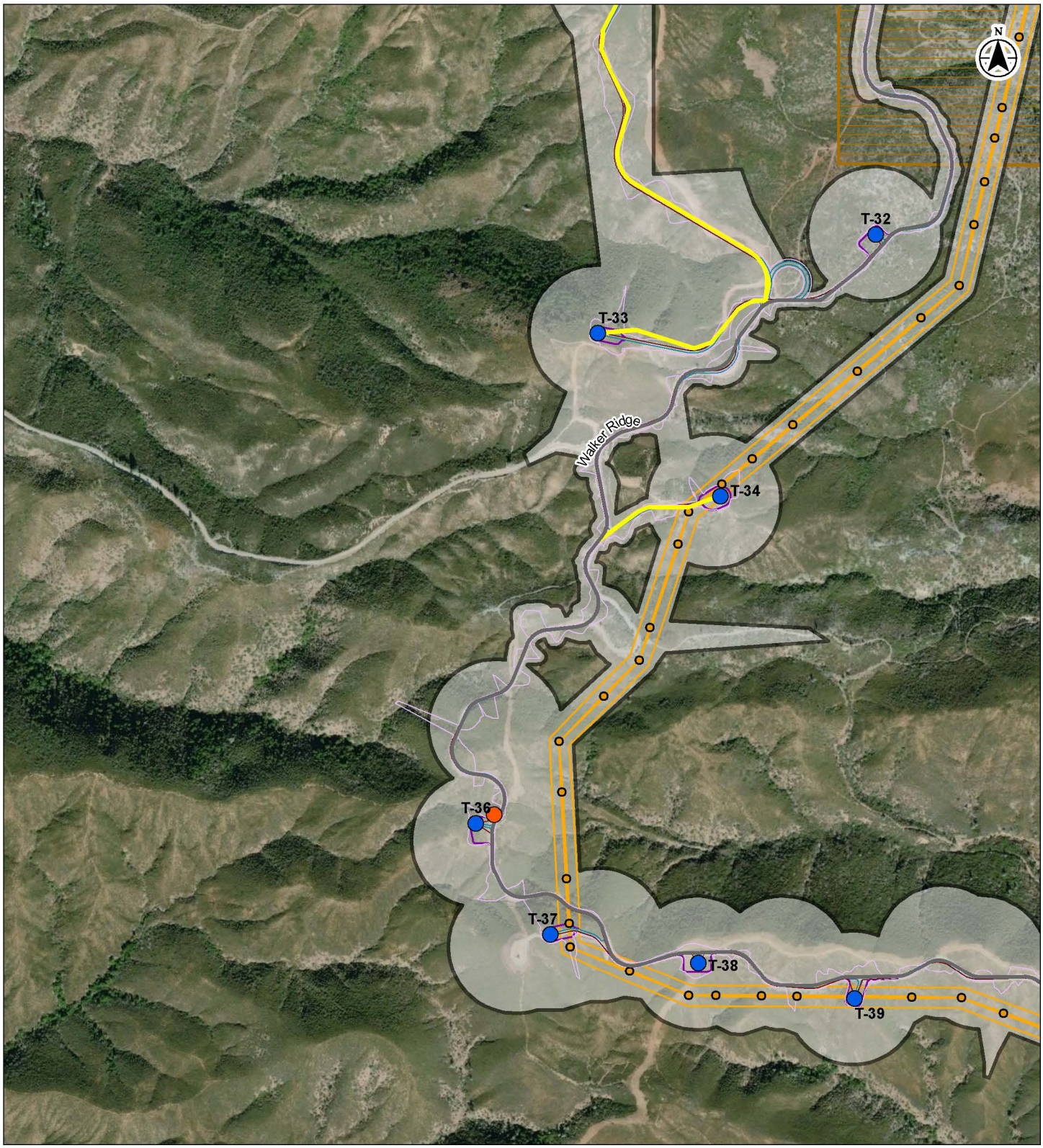
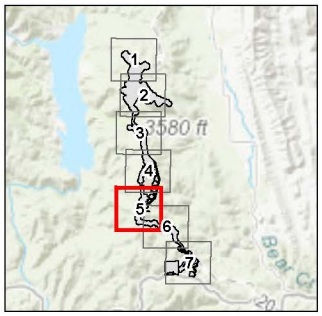
Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

Document Path: V:\1857\Active\185704083\03_data\gis_cad\gis\mxds\Archive\FIG2_Project_Components.mxd





- Turbine
- MET Tower
- Transmission Line Pole
- Existing Road to be Upgraded
- New Access Road
- Transmission Line
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area
- Areas of Critical Environmental Concern (ACEC)

Design is preliminary and subject to revision

Figure No.
2c

Stantec

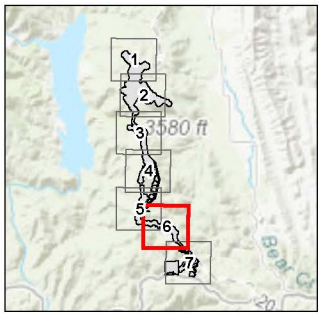
Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

Document Path: V:\1857\Active\185704083\03_data\gis_cad\gis\mxds\Archive\FIG2_Project_Components.mxd



- Turbine
- Transmission Line Pole
- Existing Road to be Upgraded
- New Access Road
- Transmission Line
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Survey Area

Design is preliminary and subject to revision

Figure No.
2c

Stantec

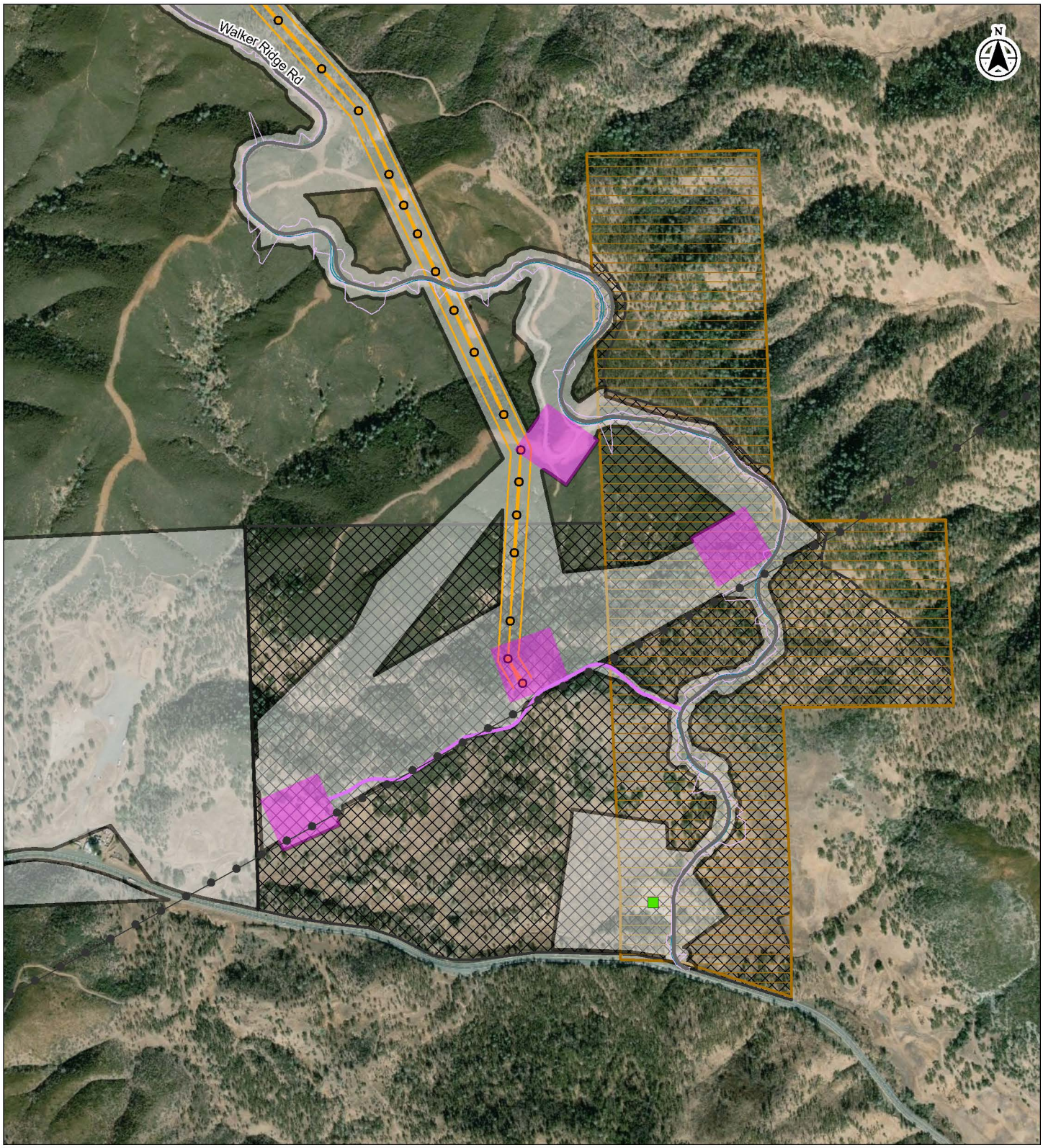
Title
Project Components

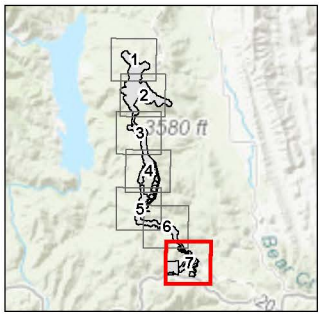
Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

Document Path: V:\1857\Active\185704083\03_data\gis_cad\gis\mxds\Archive\FIG2_Project_Components.mxd





- Potential O&M Building Location
- Transmission Line Pole
- PGE Transmission Line
- Interconnect Access Rd.
- Existing Road to be Upgraded
- Transmission Line
- Grading Limits
- Gravel Edge
- Interconnect Options
- Survey Area
- Areas of Critical Environmental Concern (ACEC)
- Land and Water Conservation Fund (LWCF) Area

Design is preliminary and subject to revision

Figure No.
2c

Stantec

Title
Project Components

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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and both would be upgraded as part of the Project. New roads will be constructed to allow access to WTG locations (Figure 2). Additionally, the Project would use lands near an existing transmission line and would not require the construction of new utility corridors outside of the proposed project ROW. Use of the existing Eagle Rock to Cortina transmission line would allow the project to produce power on federal land near an existing load center (the San Francisco Bay area) without requiring additional transmission to be constructed.

1.4 GENERAL FACILITY DESCRIPTION, DESIGN, AND OPERATION

This section describes the Project, construction techniques, and permanent and temporary disturbances associated with construction and operation. Decommissioning will be described in Section 4.3.

1.4.1 Project Location, Land Ownership, and Jurisdiction

Walker Ridge and the Project are located on the border of Lake and Colusa counties in north central California (Figure 1). The site is under the administration of the BLM's Ukiah FO. The Project is about 10 miles south of the Mendocino National Forest and directly east of Indian Valley Reservoir.

1.4.2 Legal Land Description of the Facility (Federal and Non-Federal Lands)

The legal land description, consistent with former ROW applications for the same project, is as follows (Table 1-1).

Table 1-1 Mount Diablo Meridian

T. 15 N., R. 6W.	Subsection	Acres
Sec. 14:	All	640
Sec. 15:	E½E½	160
Sec. 22:	E½E½	160
Sec. 23:	All	640
Sec. 24:	W½	320
Sec. 25:	All	640
Sec. 26:	All	640
Sec. 27:	E½E½	160
Sec. 35:	All	640
T. 14 N., R. 6W.	**Subsection**	**Acres**
Sec. 01:	Lot 3	39.86
	Lot 4	39.81
	S½NW¼	80
	SW¼	160
Sec. 02:	Lot 1	39.76
	Lot 2	39.73
	S½NE¼, SE¼	240
Sec. 11:	W½E½	160

Sec. 12:	All	640
Sec. 13:	N½, W½SW¼, NE¼SW¼	440
Sec. 14:	E½W½, E½	480
Sec. 23:	N½NE¼, NE¼NW¼	120
Sec. 24:	N½NW¼, SE¼NW¼, NE¼SW¼, E½	480
Sec. 25:	NE¼NE¼	40
T. 14 N., R. 5 W.	**Subsection**	**Acres**
Sec. 07:	Lot 1	39.82
	Lot 2	39.81
	Lot 3	39.81
	Lot 4	39.80
Sec. 18:	Lot 1	39.79
	Lot 2	39.78
	Lot 3	39.76
Sec. 19:	Lot 2	39.86
	Lot 3	39.94
	Lot 4	40.02
	SE¼NW¼, NE¼SW¼	80
Sec. 30:	Lot 1	40.03
	Lot 2	39.98
	Lot 3	39.92
	Lot 4	39.87
	W½E½, E½W½, NE¼SE¼. Excepting portions lying within Colusa County	360
Sec. 31:	NE¼NW¼	40
	Portion north of Hwy 20 in Lot 1, NW¼NE¼	

1.4.3 Total Acreage and General Dimensions of All Facilities and Components

Disturbance acreages for each Project element are provided; when a range of equipment or design options are considered, the largest possible disturbance limits are provided (Table 1-2).

Table 1-2 Conceptual or Projected Approximate Spatial Requirements by Project Element

Project Element	Unit Dimensions	Temporary Dimensions (feet)	Permanent Dimensions (feet)	Temporary Disturbance (acres)	Permanent Disturbance (acres)
WTG/WTG Assembly Areas	Radius	200	150	27.0	15.2

Project Element	Unit Dimensions	Temporary Dimensions (feet)	Permanent Dimensions (feet)	Temporary Disturbance (acres)	Permanent Disturbance (acres)
WTG Temporary Work Area/ Crane Pads	Length x Width	500 x 700	150 x 250	20.0	5.0
New Access Roads/Crane Paths	Width	50	50	34.7	34.7
Spur Roads to Turbines	Width	75*	50	24.3	24.3
Upgrade of Walker Ridge Road and Bartlett Springs Road	Width	100*	75	225	111
Staging Area/Batch Plant	Length x Width	700 x700	0	11.2	0
Underground Power Collection Lines	Width	50	0	98	0.1
Transmission Line	Width	100	20	82.6	16.5
Transmission Line Structures	Length x Width	90 x 90	25 x 50	0.17	0.03
Substation	Length x Width	800 x 800	200 x 400	14.7	1.9
Operation & Maintenance (O&M) Buildings	Length x Width	360 x 360	360 x 360	3.0	3.0
Interconnect Station	Length x Width	800x 800	450 x 400	4	4.2
Walker Ridge Road and Bartlett Springs Road Radius Improvements	Square Feet	5,000	5,000	2.3	2.3
Meteorological (MET) Tower	Radius	150	30	1.6	0.1
TOTAL	**-**	**-**	**-**	**575.7**	**209.2**
* Temporary ground disturbance may increase during construction at discrete, specific locations for a limited time.					

1.4.4 Number and Size of Wind Turbines

The Project involves construction, operation, and decommissioning of 42 WTGs (Figure 2). Outputs for smaller WTGs will range from 2 MW to 2.625 MW and large WTGs will range from 4.5 MW to 5.6 MW. Each WTG would be mounted on a reinforced concrete foundation (Figure 3). WTGs consist of three main aboveground components: the turbine tower, the nacelle, and the rotor. The turbine tower supports and provides access to the nacelle, which is the enclosure that houses the turbine's main shaft, gearbox, generator, brakes, bearings, cooling systems, and other components. The rotor is composed of three blades which attach to the main shaft via the hub. The proposed height of the turbine, nacelle, and rotor-mounted blade tips vary depending on the type of WTG, but the maximum height of the blade tips may range between 450 to 676 feet above ground level. Depending on the type of WTG selected and the associated data that is required for each type of WTG, the Meteorological (MET) towers will range in height from 260 to 400 feet above ground level. Dimensions for WTG pads as well as permanent and temporary disturbance acreages are shown in Table 1-2, above.

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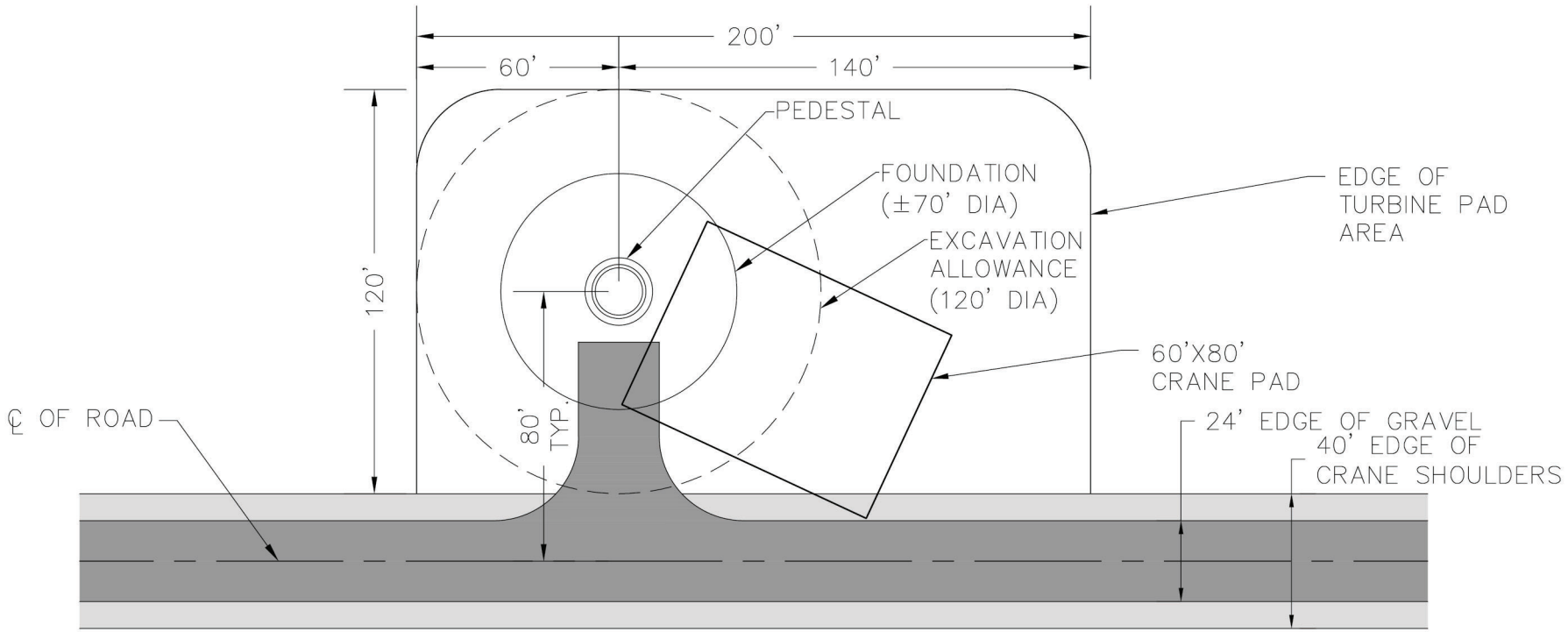
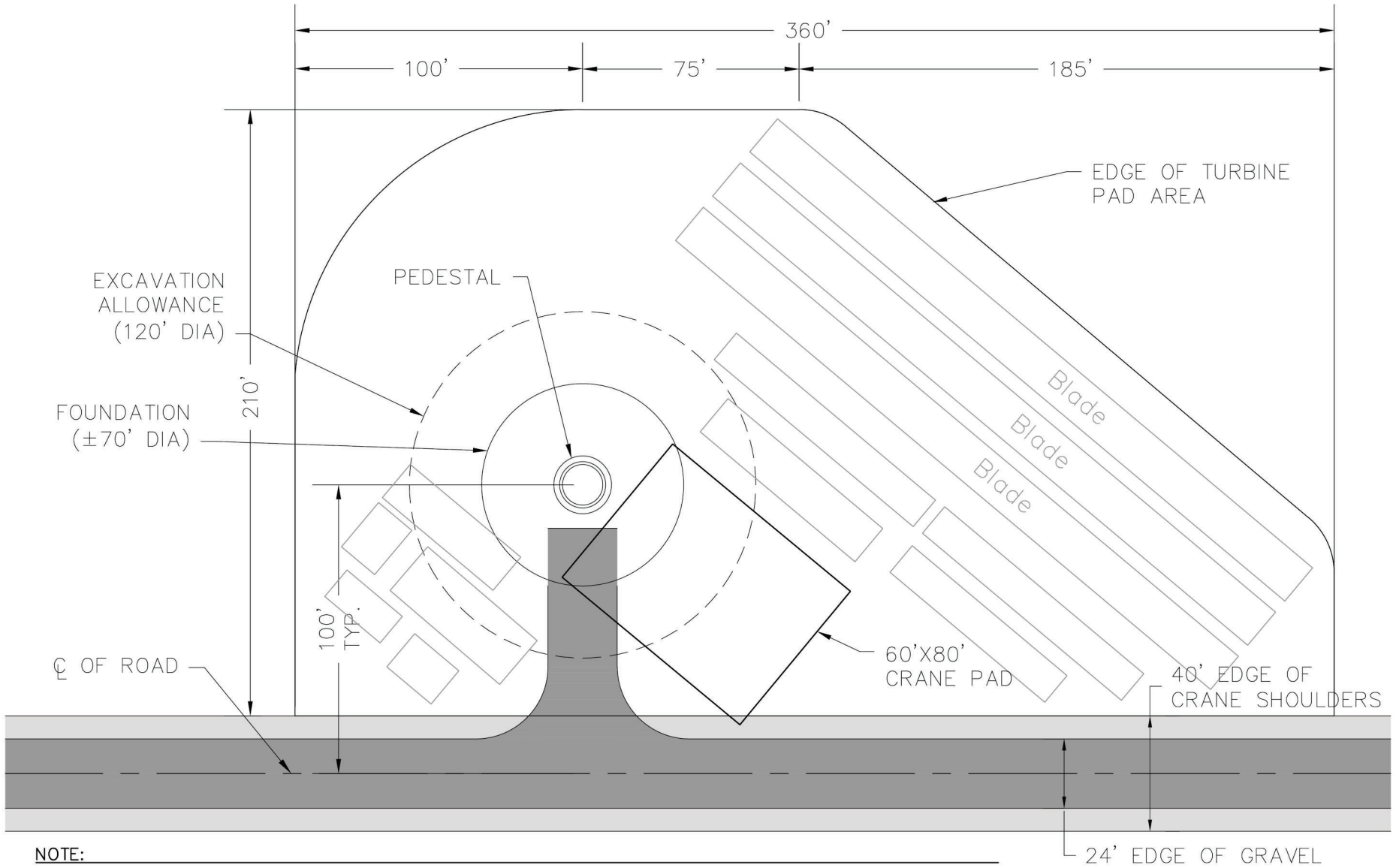


NOTE:

1. CLEARED AREA TO BE GRADED AT LESS THAN 2% MAX SLOPE.
2. CRANE PAD LOCATION TO BE FIELD VERIFIED. COMPACT NATIVE GROUND AND GRADE AT LESS THAN 1% MAX SLOPE AT CRANE PAD.
3. TURBINE PAD DIMENSIONS SHOWN ARE ASSUMED TYPICAL VALUES USED FOR THE DESIGN. SITE SPECIFIC CONSTRAINTS MAY REQUIRE ADJUSTMENTS TO FIT THE TERRAIN.
4. THIS PAD IS INTENDED TO BE THE MINIMUM PAD SIZE AND TO BE USED IN STEEP OR CONSTRAINED AREAS.

Westwood	TYPICAL JUST–IN–TIME DRIVE–BY WTG SITE	LAST REVISED: 03/12/18
		TS04–A

Figure 3: Turbine Schematic

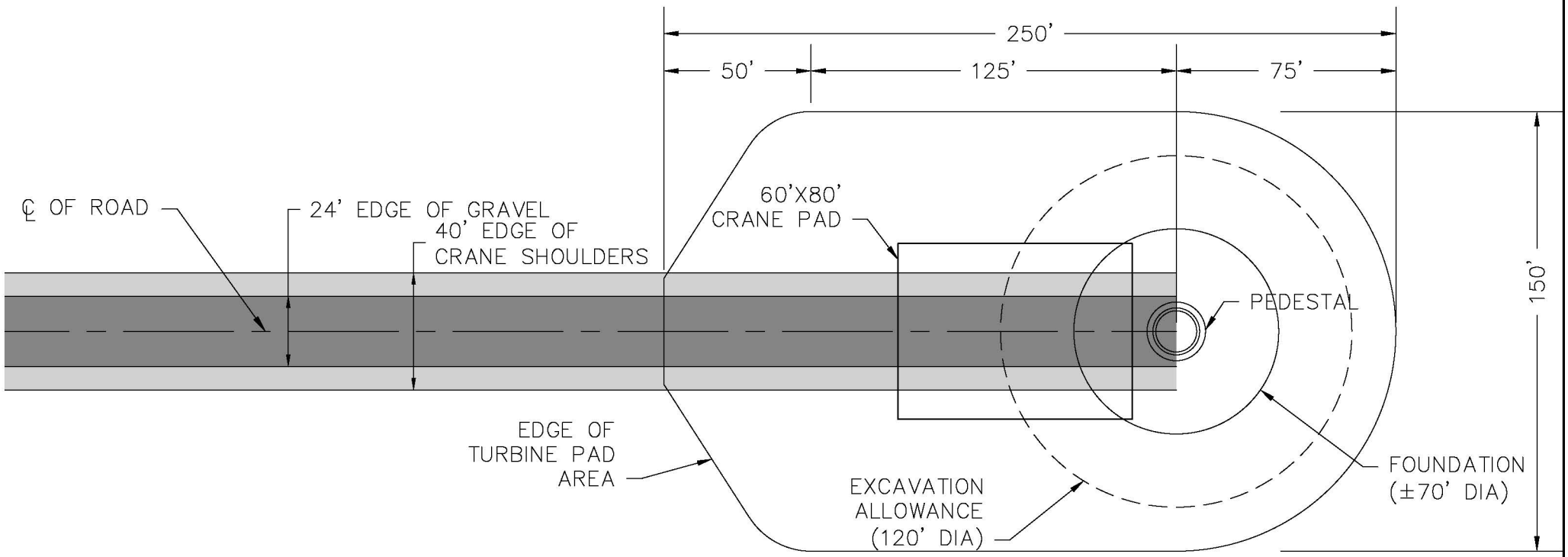


NOTE:

1. CLEARED AREA TO BE GRADED AT LESS THAN 2% MAX SLOPE.
2. CRANE PAD LOCATION TO BE FIELD VERIFIED. COMPACT NATIVE GROUND AND GRADE AT LESS THAN 1% MAX SLOPE AT CRANE PAD.
3. TURBINE PAD DIMENSIONS SHOWN ARE ASSUMED TYPICAL VALUES USED FOR THE DESIGN. SITE SPECIFIC CONSTRAINTS MAY REQUIRE ADJUSTMENTS TO FIT THE TERRAIN.
4. THIS PAD IS INTENDED TO BE USED IN FLATTER AREAS WHERE COMPONENT LAYDOWN IS FEASIBLE. PAD DIMENSIONS ASSUME A BLADE LENGTH OF 73.7 METERS (242').

Westwood	TYPICAL DRIVE–BY WTG SITE WITH COMPONENT LAYDOWN	LAST REVISED: 03/12/18
		TS04–B

Figure 3: Turbine Schematic

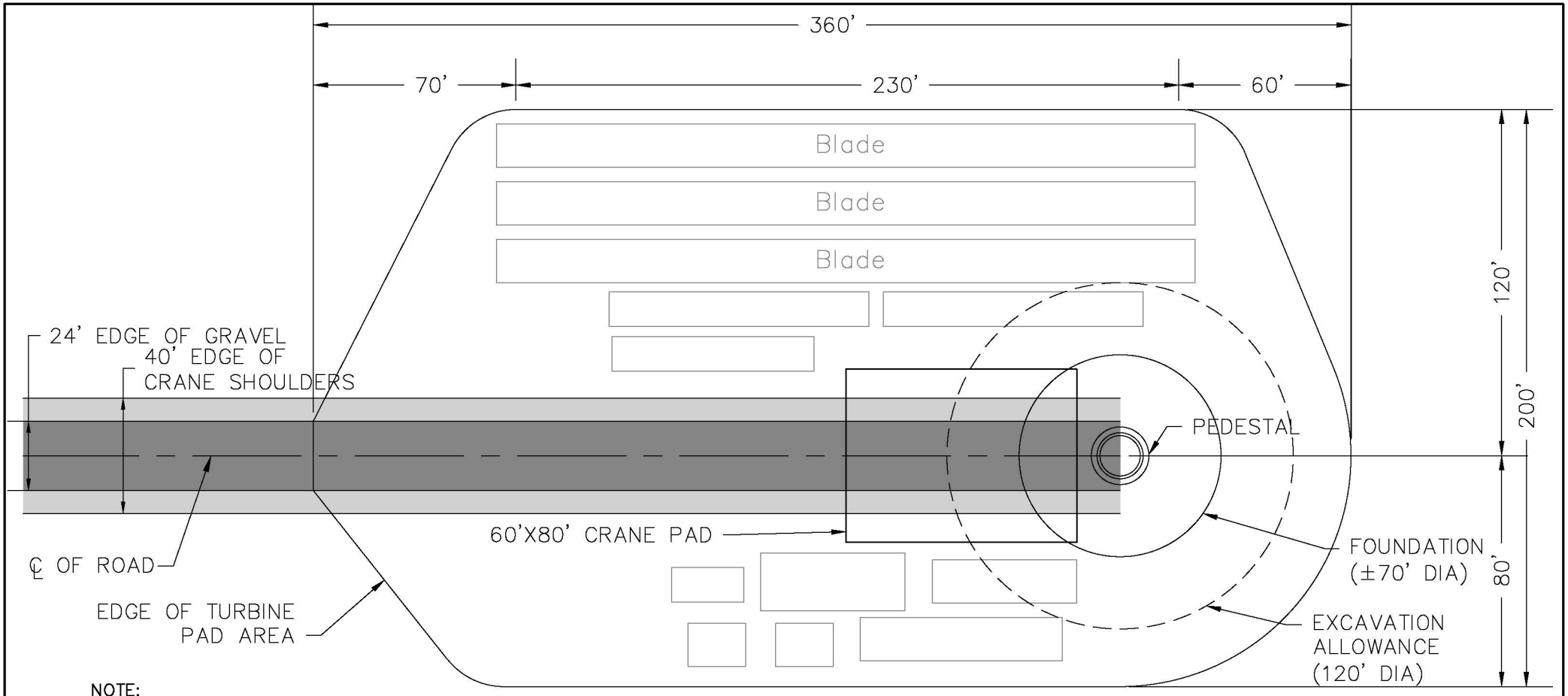


NOTE:

1. CLEARED AREA TO BE GRADED AT LESS THAN 2% MAX SLOPE.
2. CRANE PAD LOCATION TO BE FIELD VERIFIED. COMPACT NATIVE GROUND AND GRADE AT LESS THAN 1% MAX SLOPE AT CRANE PAD.
3. TURBINE PAD DIMENSIONS SHOWN ARE ASSUMED TYPICAL VALUES USED FOR THE DESIGN. SITE SPECIFIC CONSTRAINTS MAY REQUIRE ADJUSTMENTS TO FIT THE TERRAIN.
4. THIS PAD IS INTENDED TO BE THE MINIMUM PAD SIZE AND TO BE USED IN STEEP OR CONSTRAINED AREAS.

Westwood	TYPICAL JUST–IN–TIME DEAD–END WTG SITE	LAST REVISED: 03/12/18
		TS04–C

Figure 3: Turbine Schematic



NOTE:

1. CLEARED AREA TO BE GRADED AT LESS THAN 2% MAX SLOPE.
2. CRANE PAD LOCATION TO BE FIELD VERIFIED. COMPACT NATIVE GROUND AND GRADE AT LESS THAN 1% MAX SLOPE AT CRANE PAD.
3. TURBINE PAD DIMENSIONS SHOWN ARE ASSUMED TYPICAL VALUES USED FOR THE DESIGN. SITE SPECIFIC CONSTRAINTS MAY REQUIRE ADJUSTMENTS TO FIT THE TERRAIN.
4. THIS PAD IS INTENDED TO BE USED IN FLATTER AREAS WHERE COMPONENT LAYDOWN IS FEASIBLE. PAD DIMENSIONS ASSUME A BLADE LENGTH OF 73.7 METERS (242').

Westwood	TYPICAL DEAD–END WTG SITE WITH COMPONENT LAYDOWN	LAST REVISED: 03/12/18
		TS04–D

Figure 3: Turbine Schematic

1.4.5 Wind Turbine Configuration and Layout

The Project was designed to best capture the wind resource and is highly sensitive to economies of scale. Maintaining this scale is an important component of the project's purpose and need. WTGs would be placed in lines along the ridges in the ROW. Due to the steep topography, and to best capture the wind resource while utilizing previously-disturbed areas, lines would be sited adjacent to Walker Ridge Road and Bartlett Springs Road. The location of each WTG was chosen to maximize that turbine's exposure to the prevailing winds while minimizing the wake loss for the entire project.

Wake loss refers to the turbulence created by each WTG as its blades spin in the wind. If WTGs are placed down-wind of each other the amount of wake loss is high. Wake loss decreases the productivity of the site. Figure 2 shows the placement of project elements including WTGs, existing access roads that will be upgraded, new access roads, and the maximum limits of disturbance.

1.4.6 Transmission Lines, Substation, and Access Roads

Roads and transmission lines would be constructed or upgraded to connect the Project to existing infrastructure. Electrical components and associated road improvements would include:

- A 34.5-kilovolt (kV) underground collector lines to collect power from each WTG to the substation (Figure 2);
- A 34.5/115-kV substation, which would include a main power transformer with oil containment (see Figure 2 for the location of the substation, and Figure 4 for a schematic of the substation);
- A 115-kV underground or overhead transmission line supported by either wood or tubular steel poles proposed at a minimum height of 30 feet (Figure 2);
- A 115-kV interconnect station to tie in to the existing 115 kV Cortina – Eagle Rock or the 115 kV Cortina – Mendocino transmission lines operated by Pacific Gas & Electric (PG&E; see Figure 2 for alternative locations of the interconnect station; see Figure 5 for a schematic of the interconnect/switching station);
- The upgrades of Walker Ridge Road and Bartlett Springs Road and potentially new access roads on the Oasis private property to accommodate construction of the project, including a standard 75-foot road width with 4-foot shoulders, and corners allowing for 175-foot turning radii to accommodate transport of the maximum blade length required for WTGs; and,
- The construction of new access roads to link the WTG pads to Walker Ridge Road and/or Bartlett Springs Road (Figure 2).

1.4.7 Ancillary Facilities (Administrative and Maintenance Facilities and Storage Sites)

An O&M facility (Figure 6) would occupy an area estimated as 360 x 360 feet (approximately 3 acres) (Table 1-2). This facility would include the O&M building, a small structure for spare parts storage, a covered parking garage for some maintenance vehicles, and a graveled area for equipment construction and storage.

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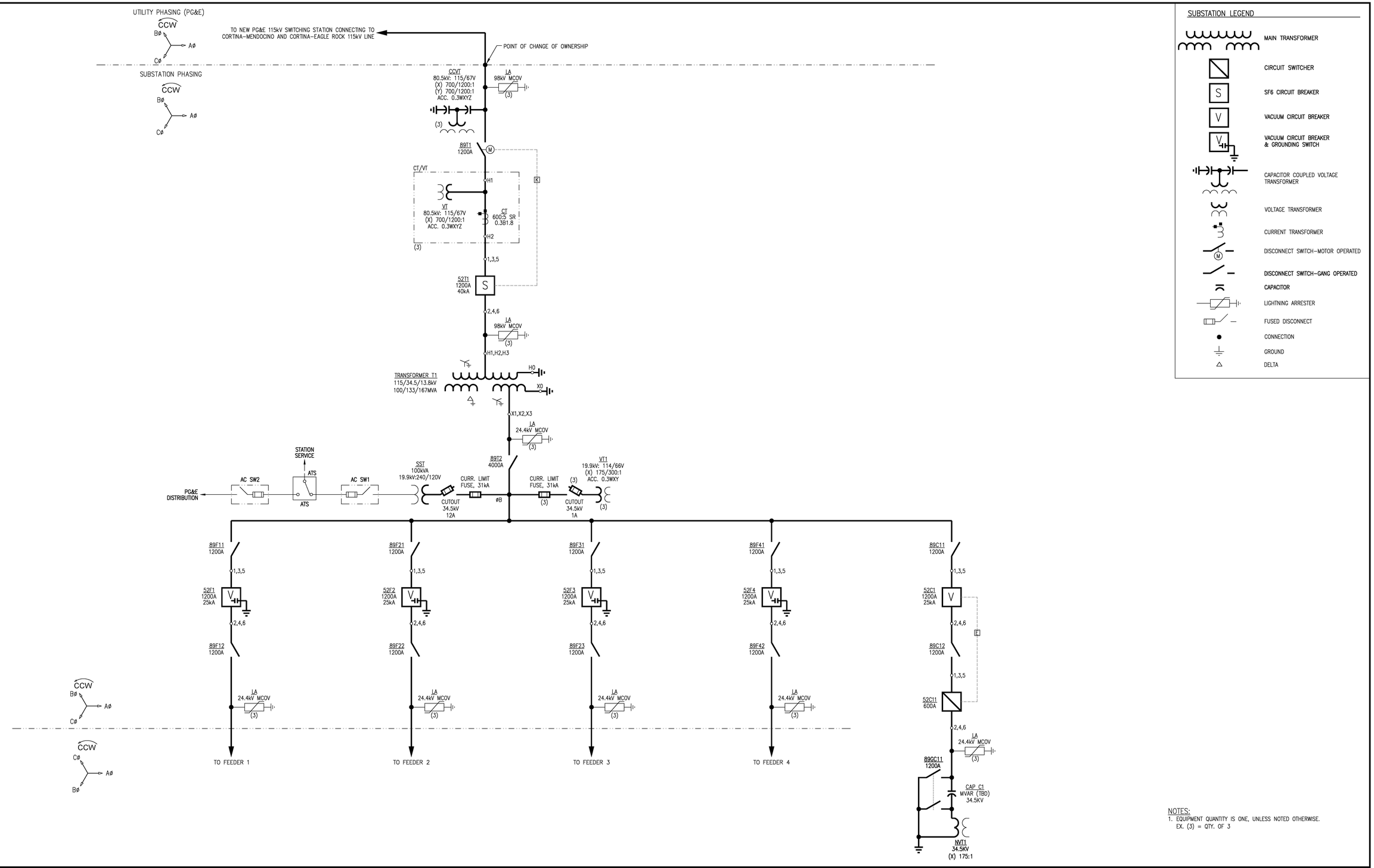


NOTES:
1. EQUIPMENT QUANTITY IS ONE, UNLESS NOTED OTHERWISE.
   EX. (3) = QTY. OF 3

REV.	DATE	DESCRIPTIONS	BY	CHK'D	APRV'D
A	4/06/18	ISSUED FOR PROPOSAL	TT	BC	MJN

PRELIMINARY DRAWING – NOT FOR CONSTRUCTION

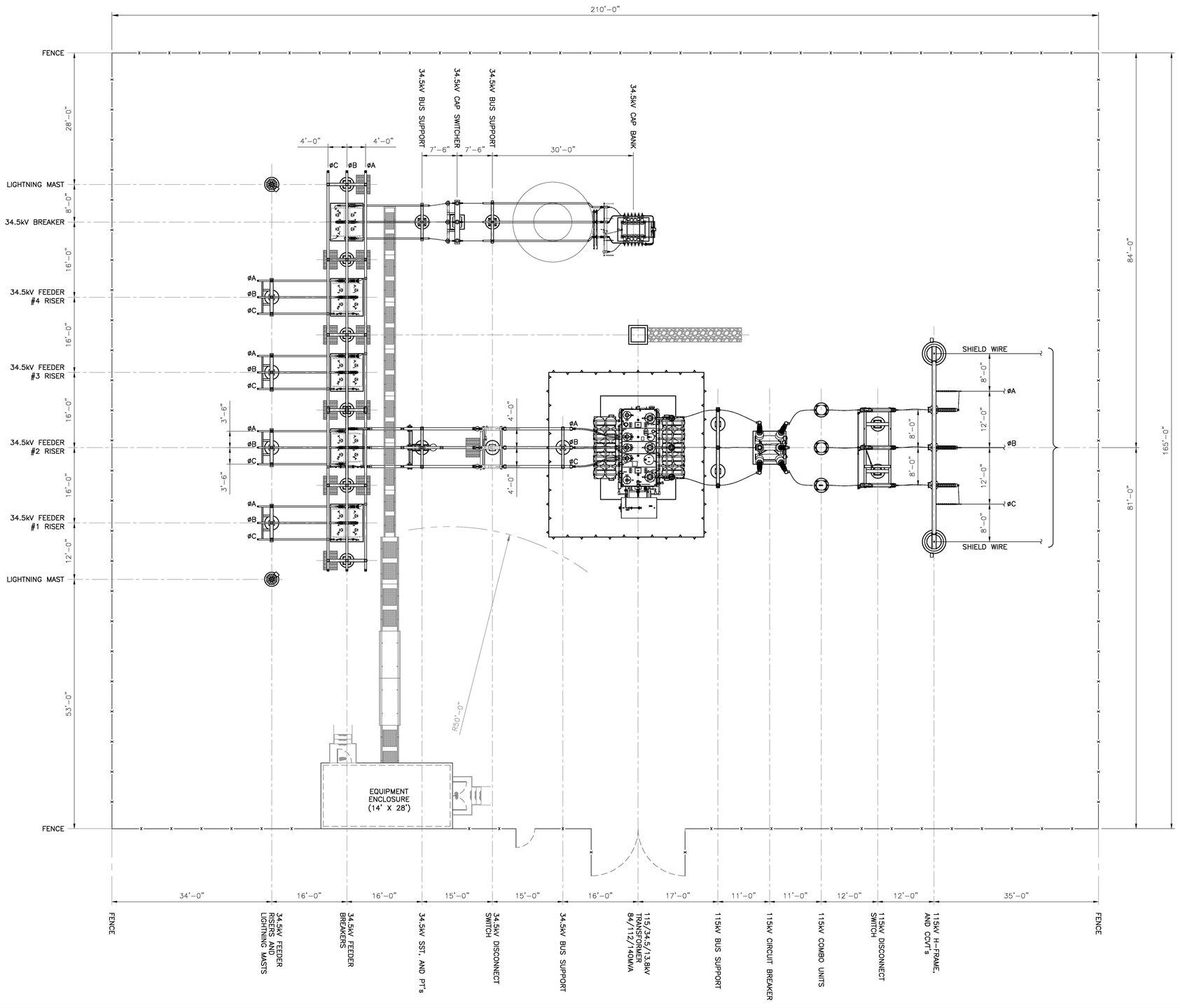
APPLIED HIGH VOLTAGE

WALKER RIDGE WIND PROJECT
LIBERTY POWER

115/34.5kV COLLECTOR SUBSTATION
ONE LINE
SWITCHING DIAGRAM

PLOT SCALE: ARCH / ENGRG
PROJ. NO.: 19119
SCALE: NONE
DWG. NO.: 001C
SHEET: 01
REV.: A

Figure 4: Substation Schematic



N

LEGEND

——x—— SUBSTATION FENCE

DESIGN CRITERIA:

SUGGESTED CLEARANCES PER APPLICABLE INDUSTRY STANDARDS:

115kV CLEARANCE (650kV BIL DUE TO ELEVATION >3300'):

PHASE TO PHASE:	
(CENTER TO CENTER)	8'-0"
MINIMUM METAL TO METAL:	
(PHASE TO PHASE)	5'-3"
PHASE TO GROUND	4'-2"
VERTICAL CLEARANCE TO LIVE PARTS FOR	
PERSONAL ACCESS:	13'-0"
HORIZONTAL CLEARANCE TO LIVE PARTS FOR	
PERSONAL ACCESS:	6'-8"
VERTICAL CLEARANCE TO	
LIVE PARTS OVER ROADWAY:	27'-0"
SAFETY CLEARANCE ZONE	
TO SUBSTATION FENCE:	14'-0"

34.5kV CLEARANCE (200kV BIL):

PHASE TO PHASE	
(CENTER TO CENTER):	3'-0"
MINIMUM METAL TO METAL	
(PHASE TO PHASE):	1'-6"
PHASE TO GROUND	1'-1"
VERTICAL CLEARANCE TO LIVE PARTS FOR	
PERSONAL ACCESS:	10'-0"
HORIZONTAL CLEARANCE TO LIVE PARTS FOR	
PERSONAL ACCESS:	4'-0"
VERTICAL CLEARANCE TO	
LIVE PARTS OVER ROADWAY:	23'-0"
SAFETY CLEARANCE ZONE	
TO SUBSTATION FENCE:	11'-0"

GENERAL CLEARANCE:

VERTICAL CLEARANCE	
TO INDETERMINATE VOLTAGE	8'-6"

(MEASURED FROM TOP OF STRUCTURE BASE PLATE)

REFERENCE DRAWING:

ONE LINE SWITCHING DIAGRAM	001

REV.	DATE	DESCRIPTIONS	BY	CHK'D	APRV'D
A	04/05/18	ISSUED FOR REVIEW	SDD	BB	BB

PRELIMINARY DRAWING — NOT FOR CONSTRUCTION

APPLIED HIGH VOLTAGE

WALKER RIDGE WIND PROJECT
LIBERTY POWER

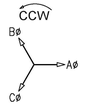
115/34.5kV COLLECTOR SUBSTATION
GENERAL ARRANGEMENT
PLAN VIEW

PLOT SCALE: ARCH 0 1 2 / ENGRG 0 1 2

PROJ. NO.:	SCALE:	
19119	3/32"=1'-0"	
DWG. NO.:	SHEET:	REV.:
101C	01	A

Figure 4: Substation Schematic

UTILITY PHASING (PG&E)



115kV LINE TO MENDOCINO SUBSTATION

115kV LINE TO EAGLE ROCK SUBSTATION

CCVT
80.5kV: 115/67V
(X) 700/1200:1
(Y) 700/1200:1
ACC. 0.3WXYZ

(3)

L2-B2
1200A

L1-B2
1200A

BAY 3 | BAY 2 | BAY 1

115kV BUS 2

89B3-11 1200A | 89B2-11 1200A | 89B1-11 1200A

1,3,5

52B3-T 1200A 40kA | 52B2-1 1200A 40kA | 52B1-1 1200A 40kA

2,4,6

89B3-12 1200A | 89B2-12 1200A | 89B1-12 1200A

89B3-T11 1200A | 89B2-T11 1200A | 89B1-T11 1200A

89B3-T12 1200A | 89B2-T12 1200A | 89B1-T12 1200A

89B3-21 1200A | 89B2-21 1200A | 89B1-21 1200A

52B3-2 1200A 40kA | 52B2-2 1200A 40kA | 52B1-2 1200A 40kA

89B3-22 1200A | 89B2-22 1200A | 89B1-22 1200A

115kV BUS 1

CCVT
80.5kV: 115/67V
(X) 700/1200:1
(Y) 700/1200:1
ACC. 0.3WXYZ

øA

SSVT
1PH-100kVA
19.9kV:240/120V

SST
1PH-100kVA
7.2kV:240/120V

TO 12kV DISTRIBUTION

SW 400A NEMA 3R

TO 2-POLE MECHANICAL INTERLOCK IN OUTDOOR CABINET

SW 400A NEMA 3R

M
REVENUE METER (BY PG&E)

L3-B1 1200A | L2-B1 1200A | L1-B1 1200A

115kV LINE TO WALKER RIDGE COLLECTOR SUBSTATION

115kV LINE TO CORTINA LINE #2 SUBSTATION

115kV LINE TO CORTINA LINE #1 SUBSTATION

SUBSTATION LEGEND

- S — SF6 CIRCUIT BREAKER
- CAPACITOR COUPLED VOLTAGE TRANSFORMER
- VOLTAGE TRANSFORMER
- DISCONNECT SWITCH-GANG OPERATED
- CAPACITOR
- LIGHTNING ARRESTER
- CONNECTION

PG&E SYSTEM PHASE SEQUENCE A-C-B

NOTES:
1. EQUIPMENT QUANTITY IS ONE, UNLESS NOTED OTHERWISE.
   EX. (3) = QTY. OF 3

REV.	DATE	DESCRIPTIONS	BY	CHK'D	APRV'D
A	4/06/18	ISSUED FOR PROPOSAL	MG	BC	MJN

PRELIMINARY DRAWING — NOT FOR CONSTRUCTION

APPLIED HIGH VOLTAGE

WALKER RIDGE WIND PROJECT
LIBERTY POWER

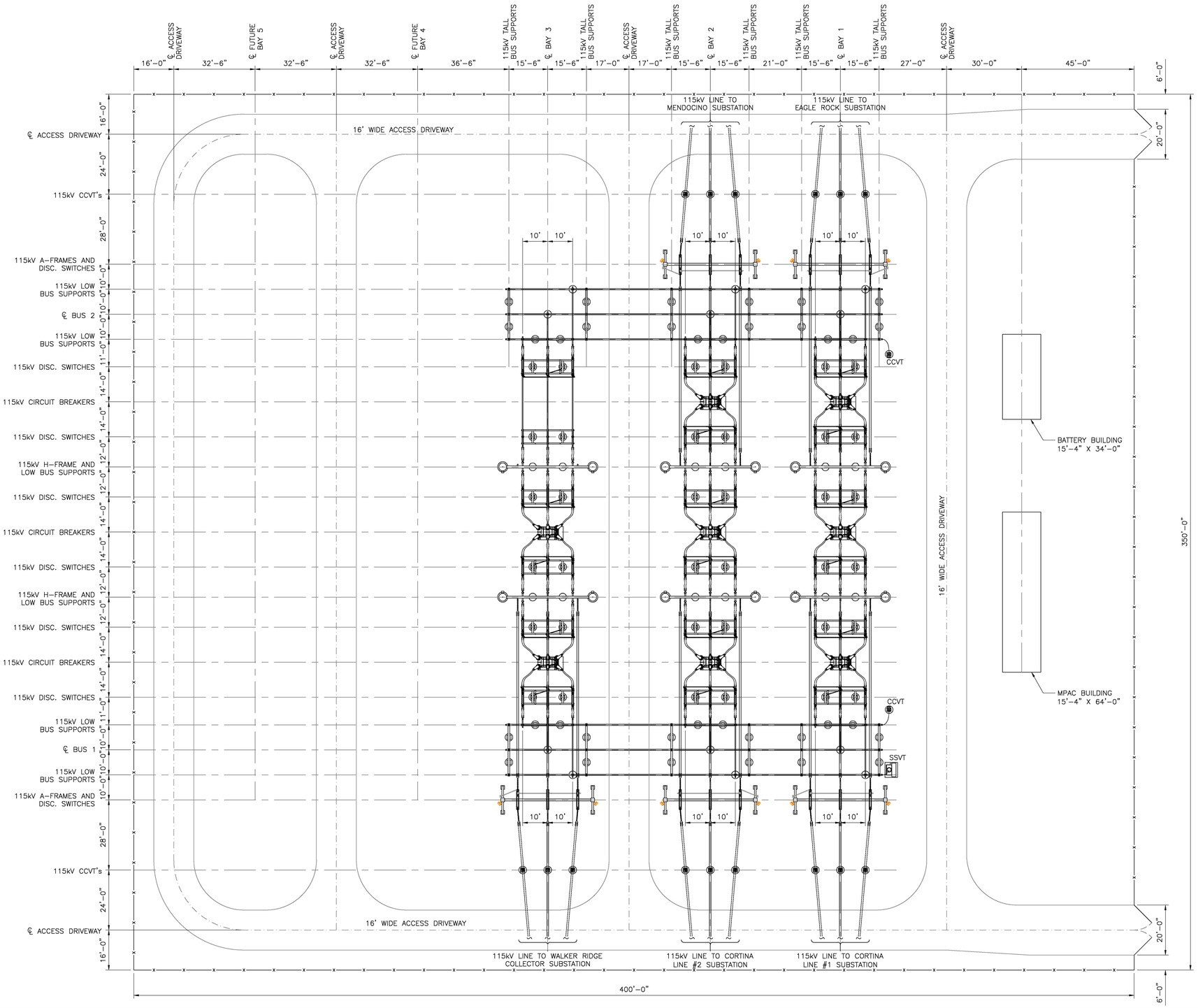
115kV SWITCHING STATION
ONE LINE
SWITCHING DIAGRAM

PLOT SCALE: ARCH 0 1 2 / ENGRG 0 1 2

PROJ. NO.: 19119 | SCALE: NONE

DWG. NO.: 001P | SHEET: 01 | REV.: A

Figure 5:Interconnect/Switching Station Schematic



N

LEGEND:

——x—— SUBSTATION FENCE

DESIGN CRITERIA:

SUGGESTED CLEARANCES PER APPLICABLE INDUSTRY STANDARDS

115kV CLEARANCE (550KV BIL):

PHASE TO PHASE:	
(CENTER TO CENTER)	7'–0"
MINIMUM METAL TO METAL:	
(PHASE TO PHASE)	4'–5"
PHASE TO GROUND	3'–6"
VERTICAL CLEARANCE TO LIVE PARTS FOR	
PERSONAL ACCESS:	12'–0"
VERTICAL CLEARANCE TO	
LIVE PARTS OVER ROADWAY:	25'–0"
SAFETY CLEARANCE ZONE	
TO SUBSTATION FENCE:	13'–0"

GENERAL CLEARANCE:

VERTICAL CLEARANCE	
TO INDETERMINATE VOLTAGE	8'–6"
(MEASURED FROM TOP OF STRUCTURE BASE PLATE)	

REFERENCE DRAWING:

ONE LINE SWITCHING DIAGRAM	001

REV.	DATE	DESCRIPTIONS	BY	CHK'D	APRV'D
A	04/05/18	ISSUED FOR REVIEW	SDD	BB	BB

PRELIMINARY DRAWING – NOT FOR CONSTRUCTION

APPLIED HIGH VOLTAGE

WALKER RIDGE WIND PROJECT
LIBERTY POWER

115kV SWITCHING STATION
GENERAL ARRANGEMENT
PLAN VIEW

PLOT SCALE: ARCH / ENGRG 0 1 2

PROJ. NO.:	SCALE:	
19119	1"=20'–0"	
DWG. NO.:	SHEET:	REV.:
101P	01	A

Figure 5: Interconnect/Switching Station Schematic

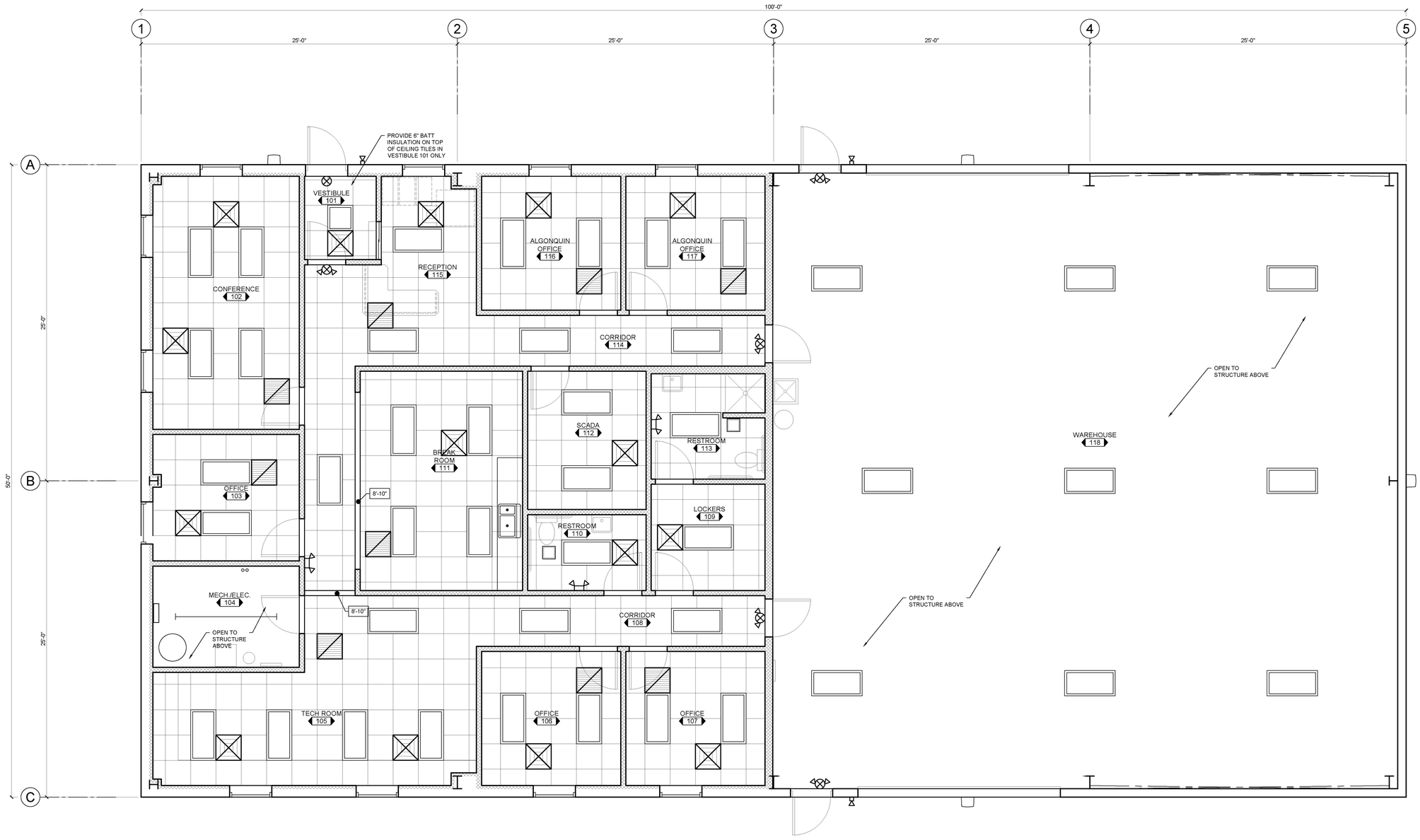
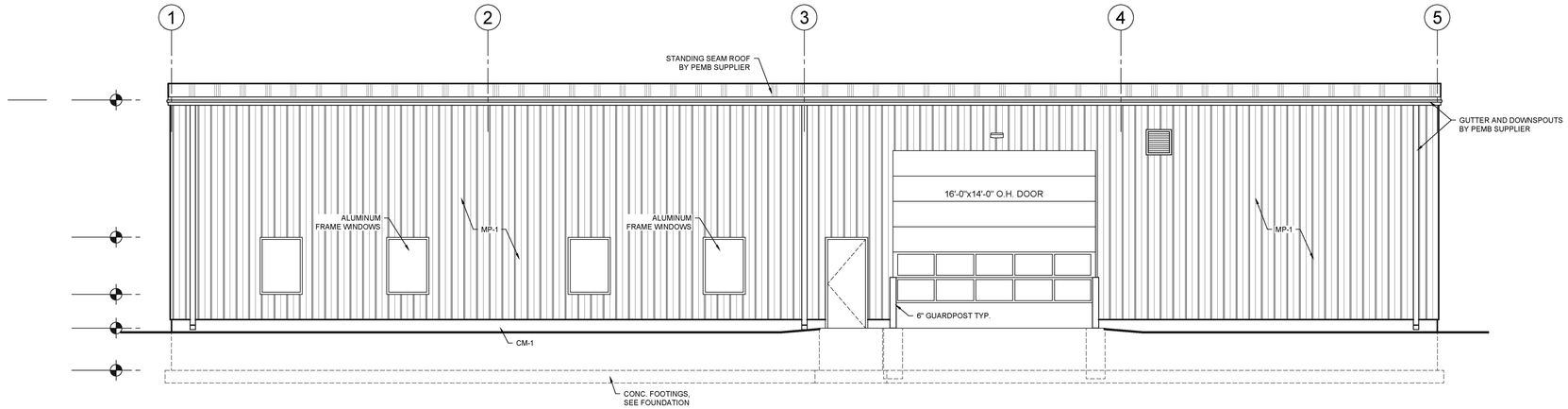
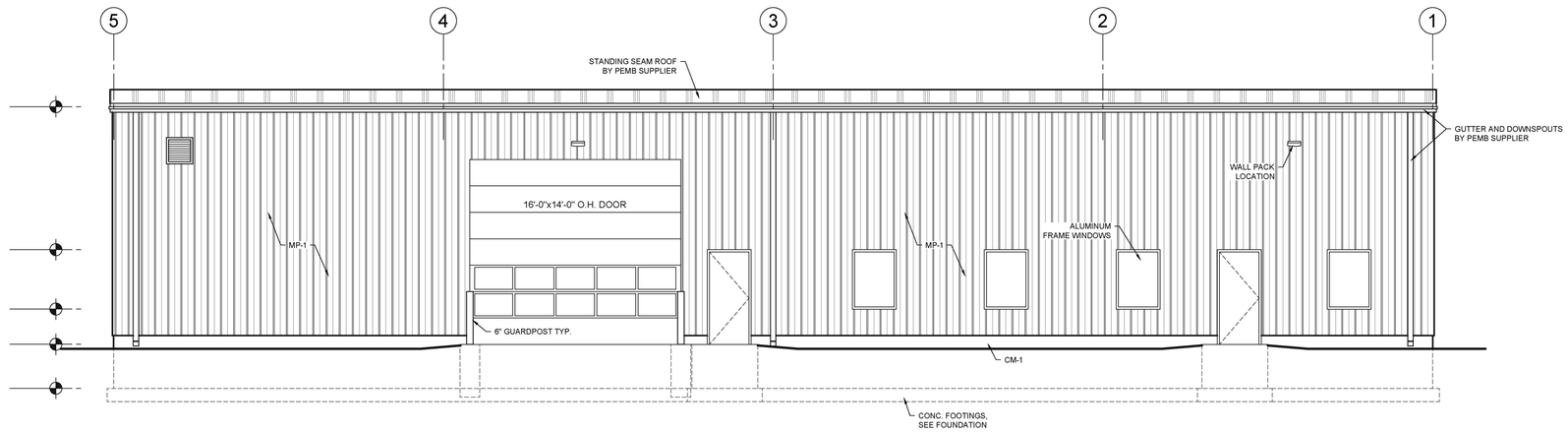


Figure 6: O&M Building Schematic



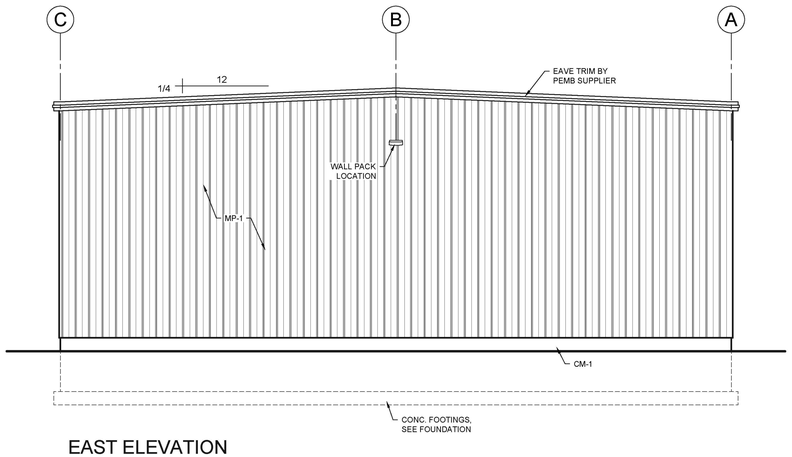
SOUTH ELEVATION

SCALE: 3/16" = 1'-0"



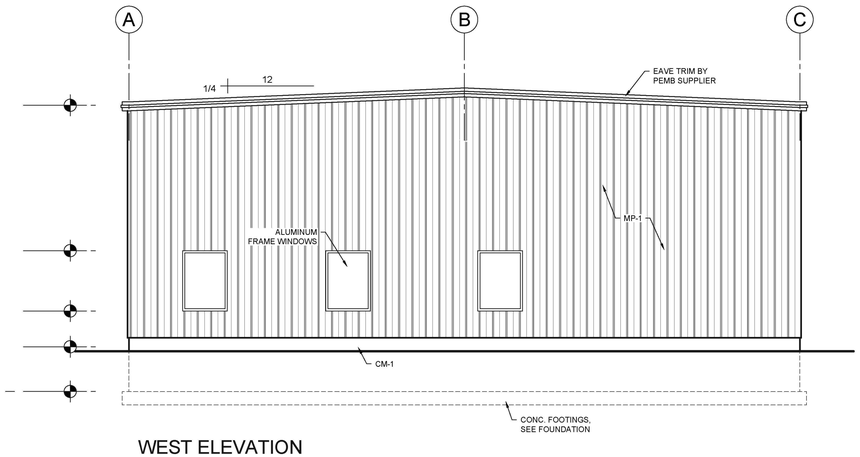
NORTH ELEVATION

SCALE: 3/16" = 1'-0"



EAST ELEVATION

SCALE: 3/16" = 1'-0"



WEST ELEVATION

SCALE: 3/16" = 1'-0"

Figure 6: O&M Building Schematic

1.4.8 Temporary Construction Workspace, Yards, and Staging Areas

During construction, temporary work areas and facilities would be needed that could include the following:

- Staging areas;
- Extra work areas (on steep side slopes);
- Crane pads for WTG erection;
- Temporary offices;
- Tool sheds/containers
- Chemical toilets;
- Parking for construction equipment and vehicles;
- Temporary widening of Walker Ridge Road and/or Bartlett Springs Road; and,
- The transmission line corridor which would be temporary, with most of it allowed to revegetate to an acceptable level.

Temporary impact areas will be reseeded following construction.

1.4.9 Water Usage, Amounts, and Sources during Construction and Operations

During construction, the project would use an estimated 61.4 to 92.1 acre-feet of water. Water would be obtained from permitted commercial or municipal sources, local batch plants or similar sources located within the same watershed as the project. During construction, water would be used to mix cement for WTG footings and for the substation, interconnect station, and O&M building foundations. Water would also be required for dust control (see Section 2.14.1) and for soil compaction. Following construction, an estimated 7,300 gallons per year would be used annually during operation for toilets, drinking water, and the septic system to serve the permanent O&M staff.

1.4.10 Erosion Control and Stormwater Drainage

Colusa will develop a site-specific Storm Water Pollution Prevention Plan (SWPPP) once the design has progressed to a point that flow patterns and volumes can be predicted, to prevent offsite migration of contaminated storm water and soil erosion. Any existing storm water pollution prevention systems will be kept in place or their function will be replaced or maintained throughout construction (see Section 2.14.2).

1.4.11 Waste and Hazardous Materials Management

Colusa will develop a Waste Management Plan, pursuant to the revised BLM Wind Energy Program Policies and Best Management Practices (BMPs) provided in BLM Instruction Memorandum No. 2009-043 (BLM 2008). The Waste Management Plan will address both hazardous and nonhazardous wastes. It will identify the waste that could be generated and will address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. The sewage system storage and treatment areas will be located within the area designated as for the O&M facility.

1.4.11.1 Nonhazardous Waste

The primary waste generated during operations would be nonhazardous. Nonhazardous solid wastes would include those typically associated with O&M activities (e.g., rags, empty containers, broken and rusted metal, and machine

parts). The Project would generate waste water and sanitary waste from the O&M building. A septic field or above-ground sewage holding tank would be used to collect sanitary waste.

1.4.11.2 Hazardous Waste

Colusa will develop a Hazardous Materials Management Plan after the design has progressed and will provide that plan to BLM for review to determine the proper storage, use, transport, and disposal of all hazardous materials. The plan will include inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposal of excess materials. It will also identify requirements for notices to federal and local emergency response authorities, including emergency response plans.

Small amounts of hazardous materials would be used and stored on site for construction and O&M, including hydraulic control fluid and transformer oil. A Spill Prevention, Control, and Countermeasures (SPCC) plan will be developed in accordance with federal regulations to protect the environment from spills of petroleum products (Section 1.4.16). Secondary containment for hazardous materials such as fuel would be provided, and the fuel would be stored on site only for as long as it was needed, to minimize potential for spillage. If hazardous materials were accidentally spilled, documentation would be kept and provided to the BLM and other federal or state agencies, as outlined in the plan. Portable sanitation facilities would be removed by a licensed hauler and taken to a municipal sewage treatment facility. All temporary sanitation facilities would be removed at the end of construction.

Key aspects of the Hazardous Materials Management Plan:

- Hazardous materials will be properly stored to prevent vandalism or unauthorized access.
- Containment units will be installed in accordance with federal, state, and local regulations.
- No hazardous material will be stored within 200 feet of an identified critical area.
- Absorbent materials will be available on site for use in cleaning up small spills.
- The contractor will correct, within 24 hours of detection or notification, inappropriate usage, storage, disposal, or management of building materials, chemicals, or general refuse.

1.4.11.3 Waste Management Plan

A Waste Management Plan will be completed by Colusa and submitted to the BLM. This plan will focus on nonhazardous waste resulting from construction of the Project. It will address waste stream composition, including solid wastes, liquids, and wastewater; collection and recycling; and particulate transport pathways and management. The plan will also include protocols for: identifying hazardous waste; solid waste minimization; inspection; locations for temporary waste storage; and any specific handling and disposal requirements, as appropriate.

The following waste management landfill disposal practices will be implemented for hazardous construction waste:

Sampling of Materials

- Take composite samples of the material (obtained from different areas of the waste) to a local laboratory.
- Keep sample glasses on ice during transportation.
- Ensure that laboratory will send results in 10 days.

Handling of Materials

- Comply with required monitoring and reporting procedures.

- Designate only contaminated material for landfills, not hazardous material.
- Complete the Hazardous Waste Manifest**.**
- Load the contaminated material and haul to the landfill with the manifest.

Disposal of Materials

- Obtain approval for the manifest.
- Pay disposal fees ($/cubic yard).
- Dispose the material where directed.
- Return the signed manifest to Colusa designated representative.

1.4.12 Fire Protection

Colusa will develop a Fire Management Plan as required by the revised BLM Wind Energy Program Policies and BMPs (BLM 2008). Colusa will build fire breaks (a.k.a. fuel breaks) as necessary, around WTGs and some above-ground Project elements. Breaks may include roadways used for access or turbine pads as well as other strategic areas of fuel reduction. Location and extent of fire breaks will be developed during project design.

1.4.13 Site Security and Fencing

Temporary fences to prevent public access during construction may be installed around excavations that would otherwise present a hazard. Permanent fences would be installed and maintained around the electrical substation and interconnect site. Permanent fences around these facilities will include a wire fence six to eight feet tall around the perimeter (Figure 7a,b). Turbine tower access doors will be locked to prevent public access, but WTGs will not be fenced. Colusa is considering the use of security gates at or near each turbine. Fences or other impediments to vehicle travel or pedestrians at WTGs are not expected at this time to continue to allow public access and recreational use.

1.4.14 Electrical Components, New Equipment, and System Upgrades

The electrical system will consist of the following components:

- Individual step-up transformers at each WTG;
- A 34.5 kV underground electrical system;
- A 34.5/115 kV substation;
- An underground or overhead 115 kV transmission line; and,
- A 115 kV interconnect site.

1.4.15 Interconnection to the Electrical Grid

The Project would interconnect with PG&E's Cortina – Eagle Rock or Cortina – Mendocino 115 kV transmission lines at an interconnection site in the southern portion of the project site (see Figure 2 for proposed alternatives for interconnect location). Colusa submitted an Interconnection Request to the California Independent System Operator (CAISO), and the proposal has been studied according to the generator interconnection procedures included in their Open Access Transmission Tariff. The interconnection studies show that the Cortina-Mendocino and Cortina-Eagle Rock lines are adequate to support the generation from the Walker Ridge Wind Generation Facility. Colusa executed the Generator Interconnection Agreement with CAISO and PG&E in December 2018.

1.4.16 Spill Prevention and Containment for Construction and Operation

A Spill Prevention and Containment for Construction and Operation (SPCC) plan will be developed and will include training requirements and appropriate spill response actions for each material or waste stream. Secondary containment for hazardous materials, as may be regulated by the governing agency, will be provided. Fuel would be stored on site for only as long as it was needed, to limit risk of spillage. In case of an accidental spill of hazardous materials, documentation will be kept and provided to the BLM and other federal or state agencies, such as the U.S. Environmental Protection Agency (EPA), as required. The Plan SPCC plan will be available for onsite review by representatives of the EPA during normal working hours.

1.4.16.1 Internal Reporting Requirements

Several levels of reporting and notification requirements are triggered by a spill event, as outlined below. Unless otherwise noted, formal notifications of a spill to outside entities would be made only by the Colusa project manager after the emergency responses related to the release had been implemented. This restriction is necessary to prevent misinformation and to ensure that the notifications are properly conducted.

Oral

- The employee who discovers the spill must notify the site project manager and safety coordinator.
- If the spill exceeds 10 gallons, the site project manager or safety coordinator must notify the company safety director.

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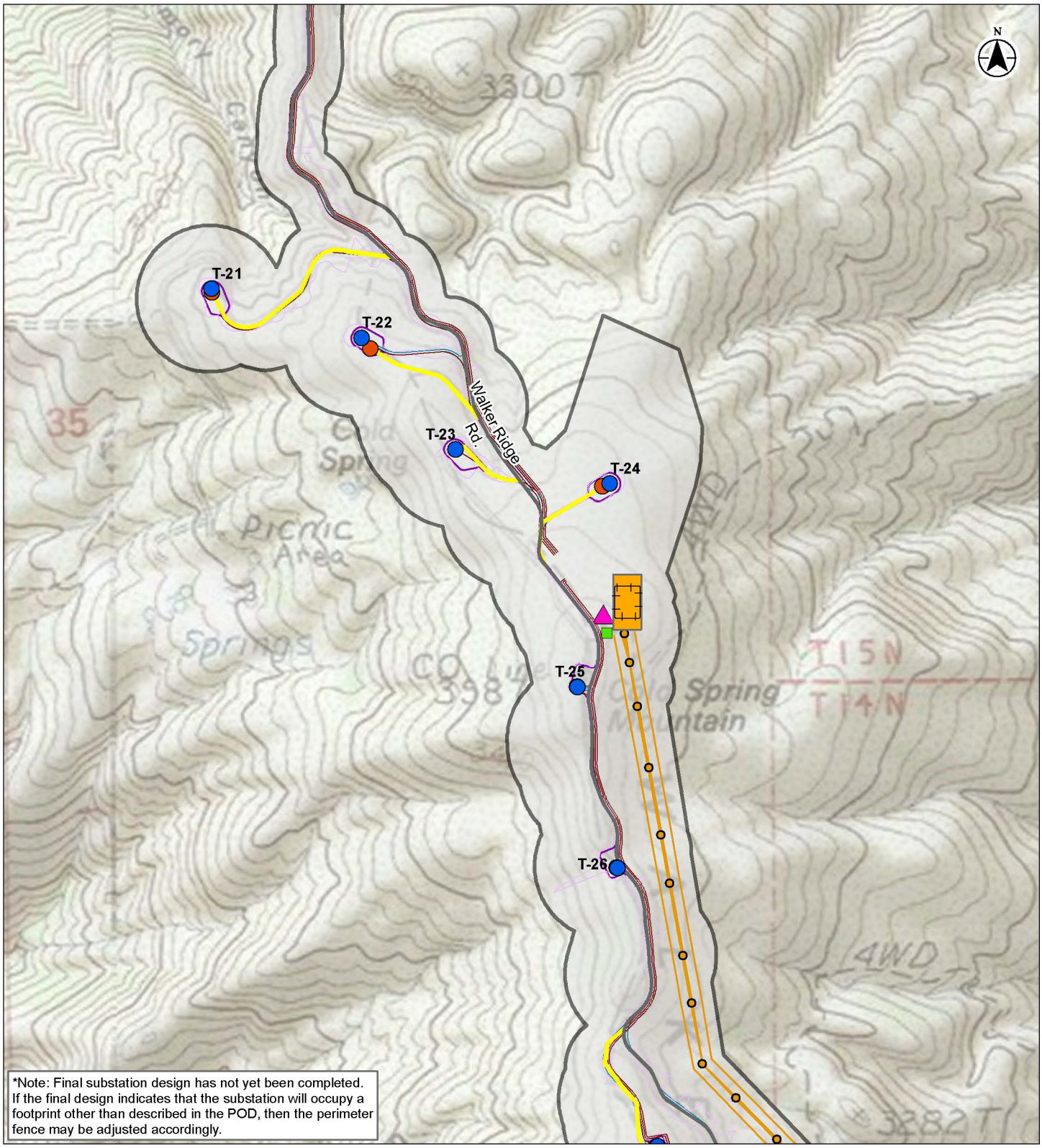

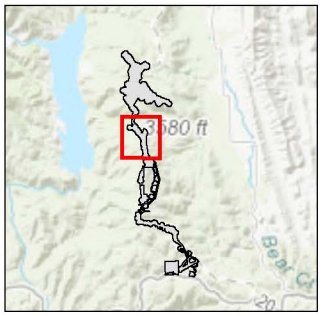

- Turbine
- MET Tower
- Potential O&M Building Location
- Approximate Location of Project Substation
- Existing Road to be Upgraded
- New Access Road
- Collection
- Grading Limits
- Gravel Edge
- Pad Edge
- Substation*
- Fencing
- Survey Area

Design is preliminary and subject to revision

Figure No.
7a

Stantec

Title
Proposed Fencing Locations

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

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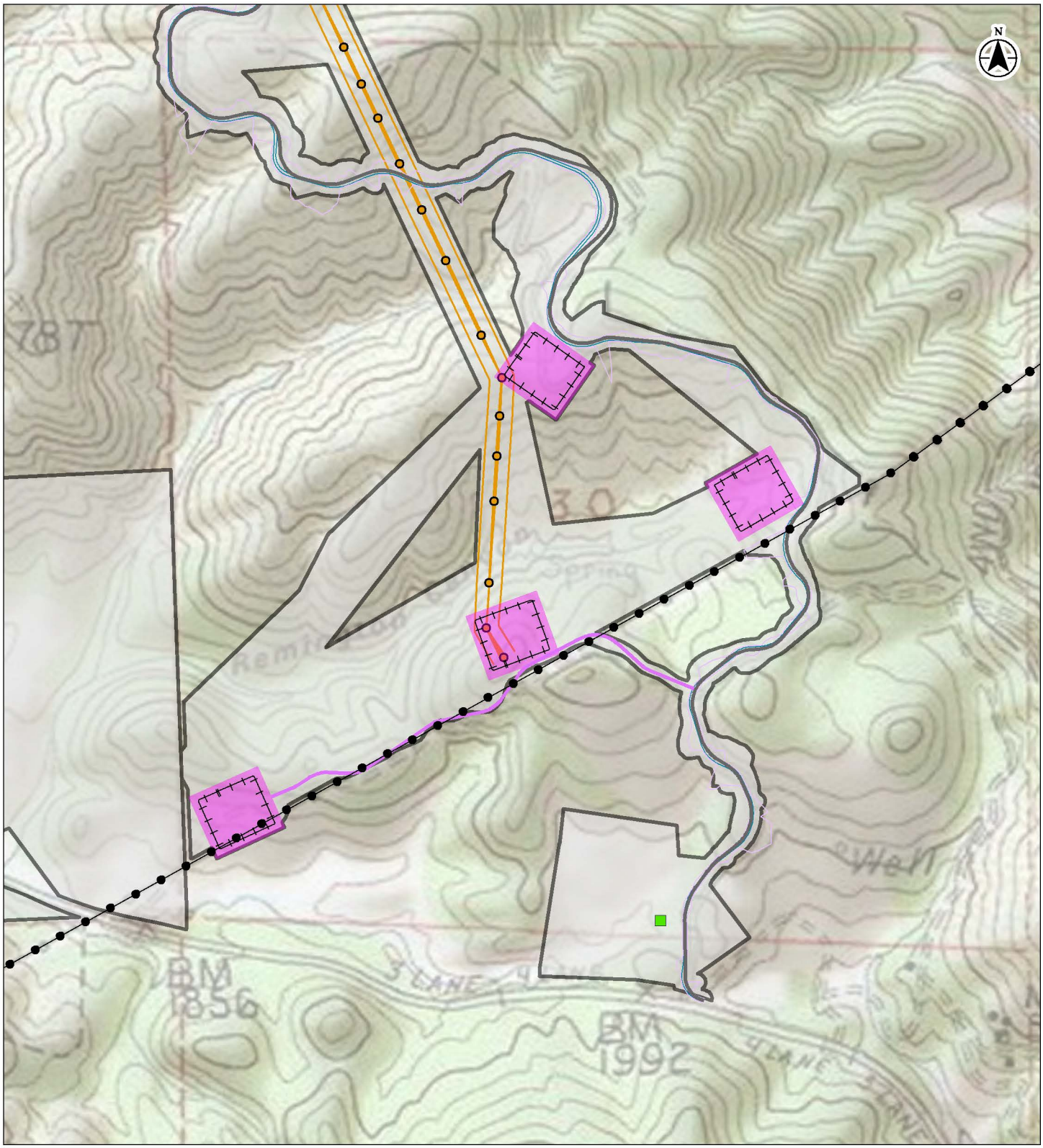

- Potential O&M Building Location
- TransmissionPole
- Interconnect Access Rd.
- Existing Road to be Upgraded
- PGE Transmission Line
- Grading Limits
- Gravel Edge
- TransmissionLine
- Fencing
- Survey Area
- Interconnect Options

Design is preliminary and subject to revision

Figure No.
7b

Stantec

Title
Proposed Fencing Locations

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 500 1,000 Feet

1.4.17 External Reporting Requirements

Federal and California State reporting requirements are outlined below.

Oral

- External reports are initially provided by telephone.
- When threshold criteria are exceeded (25 gallons, or any quantity that could pollute waters of the state), the project manager (or designee) must notify the National Response Center (NRC), the EPA, or the Coast Guard, as required.
- After federal reporting, the project manager (or designee) must notify the California Environmental Protection Agency (CalEPA) within 24 hours for spills or overfills that:
- Are equal to or greater than 25 gallons; or
- Cause a sheen on surface water; or
- Exceed the reportable quantity of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance; or
- Cause a violation of the Clean Water Act 311(b)(3).

Written

A written report must be filed with the EPA when Per 40 CFR Section 112.4:

- More than 1,000 gallons of oil are discharged into navigable waters in a single event; or
- The following events occur twice or more within 12 months:
  - More than 42 gallons are discharged into navigable waters; or
  - Quantities of oil that "violate applicable state water quality standards" are discharged; or
  - Discharges of oil "cause a film or sheen upon or discoloration of the surface of the water or adjoining shoreline or cause a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines."

When the threshold criteria are exceeded, the project manager must submit the following information within 60 days of the spill event to the EPA Regional Administrator, and, at the same time, to the appropriate divisions of the CalEPA.

- A complete copy of the SPCC Plan, with any amendments;
- The name of the facility;
- The names of the facility owner/operator;
- The location of the facility;
- The description of the facility including site maps, flow diagrams, and topographical drawings;
- The cause of the spill, including a failure analysis of the system in which the failure occurred;
- Any corrective actions and/or countermeasures taken, including a description of equipment repairs and/or replacements;
- Any additional preventive measures taken or contemplated to minimize the possibility of recurrence; and,
- All other information as the EPA Regional Administrator may reasonably require.

1.4.18 Spill Notification Procedure

This section summarizes actions to be taken by the project manager after the emergency responses related to the release have been implemented.

Procedure

- Call the NRC at 1-800-424-8802 and state:
  - "Operation oil spill – this is an alert."
  - Your name and the company name.

  - Location of spill (name of city and state).
  - Nature of spill, type of product, and estimated size of spill.
  - Type of actions taken thus far and type of assistance or equipment needed.
- Contact the CalEPA within 24 hours.
- If the spill did or could enter a navigable waterway, notify all water users of navigable waterways within 5 miles of the site immediately after contacting the NRC and CalEPA.
- For releases of over 1,000 gallons that have the potential to impact navigable waterways, or more than 42 gallons in each of two releases within a 12-month period that cause a sheen on surface waters or shoreline, or sludge or emulsion in waters, submit the required written information to the Regional EPA office and the California Division of Water Quality.

1.4.19 Health and Safety Program

Colusa will develop a thorough site-specific safety program to mitigate and eliminate injuries and to protect workers and the general public during construction and operation of the project. Pursuant to the revised BLM Wind Energy Program Policies and BMPs (BLM 2008), the health and safety program will:

- Identify all federal and state occupational safety standards applicable to the project;
- Establish safe work practices for each task, including requirements for personal protective equipment, Occupational Safety and Health Administration standard practices for safe use of explosives and blasting agents, and measures for reducing occupational electric and magnetic field exposure;
- Establish fire safety evacuation procedures;
- Define safety performance standards;
- Develop and implement a program to identify hazard training requirements for each major task and procedures for providing the required training;
- Comply with a mutually agreeable setback requirement for WTGs from roads; and,
- Identify requirements for temporary fencing around pertinent project facilities and measures to be taken during operations to limit public access to hazardous facilities.

Additional precautions, such as consulting with local planning authorities about increased traffic during construction and planning the project to comply with Federal Aviation Administration (FAA) regulations, will also be undertaken as part of the health and safety program.

1.5 ALTERNATIVES CONSIDERED

Over the years the BLM and members of the public have reviewed several alternative sites, layout configurations, and minor modifications to the Walker Ridge project. A brief synopsis of the alternative sites is included and it is anticipated that alternative layouts and minor modifications to the Project design will be evaluated by the BLM during the NEPA process.

1.5.1 Alternative Technologies

Alternative technologies such as solar and geothermal technology were considered as potential alternatives to the project. However, because Colusa has not applied for and is not pursuing development of alternative renewable technologies, such an alternative would be remote or speculative. Moreover, sites on public land considered for the project and alternatives are located on the areas identified as wind resource areas by the BLM in the Ukiah FO RMP (BLM 2006). Finally, as a result of terrain constraints and the lack of availability of suitable alternative energy resources within these areas, other alternative energy technologies would be technically infeasible.

1.5.2 Alternative Sites

Three alternative sites to the Walker Ridge site were considered on BLM lands during the BLMs last Resource Management Plan (BLM 2006). These sites included the three other locations identified in the Reasonable Foreseeable Development Scenario – Wind Energy (Appendix J of the Ukiah FO RMP): the Berryessa Management Area, the Geysers Management Area, and the Knoxville Management Area (BLM 2006). These alternative sites and the rationale for their elimination from detailed analysis are discussed below.

Information regarding management areas identified for wind energy development in Appendix J of the Ukiah FO RMP was used as the basis for assessing other sites within the plan area. The Ukiah FO RMP used regional wind speed data collected by the Department of Energy's National Renewable Energy Laboratory to identify sites within the Ukiah FO RMP area that had wind speeds high enough to support a commercially viable wind installation. To determine the technical and economic feasibility of each wind resource area, the analysis focused on the wind energy generation potential, proximity to existing transmission lines, and adequate road access. A project without adequate wind energy generation potential is considered economically infeasible. Projects without adequate access roads or that would not be close enough to a transmission line would also be considered economically infeasible and potentially technically infeasible (e.g., if terrain prohibits the construction of required transmission or access roads capable of supporting construction equipment). Construction of new roads, in locations that have very complex terrain or complex design considerations, would also have adverse environmental impacts.

A comparison of the generation potential and proximity to existing infrastructure for each wind resource area considered in the Ukiah FO RMP (including the area of the project) is provided (Table 1-3). Advances in wind turbine technology have been made since the Ukiah FO RMP was finalized in 2006. Therefore, the capacity of each site would be much higher if developed with contemporary wind turbines. The rationale for eliminating each of the other three management areas identified in Appendix J of the Ukiah FO RMP area from detailed analysis is provided below.

Table 1-3 Summary Comparison of Wind Resource Areas within the Ukiah Field Office Management Area

Management Area[1]	Wind Energy Generation Potential	Proximity to Existing Transmission Line	Adequate Road Access
• Berryessa	• 37.5–66 MW[2]	• Yes	• No
• Geysers	• 16.5–71 MW[3]	• Partial	• Partial
• Knoxville	• 6–10.5 MW[4]	• Yes	• Yes
• Indian Valley/Walker	• 40.33–74.66 MW[5]	• Yes	• Yes

Table 1-3 Summary Comparison of Wind Resource Areas within the Ukiah Field Office Management Area

Management Area[1]	Wind Energy Generation Potential	Proximity to Existing Transmission Line	Adequate Road Access
Ridge (Project site location)			

- Source: BLM 2006
- Notes:
- [1] All locations are considered proximate to a load area because isolated areas were eliminated from consideration in the analysis in Appendix J of the Ukiah FO RMP.
- [2] Based on 2002 data, the estimated wind energy generation potential for the Berryessa Management Area was 37.5–123 MW; however, the Ukiah FO RMP estimated that the likely generation potential would be in the bottom third of this range.
- [3] Based on 2002 data, the estimated wind energy generation potential for the Geysers Management Area was 16.5–180 MW; however, the Ukiah FO RMP estimated that the likely generation potential would be in the bottom third of this range.
- [4] Based on 2002 data, the estimated wind energy generation potential for the Knoxville Management Area was 6–19.5 MW; however, the Ukiah FO RMP estimated that the likely generation potential would be in the bottom third of this range.
- [5] Based on 2002 data, the estimated wind energy generation potential for the Indian Valley Management Area was 6–109 MW; however, the Ukiah FO RMP estimated that the likely generation potential would be in the middle third of this range.

1.5.2.1 Berryessa Management Area

The Berryessa management area covers about 56,000 acres, including about 15,000 acres of public land around Berryessa peak, east of Lake Berryessa. The wind resources within the Berryessa management area include a northern area on a generally north-south oriented ridge and a smaller southern area along amore northwest-to-southeast ridge line. The prevailing wind in the area is generally north to northwest (BLM 2006).

While both the northern and southern areas are located near existing transmission (an east-west alignment between the Central Valley and the California coast and an east-west alignment near the dam at Lake Berryessa, respectively), road access to both resource areas is inadequate (BLM 2006). Because the management area lacks adequate access, a project in this area would be considered economically and technically less feasible when compared to a project with existing access roads. Moreover, even though this management area was analyzed in the reasonable foreseeable development scenario for wind in Appendix J of the Ukiah FO RMP, the management area was designated as an avoidance area for wind energy development applications in the Record of Decision for the Ukiah FO RMP (BLM 2006). This means that in order for a wind energy development application to be considered in the Berryessa management area, there would have to be no other reasonable alternatives for the development.

1.5.2.2 Geysers Management Area

The Geysers management area encompasses approximately 37,000 acres, including 7,100 acres of public land, and straddles the Lake County/Sonoma County line. The wind resources within the Geysers management area are located in a small ridge resource area in the northern portion, a long ridge resource area along the western edge, and a smaller

ridge in the southern portion of the Geysers area. The prevailing wind direction is north to northwest and generally consistent (BLM 2006).

While the northern and western resource areas, which represent 20 percent and 55 percent of the capacity of the resource area, respectively, have access to public roads and transmission, the southern resource area, which represents approximately 25 percent of the capacity of the resource area, lacks public access and transmission (BLM 2006). Similar to the Berryessa management area, the southern resource area of the Geysers management area is considered economically infeasible and potentially technically infeasible due to a lack of existing transmission and transportation infrastructure.

In 2014 a ROW was granted to another wind energy developer for a wind-testing ROW within the Geysers management area (CACA 52341). However, the developer has since relinquished the ROW due to insufficient wind resources and construction constraints. Future development of a wind energy facility within the Geysers area remains speculative.

1.5.2.3 Knoxville Management Area

The Knoxville management area encompasses approximately 35,000 acres, including 24,000 acres of public land, and is located just south of the Cache Creek watershed and north of Lake Berryessa. The wind resources within the Knoxville management area are located in a larger northern resource area on a generally north-south oriented ridge and a smaller southern resource area on a more northwest-to-southeast ridge. The wind direction and frequency are variable (BLM 2006).

Due to wind variability, the estimated wind energy capacity of the Knoxville management area is 6–10.5 MW (BLM 2006), insufficient to support commercial wind energy development. For this reason, the Knoxville management area is considered economically infeasible for development. Future development of a wind energy generation facility within the Knoxville area remains speculative.

1.5.3 Alternative Design Layouts

The range of alternatives may include those based upon input from other agencies, the public, and local community interests. If one or more alternative(s) are identified, and it is feasible and practical, it should be included in the EIS.

A private land holding, adjacent to State Route 20, will be assessed as a potential alternative location for an access road (which may be used as secondary emergency access in the case that Walker Ridge Road is inaccessible during an emergency), Point of Interconnection (interconnect site; switchyard), transmission line, and O&M building. Use of the adjacent parcel may result in reduced use of Land and Water Conservation Fund (LWCF) parcels and Areas of Critical Environmental Concerns (ACEC).

1.6 OTHER FEDERAL, STATE, AND LOCAL AGENCY PERMIT REQUIREMENTS

Other permits and approvals may be required for this project (Table 1-4). Additional studies will be conducted to confirm permit requirements.

Table 1-4 Permits and Approvals that may be Required to Construct the Project

Permit, Approval, or Report	Regulatory Authority	Permit Description	Comments
Federal			
SF 299 – Application for Transportation and Utility Systems and Facilities on Federal Lands (ROW authorization permit)	BLM	This permit serves all energy facilities.	This application starts the process to gain ROW on BLM land (same as the BLM's previous Conditional Land Use permit). SF 299 has been filed already, but additional applications may be required for the transmission line.
EIS	BLM	An evaluation of the project's effects on natural and human resources to determine the potential for significant impacts.	
Fieldwork Authorization	BLM	Pursuant to Sec. 302(b) of P.L. 94-579, October 21,1976, 43 U.S.C. 1732, and Sec. 4 of P.L. 96-95, October 31, 1979, 16 U.S.C. 470cc. Requires that applicant (cultural resources contractor) hold an active Cultural Use Permit issued by the BLM's California State Office.	Authorization to conduct specific cultural resources work, granted by BLM Ukiah Field Office (FO) prior to any field work (e.g., Class III survey of Area of Potential Effect (APE)).
Record of Decision (ROD)	BLM	A ROD documents the decision and rationale of the BLM to grant a ROW for the project.	
ROW Grant and Notice to Proceed	BLM	ROW Type III, Temporary Use Permit, and a Notice to Proceed granted to Colusa Wind by the BLM will allow construction to commence, and maintenance and operation of facilities during the duration of the ROW granted.	
Form 7460 – Notice of Proposed Construction or Alteration	FAA	Required for erecting structures in excess of 200 feet tall.	
National Historic Preservation Act (NHPA) Section 106 Review (36 CFR 800)	BLM	This act requires all federal agencies to consider the effect of their actions on historic properties (those listed in or eligible for inclusion with the National Register of Historic Places). Applies to any federal undertaking, funding, license, or permit. The Advisory Council on Historic Preservation, the California State Historic Preservation Officer, the Tribal Historic Preservation Officer(s), and other consulting parties advise and assist the BLM in this effort.	The Advisory Council on Historic Preservation must be provided an opportunity to comment.
NHPA Section 110; EO11593	BLM	The BLM, following the guidance and standards set by the Secretary of the Interior, will determine the appropriate approach for addressing cultural resources on BLM lands.	1. Archeological contractor needs to complete Class I inventory (e.g., file

Permit, Approval, or Report	Regulatory Authority	Permit Description	Comments
			search for sites within APE). 2. Archeological contractor needs to complete Class III survey of APE.
National Pollutant Discharge Elimination System (NPDES) Construction Activities Storm Water General Permit	State Water Resources Control Board	Required for land disturbance of greater than 5 acres. Permit application needs applicant information; project description, including size of area to be affected; and other environmental permits associated with the project.	As part of the general permit, a Storm Water Pollution Prevention Plan would be required.
Plan of Development	BLM	Plan for construction and operation of energy facilities must be completed prior to construction. Plan provides full project description including applicant information, site location, maps, and proposed operating plan. This plan is not perfected until completion of the EIS.	This document.
Section 401/404 Permit(s)	Regional Water Quality Control Boards/U.S. Army Corps of Engineers	Applies if the project involves the removal or placement of fill (i.e., soil, sediment, or most other material) in or near water bodies of the U.S. If a nationwide permit applies, no permit application is required.	Can be avoided if project remains outside of regulated waters and does not otherwise impact them.
State			
2081 – Endangered Species Incidental Take Permit	California Department of Fish and Wildlife (CDFW)	BLM consults CDFW about species protected under the California Endangered Species Act (CESA). Would require site surveys by qualified wildlife biologists.	Discussions need to be initiated with CDFW about permitting for species listed under CESA. CESA permitting can likely be completed at the same time as United States Fish and Wildlife Service (USFWS) permitting/consultation.
California Fish and Game Code 1600 Lake or Streambed Alteration Agreement	CDFW	Applies if streams are impacted from construction of the project.	Avoided if project remains outside and beyond riparian vegetation of jurisdictional streams. Avoidance is expected given the project's current design.
Hauling Truck and Other Overload Permits	California Department of Transportation	Required for construction hauling.	
Storm Water Discharge Permit	California State Water Quality Control Board	Required for construction site over 5 acres. Authorization to be covered under the	

Permit, Approval, or Report	Regulatory Authority	Permit Description	Comments
		NPDES Construction Permit and approval of a Storm Water Pollution Prevention Plan.	
Local			
Air Quality Permit	Lake County Air Quality Management District and Colusa County Air Pollution Control District	Management of particulates generated by construction at the site is required. Typically, BMPs are employed and will be documented in the permit application.	Includes fugitive dust from grading.
County Use Permit	Lake County Planning Department	Authorizes the construction and use of facilities within the County.	May be required if alternative sites outside of BLM land are proposed and selected.
Building Permits from Lake and Colusa counties	Lake County Planning Department. Colusa County Planning Department.	Authorizes the construction of a structure within the county.	Counties may have no requirements, other than a request for continued information. Lack of permitting, consultation, or approvals needed by either county remains to be confirmed.
Fire Protection Permit	Lake and Colusa counties fire departments	Will require information on fire detection and prevention systems installed at the facility. Also will likely need to consult with fire departments that have reviewed similar facilities.	

1.7 FINANCIAL AND TECHNICAL CAPABILITY OF APPLICANT

Colusa a subsidiary of the Liberty Power Co. (LPCo, , is ultimately owned by its parent Algonquin Power and Utilities Corp. (APUC). APUC is a diversified utility company operating generation, transmission, and distribution assets. Through its two business groups, APUC owns and operates a diversified portfolio of North American rate-regulated and non-regulated electricity, natural gas, and water utility businesses. LPCo intends that Colusa will be the developer and owner/operator of the Project.

The Liberty Utilities business group is APUC's national rate-regulated generation, transmission, and distribution utility which provides electricity, natural gas, and water utility services to nearly 800,000 customers in thirteen U.S. states. With the acquisition of The Empire District Electric Company, the rate-regulated asset portfolio now includes 1.3 GW of generation capacity dedicated to satisfying the electricity needs of Liberty Utilities' distribution customers. Liberty Utilities is committed to reducing customer costs through increased efficiencies and a prudent increase in the amount of renewable energy within the electricity mix delivered to customers. The expanded transmission businesses now include 1,200 miles of electrical transmission lines and 100 miles of natural gas transmission pipelines. Liberty Utilities is focused on delivering increased efficiencies to customers through continued investment in its utility systems and accretive acquisitions, representing more than USD$3 billion in near term investment.

PLAN OF DEVELOPMENT

APUC's Liberty Power business group generates and sells electricity produced by its diversified portfolio of North American renewable and clean energy power generation facilities. Liberty Power's portfolio of non-regulated generation facilities includes more than 1.5 GW of hydroelectric, wind, solar, and natural gas fired generating capacity, delivering renewable and clean energy under long term off-take agreements. Liberty Power creates value through the development of new Greenfield power generation projects, represented by more than USD$2 billion in near term investment.

APUC owns and operates renewable energy facilities throughout North America, with a combined generating capacity of over 1,700 MW. The majority of APUC's renewable assets are located in the United States totaling over 930 MW of wind and solar powered facilities. Of these assets, the majority of APUC's project development experience has been gained with wind energy generation facilities, with a current installed capacity of over 850 MW. APUC commissioned its first wind energy generation facility in 2005. APUC has more recently gained experience as a primary developer in the U.S. for solar energy generation facilities, with a total operational capacity of 80 MW across two projects; the 30 MW Bakersfield facility in California, which was developed in two phases, and the 50 MW Luning facility, located on BLM land, in Nevada. The Luning Solar Energy Center is a 50 MW project that will include construction of a 120 kV power line, approximately 1.6 miles long, from the solar facility to NV Energy's existing Table Mountain Substation. From this point of interconnection, CalPECo can transmit the energy from the Luning Project to delivery points within its service territory. Currently, CalPECo is purchasing 100% of energy requirements under wholesale power purchase agreements. With the new solar facility, the company will generate 25% of its needs using utility owned, renewable generation.

Additionally, APUC is finalized construction on its 75 MW Great Bay solar facility in Maryland in 2018 and continues to build a pipeline of solar development assets across the U.S.

APUC has an industry reputation for safety, quality, and efficiency. Furthermore, APUC takes pride in delivering its projects on schedule, within budget, and fulfilling all contractual obligations to the highest degree possible. APUC's approach to achieving this level of excellence is to maximize the utilization of internal resources while minimizing external costs. This allows development projects to evolve to the point where most major elements and uncertainties of a project are quantified and resolved prior to the commencement of project construction. Major elements and uncertainties of a project include the signing of a power purchase agreement, obtaining the required financing commitments to develop the project, completion of environmental permitting, and fixing the cost of the major capital components of the project. It is not until all major aspects of a project are secured that APUC will begin construction.

APUC is relying on the experience of the following principle team members to lead the design, siting, permitting, financing, construction, and operation of the Project:

- APUC's Vice President of Business Development will lead the design and construction of the proposed Project;
- Chief Development Officer will be responsible for arranging financing;
- Project Manager will be responsible of overall Project Management;
- Senior Director of Energy Projects will oversee the Project siting and permitting;
- Director of Project Planning & Permitting;
- Senior Manager of Environmental Planning and Permitting;
- Director, Electrical Engineer;
- Director, Project Construction.

Table 1-5 lists select U.S.-based utility-scale solar and wind facilities that were designed, built, installed and financed by APUC in the last five years.

Table 1-5 APUC's Recent U.S. Experience as Primary Developer

Facility	State	Technology	Capacity (MW)	Commercial Operation Date
Bakersfield I & II	California	Solar	30	2014 / 2017
Great Bay Solar	Maryland	Solar	75	Q1 2018
Luning	Nevada	Solar	50	2017
Deerfield	Michigan	Wind	149	2017
Odell	Minnesota	Wind	200	2016

APUC's common shares are publicly traded on the Toronto Stock Exchange and the New York Stock Exchange under the trading symbol "AQN". APUC has a long term consolidated corporate credit rating of BBB (flat) from Standard & Poor's (S&P) and a BBB (low) rating from DBRS Limited (DBRS). LPCo has a BBB (flat) issuer rating from S&P and BBB (low) issuer rating from DBRS. Both APUC and LPCo have investment grade credit ratings.

Construction of Facilities

1.8 DESIGN, LAYOUT, AND INSTALLATION

Final project design, including final selection of WTG and project layout, will take place during the final phase of project permitting.

1.9 CONSTRUCTION PROCESS TIMETABLE AND SEQUENCE

Major construction milestones and schedule are preliminary and subject to change depending on a number of factors, including market conditions and equipment availability (Table 1-6).

Table 1-3 Project Construction Schedule Major Milestones

Activity	Date
BLM ROD Published	June 22, 2020
BLM Issue Notice to Proceed	June 23, 2020
Obtain permits	September 2020 December 2020
Begin construction/mobilize to site	June 2020
Assemble/erect WTGs	August 2020 September 2020
Interconnect ready to energize	October 2020
Finalize construction	December 2020

Construction of the project, from mobilization to the site to final completion, is expected to occur during a single build season, from the date of Notice to Proceed to the fourth quarter of 2020. No construction phasing is proposed.

Construction would proceed following receipt of all permits and agency approvals and would include the following activities, listed in approximate order of occurrence (some construction activities will occur simultaneously):

- Completing upgrades of existing roads and construction of new roads;
- Trenching for underground electrical system;
- Surveying, staking, and general site work for the substation and interconnect site;
- Excavating and constructing WTG foundations;
- Constructing the transmission line;
- Assembling and erecting WTGs;
- Electrical commissioning; and,
- Restoring and reclaiming temporarily disturbed areas (see Section 2.14.4).

1.10 GEOTECHNICAL STUDIES

The previous project developer, AltaGas, began detailed geotechnical investigations to determine the final WTG foundation design, road design, and underground electrical system trenching requirements. Colusa anticipates conducting an additional full geotechnical investigation consisting of additional borings, field testing (such as pressure meter testing and geophysical exploration and laboratory testing) at each turbine location. Electro resistivity testing, thermal resistivity testing, cone penetration testing, and a detailed slope stability analysis may also be completed. A copy of Barr Engineering Company's (Barr) preliminary geotechnical investigation is included as **Attachment A**.

The preliminary investigation indicated that it may be possible to use conventional machinery at some turbine locations where heavily fractured rock is present at the surface. The subsurface conditions encountered during the preliminary field work indicated that the foundations will likely bear on sedimentary rock or serpentine. Based on these boring results, only minimal elastic foundation settlement is anticipated. The preliminary foundation design is a 76-foot diameter spread footing tapered to an 18-foot diameter pedestal. The spread footing will be placed 8 feet below grade and backfilled with select fill. Approximately 680 cubic yards of concrete and 63 tons of reinforcing steel will be required per foundation. An alternate design is the patented Patrick and Henderson (P&H) tensionless pier design which incorporates two vertical, concentric corrugated metal pipes (CMP) combined with reinforcing steel, concrete, and post-tensioned anchor bolts. The P&H foundation has an estimated diameter of 16 feet and is installed 32 feet below grade.

1.10.1 Additional Investigations

Prior to final design, a full geotechnical investigation consisting of additional borings, field testing (such as pressure meter testing and geophysical exploration and laboratory testing will be required at each turbine location). Electro resistivity testing, thermal resistivity testing, cone penetration testing, and a comprehensive slope stability analysis will need to be completed. Results of this investigation will be used to inform project design and will thus be needed before the environmental review process for the project can be completed. Therefore, the comprehensive geotechnical investigation will be subject to separate, independent environmental review and is not further addressed in this document as geotechnical studies also require their own short-term authorization, review, and approval from the Authorized Officer before proceeding on public land.

1.10.2 Micrositing

Either prior to or in conjunction with the comprehensive geotechnical investigation, the locations of project elements will be evaluated to identify the most suitable locations. Factors affecting WTG locations include potential for wind

exposure and spacing between WTGs (for maximizing electric energy generation), distance from roads and property boundaries (for safety and noise considerations), and when feasible, avoidance or reduction of potential environmental effects, such as visual effects or impacts on sensitive biological resources.

To begin micrositing, each location will be evaluated for construction suitability based on the factors described previously. A survey crew will locate and stake all project elements. If the location of any project element is determined to have a substantial adverse impact on the environment or to pose obstacles to construction, an alternate location may be evaluated, marked, and located via Global Positioning System coordinates.

1.11 ACCESS AND TRANSPORTATION SYSTEM, COMPONENT DELIVERY, AND WORKER ACCESS

Existing highways and roads would be used to deliver project components, up to and including Walker Ridge Road.

Colusa's site plan uses Walker Ridge Road, Bartlett Springs Road, and new access roads to link WTGs (Figure 2). As needed, Walker Ridge Road and Bartlett Springs Road would be improved to accommodate construction and WTG delivery. Access during construction and operations would be via Highway 20 from the east and west and Walker Ridge Road from the south. Walker Ridge Road would provide the primary access during site evaluation, construction, and operation, and would require radius improvements, and other upgrades.

Colusa will ensure compliance with Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, found in the BLM's 9113 manual. Colusa will develop a Transportation Plan addressing the logistics and safety issues associated with the transportation of WTG components, main assembly cranes, and other large pieces of equipment, and all required permits such as the California Department of Transportation hauling truck permits will be obtained. California State and Colusa and Lake county restrictions will be identified and addressed. The Transportation Plan will identify hazards associated with truck traffic and other traffic flow, and provide measures to mitigate these hazards, such as flaggers, passing lanes, and barriers. The plan will establish a maximum speed limit of 25 miles per hour on the project site. The speed limit will be enforced to promote safety, reduce the potential for impacts on wildlife (e.g., such as those resulting from collisions), and limit generation of airborne dust. Dust control measures are further discussed in Section 2.14.1. The Transportation Plan will also address emergency access. Currently the emergency ground egress from the project area includes either travelling south on Walker Ridge Road to State Route 20, or north on Walker Ridge Road to Brim Road and east to Bear Valley Road, or west on Bartlett Springs Road to the Town of Nice.

1.12 CONSTRUCTION WORK FORCE, VEHICLES, EQUIPMENT, AND TIMEFRAMES

Construction would generally occur between 7 a.m. and 10 p.m., up to seven days per week, for the duration of construction. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities. For example, night work could be anticipated during WTG erection to allow for completion in low-wind conditions. During construction, workers would park in the construction staging area, while delivery trucks may use an existing parking lot, adjacent to Highway 20.

The onsite construction workforce would consist of laborers (skilled and unskilled), craftsmen, supervisory personnel, support personnel, and construction management personnel. The construction workforce is expected to reach a peak of approximately 170 people, with an anticipated overall project average of 150 onsite personnel (Table 1-4, Table 1-5, and Table 1-6).

Table 1-7 Typical Construction Equipment

Construction Equipment	Use
Excavator	Clearing
Bulldozers	Moving fill, clearing, grading
Multiple graders	Cutting subgrade and final grade
Off-road dump trucks	Moving cut or fill material
Compactor	Subgrade
Smooth drum vibrating compactor	Final subgrade and final grade
Large rubber tire rollers	Final grade
Belly dump trailers on tractors	Placing base material
Large excavator	Digging foundation hole
Water truck or other vehicle	Point load testing of foundation bottom
Track hoe	WTG foundation construction
Truck-mounted hydraulic jackhammer	WTG foundation construction
Loader	Backfilling
Small sheepsfoot roller	Compaction of each lift for backfill
Telescopic forklift	Moving and lowering steel into hole; assembling
40–60-ton crane	Lowering anchoring assembly
Graders (maintainers)	Cutting subgrade and final grade on pad; leveling and clearing work along trench line and leveling at completion of backfill
Off-road dump trucks	Moving fill and placing base material
Larger trencher machine	Trenching
Padding machine	Placing cable bedding above and below cable
Remote dual drum compactor	Compacting the trench line in lifts
Smooth drum roller	Final compaction on top
Vertical drill rig	Drilling
Concrete truck or dry mix machine	Pouring concrete
Rotating boom derrick	Holding pole level and in place in preparation for concrete
Pulling trailers and pulling trucks	Guiding the cable
Boom trucks with man baskets	Providing worker access to cables
Rubber tire backhoe	Excavation and loading truck
Vibrating roller	Compaction
Small compaction machine	Compacting around foundation
Cranes (multiple sizes)	Setting breakers, placing transformers, lifting structures

Construction Equipment	Use
Man lifts	Connecting steel electrical structures and installing overhead equipment
Jumping jack	Compaction following pouring of foundation (in small areas)

Table 1-8 Approximate Construction Labor Force

Activity	Trade	# Workers	Hours/ Week	Duration (Weeks)	Total
Staging area	Electrician	3	40	1	120
Foundations – conduit and grounding	Electrician	4	40	8	1,280
Transformers – vault & misc.	Electrician	3	40	8	960
Collection system	Electrician	12	40	10	4,800
Substation	Electrician	8	40	16	5,120
Transmission	Electrician	6	40	6	1,440
Tower wiring	Electrician	12	60	13	9,360
	Electrician Total				**23,080**
Laydown yard	Equipment operator	4	40	1	160
Civil-access roads	Equipment operator	12	40	10	4,800
Foundations-excavation	Equipment operator	4	40	7	1,120
Foundations-backfill	Equipment operator	2	40	7	560
Civil-crane pad	Equipment operator	2	40	7	560
Foundations-equipment-rough terrain crane (2)	Equipment operator	2	50	10	1,000
Foundations-equipment-forklift (2)	Equipment operator	2	50	10	1,000
Substation-civil pad	Equipment operator	4	40	1	160
Electrical trans – clear & grub	Equipment operator	4	40	2	320
Electrical trans – install poles	Equipment operator	5	40	8	1,600
Erection-main erection crane – (operator and oiler)	Equipment operator	2	60	16	1,920
WTG Erection-base/mid (operator and oiler)	Equipment operator	2	60	16	1,920
WTG Erection-Rotor (operator and oiler)	Equipment operator	2	60	16	1,920
Erection- Rough Terrain crane (2)	Equipment operator	2	60	16	1,920
Erection Fork Lift (3)	Equipment operator	3	60	16	2,880
Civil-restoration	Equipment operator	4	40	3	480
	Equipment operator Total				**22,320**
Foundations-rebar	Ironworkers	8	40	8	2,560

Activity	Trade	# Workers	Hours/ Week	Duration (Weeks)	Total
	Ironworkers Total				**2,560**
Unload & erect WTG components	Ironworkers and Millwrights	18	40	18	12,960
	Ironworkers and millwrights Total				**12,960**
Civil-access roads	Laborer	2	40	7	560
	Laborer Total				**560**
Foundations-F/R/P	Laborers & carpenters	15	40	9	5,360
Substation-concrete	Laborers & carpenters	6	40	3	720
	Laborers & carpenters Total				**6,080**
Civil-laydown yard	Truck driver	4	40	1	160
Substation-civil pad	Truck driver	2	40	1	80
	Truck driver Total				**240**
Onsite project staff	Various salaried professionals	10	40	30	12,000
	Various salaried professionals Total				**12,000**
Civil-access roads	Water truck driver	2	40	20	1,600
	Water truck driver Total				**1,600**
	Total			Subtotal	**81,400**
				10% Additional	8,140
				Total Hours	**89,540**

Table 1-9 Approximate Number of Construction and Worker Vehicles

Construction Traffic	Approximate Vehicles Per Week
Construction workers	750
Site security personnel	2
WTG deliveries	55
Steel deliveries	45
Aggregate deliveries	375
Batch plant deliveries	75
Concrete trucks	10
Water deliveries	25
Electrical deliveries	250
General deliveries	250

Construction Traffic	Approximate Vehicles Per Week
Substation deliveries	50
Life of Project	**Vehicles per Week**
Employees	100

1.13 SITE PREPARATION, SURVEYING, AND STAKING

Following micrositing but prior to construction (Section 2.2), a licensed surveyor would conduct a land survey of the project site. Site surveying would be completed to delineate the construction sites, including WTG locations, pad boundaries, substation and O&M facility boundaries, and access road and underground electrical collection system centerlines. Transmission line surveying would delineate the transmission line ROW centerline and boundaries, transmission line tower locations, and access road centerlines. Construction exclusion areas, including cultural resources sites, and environmentally sensitive areas (see Chapter 5) would be field delineated to ensure avoidance during construction in consultation with BLM and Colusa. Typical staking frequency is outlined below.

Walker Ridge Road, Bartlett Springs Road, and New Access Roads would be staked for horizontal and vertical alignment. Centerline stakes are set every 100 ft on straight segments and 50 ft on curves. Stakes are also used to identify other linear elements (e.g., culverts or guard rails). Signage would be placed at interval along the road to notify the public about the presence of construction.

WTG Locations are indicated by a stake at the center point, with outer stakes being located 100 to 125 ft outside of the center point to guide excavations.

Meteorological Tower(s) (MET) center points are staked.

Electrical Collection centerline stakes are set every 500 ft, at a minimum.

Transmission Line centerline and structure locations are staked.

Substation boundaries are staked. Additional staking for pads, fencing, and grading within the boundaries is provided to facilitate construction.

O&M Building boundaries are staked. Additional staking for pads, fencing, and grading within the boundaries is provided to facilitate construction.

Temporary Construction Areas include the construction staging area, crane path, and batch plant site. Boundaries are staked.

1.14 SITE PREPARATION, VEGETATION REMOVAL, AND TREATMENT

1.14.1 Vegetation Removal

Vegetation would be cleared or cut immediately prior to construction, or may be removed in advance to avoid nest construction by birds. Removing vegetation immediately before construction at a given location will limit the potential

for soil erosion and minimize the size of temporary disturbance areas cumulatively. Additional details of measures to prevent erosion are provided in Section 2.14.1.

1.14.2 Noxious Weed Control

Noxious weeds are plants that interfere with BLM land management objectives, as they may invade disturbed areas such as construction sites and may continue to invade for many years following the initial ground disturbing activity. In addition, construction equipment is a known noxious weed vector and can transport weeds to previously weed-free areas or cause the rapid increase of noxious weeds that are already established.

A Noxious Weed Control Plan will be developed and submitted to the BLM for review and approval prior to the start of construction. This plan will focus on transport trailers and trucks coming from locations with harmful weed species. In compliance with the revised BLM Wind Energy Program Policies and BMPs (BLM 2008), this plan will address monitoring, educating personnel about weed identification, methods of spreading weeds, and methods for treating infestations. It will also describe additional precautionary actions stipulated by the BLM, such as the use of certified weed-free mulch and seed, and a controlled inspection and cleaning area if trucks and equipment will be arriving on site from locations with known invasive species problems (including locations within the Project site). Any herbicides will be non-persistent and immobile. Herbicides used will be subject to BLM Standard Operating Procedures and will be taken from the list of approved herbicide formulations. The following are project-specific measures that Colusa will implement to control noxious weeds:

Noxious Weed Risk Assessment Form provides information about the types of weed surveys to be conducted and weed treatment and prevention method schedules appropriate for the types of noxious weeds likely to be present. The form identifies and evaluates the level of noxious weed management necessary.

Herbicide Use Proposal will be prepared and maintained for the project. Colusa will coordinate weed control activities with the BLM Weed Coordinator, particularly regarding proposed herbicide treatments.

Weed Management Plan will be prepared prior to ground-disturbing activities. The plan will identify potential weed infestations at the project site and along the project-associated linear facilities, and will prescribe treatment. Colusa will limit ground disturbance to the minimum necessary to safely construct and operate the project and will avoid creating soil conditions that promote weed germination and establishment.

The BLM requires that an Integrated Pest Management Plan be developed to ensure that the applications will be conducted within the framework of BLM and Department of the Interior (DOI) policies and include only the use of EPA-registered pesticides. Pesticides will be non-persistent and immobile, and would be applied only in accordance with label and application permit directions. Any applications of pesticides would be subject to BLM Standard Operating Procedures, and only approved chemicals would be used.

1.14.3 Clearing and Grubbing

Mechanical clearing and grubbing would precede construction of all new project elements. Within temporary workspaces, vegetation would be maintained at a maximum height of 6 inches for site maintenance and fire-risk management. Vegetation debris would be piled or shredded and distributed in place unless it contains noxious weeds. Erosion control measures would be employed in areas susceptible to erosion.

1.15 SITE GRADING AND EXCAVATION

As described in Section 2.6, site clearing and grading would be done immediately prior to construction activities to minimize the amount of topsoil exposed at any one time. The project environmental review will consider in detail potential effects on regulated resources, which could include cultural and biological resources. Depending on the results of the review, monitors may be present on site during construction to minimize potential adverse effects on these resources.

Roads would generally be designed to have grades lower than 16%; however, when topography requires areas with grades greater than 16%, erosion control measures will be implemented as necessary. Examples of these measures are presented in Section 2.14.1.

1.15.1 Access Roads

Access road construction would begin with site preparation, including the construction of access entryways from public roads. Project design would account for terrain, access, and other engineering requirements (including safety of construction and maintenance activities), but would generally follow these criteria:

- General dimensions of access roads and crane paths are given in Table 1-2.
- Turning radius for WTG part delivery would be 175 feet wherever possible, but 150 feet if necessary because of physical constrictions.
- Road surfaces will include approximately 8 inches of aggregate material on top of the base.
- Speed limits would be 15 mph on new access roads and 25 mph on Walker Ridge and Bartlett Springs Road.

Roads would be constructed in multiple phases, starting with rough grading and leveling. Once rough grading is completed, crushed native material or offsite aggregates will be placed and compacted to create a road base. Upon completion of heavy construction, a final pass would be made with the grading equipment to level road surfaces, and more capping rock would be spread and compacted as necessary to repair damage from construction traffic. Side ditches would be excavated as needed to allow for natural drainage of water away from the road surface and to reduce the potential for erosion. Excavated soil and rock would be used for road construction, construction fill, and excess materials may be distributed on site in engineered stockpiles. Additional details of measures to control erosion are provided in Section 2.14.1.

Roads would be constructed in the following sequence:

- Stake row centerline and boundaries of roads as necessary for construction.
- Install temporary stabilization features, such as silt fences, straw wattles, and other controls, at the limits of construction.
- Clear and grub area associated with road.
- Separate and stockpile topsoil for later use.
- Grade roads to slopes/design indicated on construction drawings.
- Distribute excess cut along the project site.
- Compact sub-grade.
- Install aggregate road surface.
- Re-vegetate disturbed areas associated with roadway corridor.
- Remove temporary stabilization measures once final stabilization/re-vegetation is established.

1.15.2 Foundation Excavation

WTG foundations will be concrete with steel reinforcement (rebar). Foundations design would be dependent on soil and subsurface conditions as determined during the final geotechnical investigations. Concrete would be supplied from an onsite batch plant located within the construction staging area, which would receive materials from offsite sources. Results of the preliminary geotechnical investigation indicate that excavation of the subsurface material across most of the site can be achieved by ripping and conventional excavating machinery. Blasting is likely to be required for foundation excavation in areas of competent rock. Based on the results of the preliminary geotechnical investigation, it anticipated that the foundations will bear directly on heavily fractured rock.

The construction process for the tower foundations could vary depending on engineering requirements and soil conditions. A typical process follows:

- Clear and grade surveyed WTG location with a bulldozer.
- Excavate foundation hole with a track hoe or blast as necessary.
- Loosen any rock with a hydraulic jackhammer.
- Complete excavation of foundation hole with track hoe.
- Pour 3-4 in thick concrete base mat.
- Install and set outer forms.
- Construct rebar mat and pedestal anchor bolt cage.
- Place base foundation concrete.
- Assemble forms in place for pedestal, place concrete for pedestal, allow to set, and remove forms.
- Backfill, re-grade, and prepare WTG erection area.

1.16 SELECT FILL, AND CONCRETE NEEDS AND SOURCES

Select Fill (i.e., proper soil or aggregate material) and concrete would be needed for various project elements. Select Fill will be needed for footprint areas surrounding the substation and WTGs, as well as for any permanent parking areas and access roads.

Upon completion of the final engineering design, sources of Select Fill, aggregate, and concrete would be identified. It is anticipated that these materials would be obtained from excavated native material or offsite permitted sources such as rock pits and concrete mixing plants.

1.17 WIND TURBINE ASSEMBLY AND CONSTRUCTION

WTG towers come in 3 to 6 sections along with the nacelle, rotor and blades, and the controller. Construction would involve establishing temporary work areas at the southern end of Walker Ridge road and at each WTG site for delivery, staging, and assembly of components (see Table 1-2 for general dimensions of temporary work areas). At each turbine location, a crane pad would be constructed to facilitate lifting the components into place, and WTGs would occupy a permanent gravel pad established within the temporary work area. Crane and WTG pads will be graded flat, compacted, and graveled. When construction is complete, a minimal area of each crane pad would be retained for O&M functions such as parking of maintenance vehicles or use during replacement or repair of major project components. The perimeter of the turbine and crane pad areas, including collector trenches and all adjacent disturbed areas up to the edge of the road shoulder will be allowed to revegetate by natural recruitment of surrounding vegetation, although the gravel substrate may be left in place.

1.18 OPERATION AND MAINTENANCE FACILITY CONSTRUCTION

The Project includes an O&M facility that contains a building, small structure for spare parts, covered parking garage for maintenance vehicles, parking lot, drive lanes, landscaping, and site fencing; see Table 1-2 for general dimensions of the O&M facility site; see Figure 6 for general dimensions of the O&M building). Construction of the O&M building would involve conventional construction techniques, with the erection of the building on a concrete foundation. Typical construction activities are:

- Survey/stake site;
- Clear/grade the site;
- Construct concrete foundations designed for the local soil conditions;
- Erect structures and exterior enclosure;
- Install interior equipment and finishes;
- Install gravel or asphalt parking area and drive lanes; and,
- Landscape and fence site.
- During use as a temporary staging area, a specific site would be designated as a helicopter landing pad in case of emergency evacuation. Alternate sites at turbine pads and/or along access roads are expected to be available throughout the project construction period.

1.19 ELECTRICAL CONSTRUCTION ACTIVITIES

1.19.1 115kV Transmission Line

The transmission line would run adjacent to Walker Ridge Road before it diverted to the Switchyard/interconnection point located in the southern portion of the project ROW. The transmission line will be installed underground or overhead. If the overhead option is selected, the transmission line will be placed on wooden H-frame structures, wooden or steel monopoles, or lattice towers, depending on the spans required and availability of components at the time of construction.

1.19.2 Underground Collection

Colusa would install a 34.5 kV underground electrical collection system. The underground electrical collection system connects each WTG to the substation. Trenches will be located within the road corridor, either in the road itself or just to the side. The depth of power cable will be 36 inches minimum, fiberoptic cable will be buried in the same trench at lesser depth around 24 inches. The minimum trench width will be 24 inches for a single circuit collection leg. The legs of multiple circuits will either be in wider trenches or multiple trenches of approximately 24 inches wide. Trenches would be excavated with a trenching machine; however, if competent rock is encountered at shallow depth, it would be necessary to jackhammer rock locally or drill and blast sections to open up a trench. In locations where two or more sets of underground lines converge, underground vaults and/or pad-mounted switch panels would be used to tie the lines together into one or more sets of larger feeder conductors. These large conductors, called “home runs,” would be buried in the same manner as the individual conductors with additional spacing from other conductors. The WTG configuration proposes four underground feeder circuits with an estimated 87,800 linear feet of buried cable.

Electrical collection cables would be installed adjacent to roads. After installation of the underground electrical collection system the temporary impact areas would be restored.

1.19.3 Substation

The electrical substation would be located on a graveled site within the temporary staging area.

Typical construction activities would include:

- Survey/stake site;
- Clear/grade site;
- Construct concrete foundations for substation equipment;
- Install base gravel across site; and,
- Install substation components, including circuit breakers, power transformers, bus and insulators, disconnect switches, relays, battery and charger, surge arrestors, alternating and direct current supplies, control house, metering equipment, Supervisory Control and Data Acquisition (SCADA), grounding (the computer system monitoring and controlling the wind farm), associated control wiring, and fencing.

During use as a temporary staging area, a specific site would be designated as a helicopter landing pad in case of emergency evacuation. Alternate sites at turbine pads and/or along access roads are expected to be available throughout the project construction period.

1.20 AVIATION LIGHTING (WIND TURBINES, TRANSMISSION)

A FAA Form 7460, Notice of Proposed Construction or Alteration, will be submitted to the FAA to identify any required air safety measures. Colusa will comply with the FAA's aircraft safety lighting requirements for structures greater than 200 feet tall. In compliance with recent FAA guidance for wind energy projects, L-864 red flashing lights with a minimum intensity of 2,000 candelas would be installed on the WTGs and operated at night to alert aviators to the presence of the project. Currently, it is anticipated that a lighting package consistent with FAA requirements lights would be installed on each tower, as necessary, while the nacelle was on the ground. Additionally, one FAA light may be required at each of the MET(s).

1.21 SITE STABILIZATION, PROTECTION, AND RECLAMATION PRACTICES

Construction has the potential to affect surface waters, particularly during site clearing and grading activities when vegetation is removed and/or disturbed. The affects are triggered by activities that result in soil exposure, which increases the potential for erosion. Erosion may and cause pollutants and sediment to enter down slope water bodies during periods of precipitation. Erosion potential would be greatest during construction, when large areas of soil would be disturbed.

Pursuant to guidelines given in the revised BLM Wind Energy Policies and BMPs (BLM 2008), Colusa will implement the following site stabilization, protection, and reclamation practices:

- Limiting construction disturbance by clearly identifying and minimizing work areas;
- Using existing roads in lieu of building new roads;
- Minimizing the overall number and size/length of project elements; and,
- Minimizing vegetation removal.

Each of these elements—site stabilization, protection, and reclamation—are discussed below.

1.21.1 Site Stabilization: Erosion and Sediment Control

To minimize impacts to water quality, erosion and sediment control measures would be implemented through an Erosion and Sediment Control Plan which will be developed for the project and will be an appendix to the approved final POD. Construction activities would incorporate the following general practices:

- Sequencing construction activities with the installation of erosion and sediment control measures;
- Installing straw mulching and re-planting vegetation in disturbed areas;
- Retaining original vegetation where possible;
- Directing stormwater runoff away from denuded areas;
- Minimizing constructed slope steepness and length to keep runoff velocities low;
- Protecting slopes susceptible to erosion by installing erosion controls such as straw bale barriers and gravel bags; and,
- Stabilizing non-active areas following completion of construction.

During construction, erosion would be controlled and sediment retained on site by the implementation of BMPs. BMPs will be developed by considering drainage, topography, soil type, and other variables as appropriate for the construction season. Sediment control measures would include use of straw bale barriers, silt fences, and vegetated strips to reduce sedimentation and installation of barriers such as sediment traps, berms, ponds, and dams to direct and collect sediment and prevent it from entering waterways. Drainage pipes and inlets/outlets would be protected using engineered ditches and sloped aprons (contoured concrete structures that direct water flow) around rip-rap pipes. In vulnerable areas such as steep slopes and areas with erosion-susceptible soil, a multitude of techniques would be employed to control erosion and runoff. Where sediment barrier devices are used, BMPs would vary by drainage area as follows:

- **Drainage areas less than or equal to 2 acres:** temporary diversions, filter fabric, or straw bale barriers.
- **Drainage areas greater than 2 acres and less than or equal to 5 acres:** sediment traps.
- **Drainage areas greater than 5 acres and less than or equal to 150 acres:** sediment basins.

Pumping suspended or re-suspended sediment can result in pollution of water bodies from sedimentation and contaminated runoff. Therefore, water pumped from the site would be treated by temporary sedimentation basins or other appropriate practices.

An Erosion and Sediment Control Plan (ESCP) would be prepared before construction activities begin. The Plan will describe details and locations of conveyance systems, detention BMPs, and erosion and sediment control facilities. The ESCP is a component of the SWPPP, which is discussed in Section 2.14.2. The ESCP would be prepared in accordance with applicable erosion and sediment control statutes and will incorporate erosion and sediment control measures required by agency permits.

During the first year following construction and/or until vegetation had been re-established, Colusa would monitor the project site for erosion, particularly after precipitation. If erosion is observed, Colusa would take corrective actions in accordance with the NPDES permitting requirements.

1.21.2 Site Protection: Stormwater Control

Point and non-point stormwater discharges would be managed in accordance with the SWPPP and NPDES permits. A detailed construction SWPPP will be developed prior to the start of construction to minimize the potential for discharge

of pollutants during construction. Site-specific BMPs will be identified for the project area and designed to meet appropriate regulatory requirements. They will include both temporary and permanent BMPs that would be implemented through the construction and operation phases. BMPs for controlling pollutants and runoff include:

- Diverting flow around a disturbed area would reduce erosion and sediment transfer when a disturbed area cannot be stabilized immediately. Diverting runoff from the disturbed area would also prevent pollutants from exiting the disturbed area.
- Managing overland flow or "sheet flow" involves temporary and permanent measures to limit runoff and sediment transfer, such as silt and straw fencing and planting of grass seed or ground cover or installation of lawn cover (sodding).
- Maintaining permanent drainageways involves stabilizing areas of concentrated flow by seeding and sodding, constructing grassed waterways, or using geotextiles to construct rock- and concrete-lined waterways.
- Protecting inlets involves the construction of catch basins, culverts, and other conveyance structures to prevent pollutants from contaminating water bodies. Local agencies responsible for maintaining water quality typically require that all storm drain inlets be protected by using straw bales, filter fabric, or an equivalent barrier.
- Preventing tracking involves ensuring that sediment which is "tracked," or transported onto roadways via vehicles and construction equipment is minimized as tracked sediment carries a high risk of subsequently contaminating water bodies. These pollutants would be controlled by using wheel washes and installing sediment collection devices alongside roadways.

1.21.3 Inspection and Compliance Monitoring

1.21.3.1 Site Inspections

During construction, Colusa or its agent would conduct site inspections every 14 days and within 24 hours after 0.5-inch of rain. The onsite project manager, or designated representative, would conduct the rainfall inspection or notify the site inspector that a rain event causing runoff had occurred and an inspection was needed. Portions of the site that had been temporarily or permanently stabilized would be inspected once each calendar month until the Notice of Termination was submitted. The inspections could be reduced to once per month when runoff was unlikely due to winter conditions.

Colusa or its agent would conduct the inspections as specified in the SWPPP. Colusa' agents might include contractor personnel or other qualified individuals, who would be listed in the project contact information section of the Delegation section of the SWPPP. The following would be completed during each inspection:

- Record date and time of inspection;
- Record name of person(s) conducting inspection and their qualifications;
- Record rainfall records since most recent inspection;
- Inspect the site for excess erosion and sedimentation;
- Inspect the site for debris, trash, and spills;
- Inspect temporary erosion and sedimentation control devices;
- Inspect construction entrances for sediment tracking onto paved streets;
- Inspect the adjacent streets, curb, and gutter for sediment, litter, and construction debris;
- Inspect site runoff outfall or discharge areas;
- Record findings of inspection, including recommendations for corrective actions;
- Record corrective actions taken (including dates, times, and party completing maintenance activities);
- Record changes made to the SWPPP, as required in paragraph IV.D.2 of the General Permit within 7days of inspection; and,
- Certify/sign inspection reports.

1.21.3.2 Maintenance of BMPs

Colusa or its agent/contractor would be responsible for the operation, maintenance, and inspection of temporary and permanent water quality management BMPs, as well as all erosion prevention and sediment control BMPs, for the duration of construction. The controls in place would be maintained to ensure compliance with the SWPPP.

Criteria used to determine whether the erosion and sediment control devices require maintenance, repair, or replacement would be:

- If sediment control devices such as silt fence or fiber rolls (wattles) were filled to 1/3 of the height of the control device, the contractor would remove all sediment within 7 days of detection or notification.
- If inlet/culvert protection devices appeared plugged with sediment, were filled to 1/3 capacity, or were surrounded by standing water, the contractor would remove the sediment and clean or replace the filter within 7 days of detection or notification.
- If the gravel construction entrances were filled with sediment or otherwise failing, the contractor would either replace the entrance or add additional gravel within 3 days of detection or notification.
- If sediment is observed on roads, the contractor would remove the sediment within 3 days of detection or notification.
- If sediment were observed on roads, in surface waters, or on other properties, the contractor would identify the source and discharge location of the sediment and implement additional erosion and sediment controls at those locations to prevent future discharges. Sediment must be retrieved within 7 days from surface waters unless additional regulatory approvals are needed. The operator would be responsible for contacting all local, regional, state, and federal authorities to obtain any applicable permits prior to conducting any work to remove sediment that had been discharged from the site.
- If excessive sediment or debris were observed at the flared end section outfalls, the contractor would determine the source and discharge locations of such materials. If the discharge had occurred on the property, the contractor would remove the sediments and debris within 7 days of notification and correct the source of such materials.

1.21.4 Reclamation Plan

Colusa will develop a Site Reclamation Plan for the restoration of all areas temporarily disturbed by the project. This plan would be implemented immediately following completion of construction for those areas disturbed during construction, including temporary roads, staging areas, and transmission line corridors. The plan will include the following provisions:

- Reclamation of all areas of disturbed soil using weed-free native grasses, forbs, shrubs, and topsoil salvaged from all excavations and construction activities;
- Re-vegetate with the site seed mix within 30 days of completion of final grade and surface; and,
- Specification of the proper seasons and timing of restoration and reclamation activities to facilitate success.

In addition, the plan will include procedures for annual reporting and an implementation and monitoring schedule.

Decommissioning would be completed in compliance with the revised BLM Wind Energy Policies and BMPs (BLM 2008) specific to decommissioning, as summarized below:

- Prior to the termination of the ROW authorization, a Decommissioning Plan will be developed and approved by the BLM. The plan will include site reclamation and monitoring.
- All management plans, BMPs, and other stipulations developed for the construction phase will be applied for similar activities during decommissioning.

- All WTGs and other project structures will be removed from the site.
- Where available, topsoil from all decommissioning activities would be salvaged and reapplied during final reclamation.
- All areas of disturbed soil will be reclaimed using weed-free native shrubs, grasses, and forbs.
- All vegetation cover, composition, and diversity will be restored using seeds and plants of appropriate local provenance to restore disturbed areas to original conditions commensurate with the ecological setting.

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2.0 RELATED FACILITIES AND SYSTEMS

2.1 COLLECTION AND TRANSMISSION SYSTEM

2.1.1 Existing and Proposed Transmission System

2.1.1.1 Electrical Collection System

The Project would include an underground electrical collection system that would include lines between WTGs in underground trenches. The length of trenching is estimated to be 16 miles, with trenches measuring approximately 2-3 ft wide and a minimum of 3 feet deep. Up to 25 feet of temporary disturbance by construction may occur on either side of the centerline. Where feasible, these trenches will be located within planned or existing roadways/ roadway shoulder to limit the extent of disturbed areas that would require restoration of vegetation. In locations where two or more sets of underground lines converged, underground vaults or pad-mounted switch panels would be used to tie the lines together into one or more sets of feeder conductors. Large conductors, called “home runs,” would be buried in the same manner as individual conductors, with additional spacing from other conductors. The amount of spacing between conductors would depend on final design but typically ranges from 5-10 ft. After installation of the underground electrical collection system is complete and final grading has taken place, the disturbed areas would be restored and reseeded. Please refer to Table 1-2 for anticipated temporary and permanent disturbance acreages and dimensions.

2.1.1.2 Substation and Interconnect Station

The underground electrical collection system would be stepped up from 34.5 kV to 115 kV at the project substation. The substation would be constructed adjacent to Walker Ridge Road, within the grading limits. The substation is necessary to increase the voltage of the 34.5 kV underground collection system to the 115 kV required for interconnection with the overhead transmission line. A grounding system would be designed in accordance with all applicable codes and standards to protect equipment and personnel from available fault currents.

In addition to the substation, a transmission interconnection station would be constructed at one of four potential sites (Figure 5). The interconnect station would be used to tie in to the existing PG&E’s Cortina – Eagle Rock or Cortina – Mendocino 115 kV transmission lines at an interconnection site in the southern portion of the project site (see Figure 2 for proposed alternatives for interconnect location). Please refer to Table 1-2 for general dimensions of the substation and interconnect station and anticipated temporary and permanent disturbance acreages associated with each.

2.1.1.3 Transmission Line

In addition to the underground electrical collection system and substation, an overhead transmission line would be constructed with an estimated minimum height of 30 feet above ground level. The transmission line would run from the Colusa substation to one of the four potential interconnect locations proposed (Figure 2). Installation of the overhead transmission line would involve clearing areas where the transmission ROW does not follow Walker Ridge Road and at each transmission pole/tower. Once the transmission ROW and pole/tower sites are cleared, a road to each tower location may be graded to facilitate equipment access for construction (refer to Table 1-2 for anticipated disturbance acreages).

A vehicle-mounted power auger or backhoe would be used to drill or excavate holes for placement of foundations for an estimated 80 to 100 poles/towers. In rocky areas, the holes may need to be excavated by a backhoe. Concrete and anchor bolt foundations may be used for some of the transmission pole/towers. At these sites, cast-in-place footings would be installed by placing reinforcing steel and anchor bolt clusters into the foundation hole, positioning the anchor bolt cluster, and encasing it in concrete. Excavated spoils would be used for fill where suitable. Foundation excavation and installation would require access to these sites for construction equipment. Where concrete is required, the concrete chutes would be washed in a depression created within the transmission line work area. After the chute had been washed into the hole, the excavated soil would be replaced and the area reseeded.

The transmission towers would be erected using a crane or a backhoe with a claw attachment. The installation equipment would depend on the site conditions and type of pole/tower being installed. After the transmission line pole/towers are erected, they would be trimmed out with brackets and insulators, and conductor.

After construction of the overhead transmission line, temporary work areas would be reseeded. An overland path would remain for inspection and maintenance.

2.1.2 Status of Power Purchase Agreements

The Project continues discussions with potential off-takers. Colusa intends to submit the project into California utility Requests for Offers throughout 2019.

2.1.3 Status of Interconnect Agreement

Colusa has continued the Phase 2 of the CAISO regulated interconnection process started by the project's previous owner (AltaGas). Colusa executed the Large Generator Interconnection Agreement (LGIA) in December 2018.

2.1.4 General Design and Construction Standards

The project would be designed in accordance with federal and industrial standards, including:

- American National Standards Institute;
- American Society of Mechanical Engineers;
- International Building Code;
- Institute for Electrical and Electronic Engineers;
- International Energy Conservation Code;
- National Electric Safety Code;
- National Electric Testing Association;
- National Fire Protection Association;
- Occupational Safety and Health Administration; and,
- Uniform Mechanical Code.

Construction would be performed in accordance with the federal codes and standards listed above and all applicable state and local codes; specifically, Chapter 5 of the building regulations of the Lake and Colusa county codes.

2.2 METEOROLOGICAL TOWERS

Colusa expects to construct three MET(s), consisting of a guy-less pole or lattice tower secured by a concrete foundation (see a typical MET drawing in Figure 8). The MET(s) would be equipped with multiple sensors (anemometers) to measure ambient weather conditions and to evaluate the performance of WTGs. The tower(s) would include two sets of mast instrumentation at various heights, and one FAA safety light. The following tasks are expected for MET(s) installation:

- Survey and stake site;
- Clear and grub site;
- Grade site;
- Install foundations by excavating, placing rebar, placing forms, and pouring cement;
- Install grounding equipment;
- Install communications and electrical lines; and,
- Erect MET(s).

3.3. COMMUNICATIONS SYSTEM REQUIREMENTS DURING CONSTRUCTION AND OPERATION

During the installation of the underground electrical collector system, fiber optic communication lines would follow the underground electrical collector system and the overhead transmission system. The communication lines would link each WTG and MET to the substation and O&M facility, which would house the SCADA system. During the operations phase, the SCADA system would allow individual WTGs and other project elements to be monitored and controlled both on site (in the O&M facility) through the central host computer and from remote locations. SCADA design, specifications, installation guidelines, and field routing approval will be required from the turbine supplier.

Hard-wired (land-line) systems for operational use would be installed during the completion of electrical construction activities. Additional fiber optic lines (and/or microwave towers added to other structures) would be required for the operational phase of the project, capable of transmitting data to Colusa, PG&E, or other regional utilities. During construction, cellular or satellite communication technology would be used for both internet and telephone systems.

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Generic Meteorological Tower Layout

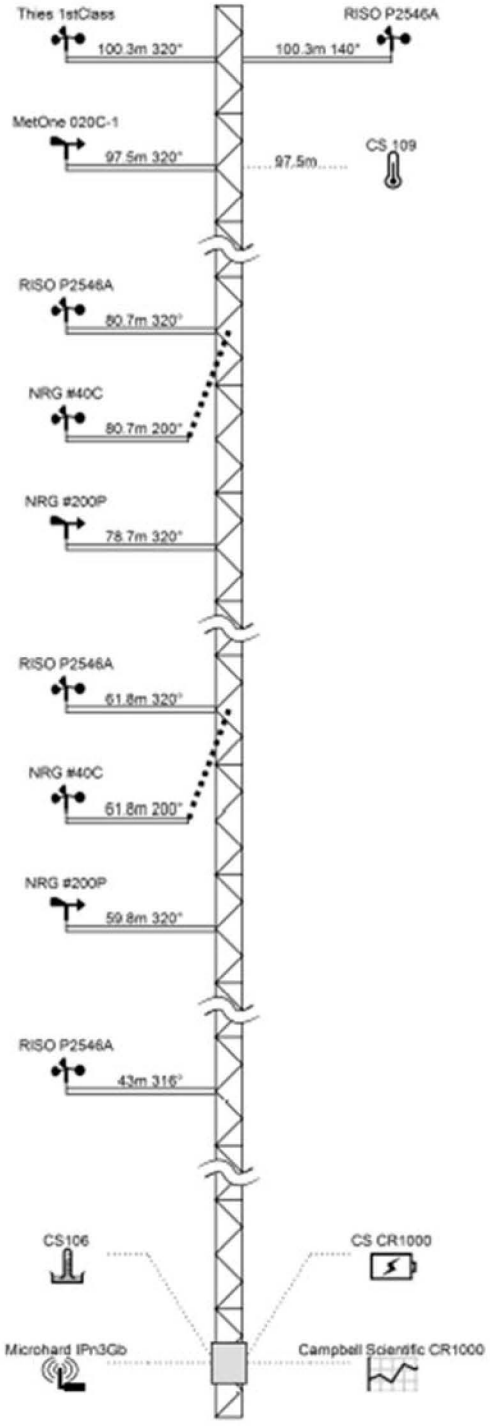

Figure 8: Typical Meteorological Tower Layout

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3.0 OPERATION AND MAINTENANCE

3.1 OPERATION AND FACILITY MAINTENANCE NEEDS

The operation phase of the Project would involve management of power production and maintenance of WTGs, MET(s), access roads, and transmission lines. Approximately two to three maintenance staff located at the O&M facility would supervise and monitor the project daily.

Colusa expects to execute a long-term service and maintenance agreement with a qualified turbine manufacturer for a period of 10 to 15 years. WTGs are scheduled for routine maintenance, consisting of visual inspections and grease, electrical, and mechanical maintenance. These onsite maintenance checks would be completed with a standard 4x4 truck and mobile equipment and are estimated to occur monthly at each turbine.

3.2 MAINTENANCE ACTIVITIES, INCLUDING ROAD MAINTENANCE

Routine maintenance would be necessary to maximize performance and address potential operational defects. Project O&M protocol would be established to specify routine maintenance and inspection activities, in accordance with the program developed by the WTG manufacturer. Scheduled maintenance would be conducted as required on each WTG. On average, each turbine would require approximately 40 to 50 hours of scheduled mechanical and electrical maintenance per year, which would result in turbines having idle periods of one to three days during each maintenance event. O&M personnel would perform routine maintenance, including replacing lubricating fluids periodically, checking parts for wear, and downloading data from anemometers. All roads, pads, and trenched areas would be inspected regularly and maintained to minimize erosion. Project staff would maintain the BLM land portion of the project site as required by the ROW Agreement. The maintenance of some project infrastructure (roads, power lines, and substation) may be contracted to local service providers.

Each WTG would be monitored continuously, and all monitoring data would be available to the Colusa via a communications link. This remote communication will use the SCADA monitoring system, which continuously monitors and alarms the wind energy facility when maintenance workers are not on site. Using information acquired from the monitoring system, staff at the control center would direct any necessary maintenance. The SCADA system can also be used to remotely shut down a WTG, if necessary.

3.3 DECOMMISSIONING

Decommissioning of the Project is not anticipated, because the project is expected to be repowered (i.e., old or obsolete WTGs replaced with newer models or technology) after the anticipated 40-year operation period. However, if the project has to be decommissioned, impacts for decommissioning would be analyzed at the time of termination. All components would be dismantled and removed from the project site, and the area would be returned to a pre-project condition. Removal of facilities would be the responsibility of the grant holder.

3.4 OPERATIONS WORKFORCE, EQUIPMENT, AND GROUND TRANSPORTATION

The Project would be in operation continuously. The O&M team would staff the Project during core operating hours 8 hours per day, 5 days per week, from 8 a.m. to 5 p.m. with weekend shifts and extended hours as required. O&M would require approximately 2-3 personnel throughout the life of the project. The Project's central SCADA system would stay online at all times. The Project would require asset management and project planning, preventive and corrective maintenance of the WTGs, preventive and corrective maintenance of the electrical collection system and substation, and direct operations dispatch to ensure continuing plant and transmission system safety and reliability.

Optimization software would remotely scan each WTG daily to ensure that operations are proceeding efficiently. Any problems would be promptly reported to O&M personnel, who would perform both routine maintenance and most major repairs.

Maintenance of the WTGs would be performed by the turbine manufacturer for the duration of the warranty period. Most servicing would be performed without using a crane to remove the turbine from the tower. The manufacturer typically requires maintenance on a rotating six-month schedule of inspections, specific testing, and minor parts replacement. Different manufacturers use different criteria to determine proper maintenance staffing levels; however, one maintenance technician is generally needed for every six to eight turbines. Therefore, it may be inferred that two to three people would be involved in the day-to-day management, operation, and maintenance of the facility. Major component failures (blades, gearbox, generator, and transformer) are rare, but could all be repaired by site maintenance personnel using special tools and a large mobile crane.

All WTGs, collection and communications lines, substations, and transmission lines would be operated in a safe manner according to standard industry operation procedures. Additional personnel would be used to test and maintain the electrical collection system and substation on a recurring basis, but these infrequent duties would be likely to be allocated to electrical subcontractors or local utility crews. Additionally, all pads and trenched areas would be regularly inspected and maintained to minimize erosion.

During normal O&M, daily traffic to and on the site would involve two vehicles. During construction and O&M, Colusa would use water as necessary for dust abatement.

It is anticipated that road maintenance would occur twice per year to fill in depressions by placing additional gravel, compacting the existing sediment, or grading as needed. More frequent maintenance may be necessary to maintain roads in a condition acceptable to the BLM. Access roads would be maintained during O&M to prevent off-road detours due to ruts, mud holes, or landslides.

4.0 ENVIRONMENTAL CONSIDERATIONS

4.1 GENERAL DESCRIPTION OF SITE CHARACTERISTICS AND POTENTIAL ENVIRONMENTAL ISSUES

The project site was selected due to its close proximity to existing PG&E transmission lines and the existence of suitable roads and pre-disturbed areas. These include CalFire fire breaks, widened portions of Walker Ridge Road and Bartlett Springs Road, unimproved parking, and firefighting equipment staging areas. The site is also ideal given its proximity to an existing load center (the San Francisco Bay area), and its wind energy generation potential (Blue Ridge Berryessa Natural Area [BRBNA] 2005). Relative to the other BLM management areas identified as having wind energy potential, the project site has fewer impacts on human and environmental resources and is the most economically feasible alternative.

The majority of the Project site is comprised of steep terrain and ridgelines covered by chaparral with a small amount of woodland vegetation. The area of the project ROW is under the jurisdiction of the BLM's Ukiah FO. The BLM property area is unpopulated, and is used for various forms of outdoor recreation including camping, hiking, boating, fishing, hunting, and wildlife viewing (RMP; BLM 2006). For a further justification of the Walker Ridge site's selection, refer to Section 1.3.

4.1.1 Protected or Special-Status Species and Habitats

The region surrounding Walker Ridge contains a diverse ecological community including serpentine chaparral, grasslands, oak woodlands, and endemic species.

Several plant and animal species that may occur at Walker Ridge are classified as threatened or endangered by the federal government (USFWS) or the state (CDFW) or are otherwise categorized as being of elevated conservation concern. Such species include CDFW "species of special concern" or "fully protected" and BLM "sensitive" species, or those that appear on various "watch" lists maintained by non-government scientific groups. Collectively, these species are referred to herein as "special status species." The Ukiah FO's diverse landscape provides habitat for several special status plants. The most notable among these depend on (are obligates of) the area's specific geologic features and soils.

Because of the particular geology and public access available on the BLM lands, botanists use the area for study. As a result, many special status plants have been documented within the FO's boundaries that may otherwise not have been documented. The BLM maintains a list of species it considers to be special status statewide. This list is based on the California Native Plant Society's (CNPS) 1B list and also on federal and state lists of threatened and endangered plant species.

The California Natural Diversity Database (CNDDB) maintained by the CDFW identifies plant and wildlife species that are sensitive, rare, threatened, or endangered. This database was consulted to confirm the potential presence of any such species within the project area; however previous studies have confirmed that there are no known occurrences species listed as threatened or endangered under the Endangered Species Act, or the California Endangered Species Act. Table 4-1 was generated based on species recorded within 5 miles of the project site (see also Figure 9).

Table 4-1 Special Status Plant and Wildlife Species that May Occur within the Project Area

Scientific Name	Common Name	Federal and State Status[1]	Other Status[2]	Potential On Site[3]	Comments on Habitat and Occurrence[4]
Brodiaea coronaria ssp. rosea	Indian Valley brodiaea	SE	1B.1	Moderate–High	In closed-cone coniferous forest, chaparral, cismontane woodland, and valley-foothill grasslands, between 335 and 1,450 m. Blooms May–June. Very narrow range from Tehama to Lake counties. Known from fewer than 20 occurrences.
Eriastrum tracyi	Tracy's eriastrum	SR	3.2	High	In chaparral, cismontane woodlands, and grasslands between 315 and 1,780 m. Blooms May–July. Large range of counties including Lake and Colusa counties.
Lupinus milo-bakeri	Milo Baker's lupine	ST	1B.1	High	In cismontane woodlands (often along roadsides) and grasslands, between 395 and 430 m. Blooms June–September. Found in Colusa and Mendocino counties.
Haliaeetus leucocephalus	Bald eagle	SE	CDFW FP, BLM S	Moderate–High	No nesting habitat present in the project area, but the species is known from the immediate vicinity. Widely distributed throughout the U.S., but normally a winter resident or migrant in California. Nesting occurs in forested habitats within a few miles of coastlines or large freshwater bodies. Aerial surveys in 2018, conducted within 10 miles of the project area, identified three nests between 1.9 and 2.6 miles away, primarily along the shores of the Indian Valley Reservoir which is west of the project area. Aerial surveys conducted in 2019 identified five nests within 10-miles of the project.
Aquila chrysaetos	Golden eagle (nesting)	None	CDFW FP, WL, BLM S	High	No nesting habitat present in the project area, but the species is known from the immediate vicinity. Resident throughout Western U.S. Nests on cliffs and in very large trees. Forages on plains, open scrublands, or woodland habitats. Aerial surveys in 2018, conducted within 10 miles of the project

Scientific Name	Common Name	Federal and State Status[1]	Other Status[2]	Potential On Site[3]	Comments on Habitat and Occurrence[4]
					area, identified five nests between 5.5 and 8.9 miles away, primarily along the ridges east of Bear Valley, which is east of the project area. Aerial surveys in 2019 identified at least five active nests.
Rana boylii	Foothill yellow-legged frog	SCT	CDFW SSC, BLM S	High	Rocky waterways with open, sunny banks in forests, chaparral, and woodlands. Can also be found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools.
Emys marmorata	Western pond turtle	None	CDFW SSC, BLM S	Moderate	Permanent or nearly permanent deep, slow moving water features that have basking sites. Can be present in a wide variety of habitats. Nest sites require good exposure to the sun and compact soil and can be far from a water feature.
Antrozous pallidus	Pallid bat	None	CDFW SSC, BLM S	Moderate	Arid grasslands, scrub, or woodlands, often near water. Roosts in crevices, behind exfoliating bark on trees, or manmade structures.
Corynorhinus townsendii	Townsend's big-eared bat	None	CDFW SSC, BLM S	Moderate	Mostly mesic forest or woodland habitats. Avoids grasslands and open areas. Roosts in caves, cave-like structures (such as large hollow trees), and buildings.

Notes:
[1] SE = State endangered species
ST = State threatened species
SCT = State candidate threatened species
[2] SSC = State species of special concern
S = State Sensitive
FP = Fully Protected
WL = Watch List
BLM S= BLM Sensitive Species
Special status plants are rated using the following CNPS status codes:
1A – plants presumed extinct in California
1B – plants rare and endangered in California and elsewhere
2 – plants rare, threatened, or endangered in California, but more common elsewhere
3 – plants about which more information is needed (a review list)
4 – plants of limited distribution (a watch list)
CNPS Threat Extension codes:
1 = seriously endangered in California
2 = fairly endangered in California
3 = not very endangered in California
[3] Potential for Onsite Occurrence:
Low – species range overlaps with project area and marginally suitable habitat in project area
Moderate – species range overlaps with project area, suitable habitat present in project area, and species known to occur in habitat similar to project area

Scientific Name	Common Name	Federal and State Status[1]	Other Status[2]	Potential On Site[3]	Comments on Habitat and Occurrence[4]

High – highly suitable habitat present in project area, or known populations exist in project area
[4] Information on habitats and life history based on CDFW 2018, USFWS 2009, RMP; BLM 2006, and Natureserve 2009.
Key:
m = meter

The CNDDB was reviewed to identify other special status wildlife species within 5 miles of the project area (Figure 9). The Walker Ridge area also supports other common wildlife species including the tule elk, black-tailed deer, and black bears.

All actions on BLM lands are subject to the requirements of federal regulation, including NEPA, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and other applicable laws, codes, and regulations. The USFWS previously confirmed that there are no known threatened or endangered plants or animals known to occupy the project site, so compliance with the legal requirements set forth under Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)) will not be applicable unless species listed federally as threatened or endangered are determined to be present.

4.1.2 Special Land Use Designations

The project is located wholly within land under BLM jurisdiction. The BLM Ukiah RMP was developed as a management guide for public lands governed by the Ukiah FO. The RMP outlines management uses and designates protected areas within the RMP for federally threatened or endangered species (RMP; BLM 2006). Important BLM-protected areas in the project area are:

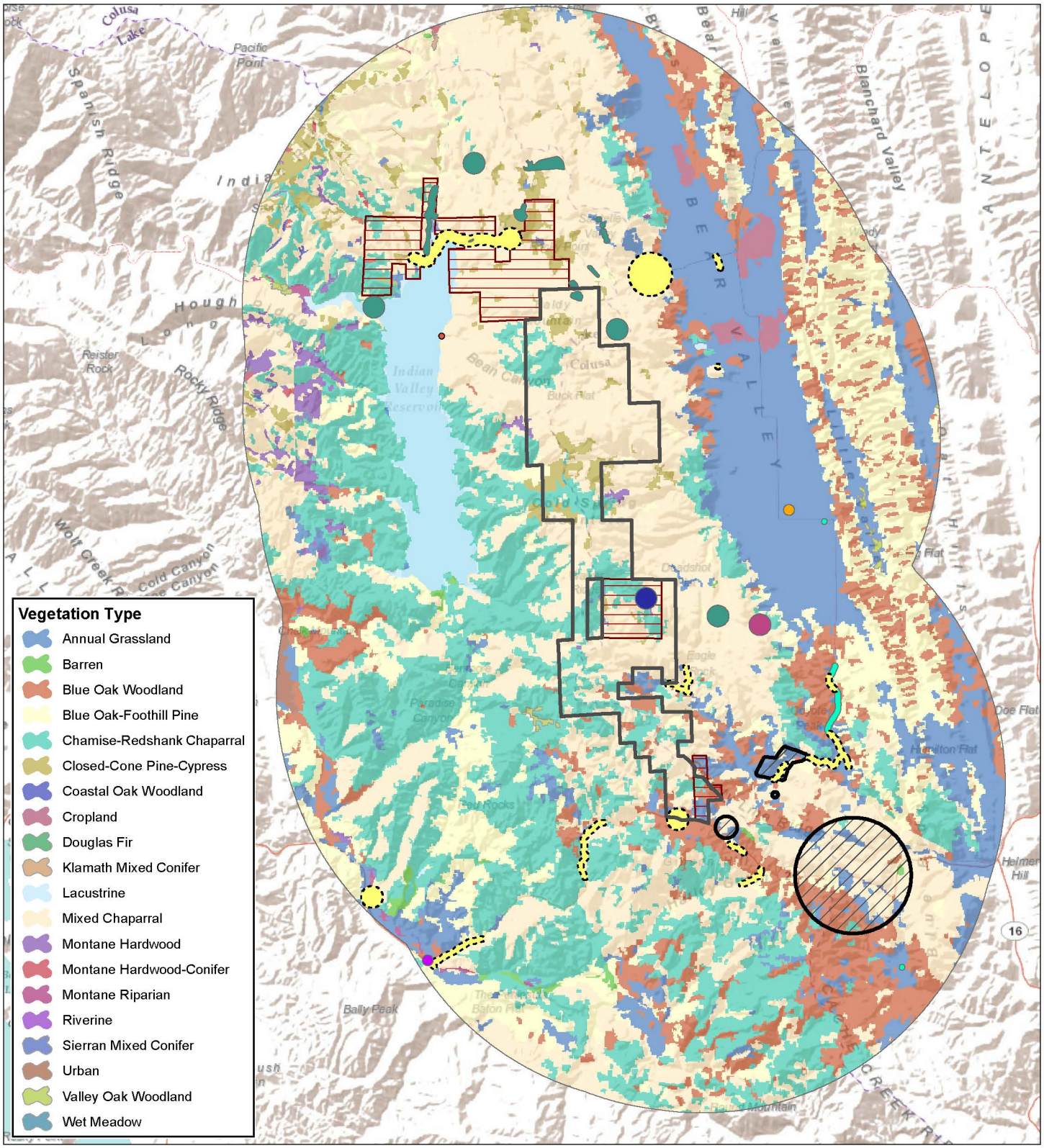
- **BLM Critical Habitat Units:** These areas are managed for the recovery of species listed federally as either threatened or endangered. There are no Critical Habitat Units in the vicinity of the project.
- **BLM Areas of Critical Environmental Concern (ACEC):** These areas are managed for the protection of specific sensitive resources or habitats. The project site is located adjacent to two units of the Indian Valley ACEC. Walker Ridge Road bisects a part of the ACEC just north of Highway 20 within the project site. This ACEC has been established for the protection of special status plants.

Although not designated in any local land use plan, the BRBNA is a voluntary conservation area proposed by a coalition of government resource management groups including the BLM; the National Park Service; the Bureau of Reclamation; Solano, Napa, Lake, Colusa, and Yolo counties; and non-governmental preservation and resource advocacy groups. Encompassing over 785,000 acres within the upper Putah and Cache Creek watersheds, this region is characterized by both its wild lands and land-based economic enterprises, including working ranches, vineyards, and recreation-based businesses. It is part of the Coast Range ecological zone that extends north into Oregon. The mission of the BRBNA is to “bringing people together to conserve and steward the upper Putah and Cache Creek watersheds” (BRBNA 2018). The project area is located within the Indian Valley/Bear Valley District of the BRBNA (BRBNA 2005).

The project is also located adjacent to land with special management designations including National Monument and Land and Water Conservation Fund (LWCF) areas. Some alternative interconnect sites are proposed within an LWCF area.

4.1.2.1 Land and Water Conservation Fund (LWCF) Land

The LWCF was created by Congress in 1964 through bipartisan commitment to safeguard natural areas, water resources, and cultural heritage, and to provide recreation opportunities to all Americans. LWCF allows purchase of property or scenic/conservation easement interests from willing sellers, protecting valuable resources while also allowing compatible uses. The BLM uses LWCF funding to conserve land within its system of national conservation lands. The project area includes LWCF land at three out of four potential interconnect sites.



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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, USGS, NOAA
Sources: Esri, Garmin, USGS, NPS

- BLM Right-of-Way
- 5-mi Buffer of Project Area
- BLM - Area of Environmental Concern

Special Status Species

- Indian Valley brodiaea
- Milo Baker's lupine
- Townsend's big-eared bat
- Tracy's eriastrum
- Bald Eagle
- Foothill yellow-legged frog
- Golden eagle
- Pallid bat
- Western pond turtle

Figure No.
9

DRAFT

Title
Special Status Species and Vegetation Type

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 1 2 Miles

N

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4.1.2.2 National Monument Land

The project area is not within any national monument land; however, the Berryessa Snow Mountain National Monument is south of the project. Some portions of the project may be visible from the National Monument which will be analyzed for impacts through a Visual Impacts Analysis (VIA).

4.1.3 Cultural and Historic Resource Sites and Values

The project is located in the BLM's Indian Valley Management Area, which is part of the BLM's Ukiah FO. The planning area is the smallest scale that can be used to evaluate cultural resources without a site survey. Cultural resources in the planning area range from early Native American habitation sites and activity areas to the remains of historic structures associated with mining, transportation, and ranching industries. The planning area also contains traditional cultural resources and includes those materials or locations used by the Native American community for maintenance of traditional cultural practices such as hunting, gathering, and mineral procurement (RMP; BLM 2006). The Ukiah planning area includes the traditional territories of over two dozen federally recognized tribes, including those descended from four main language families: the Wintuan, Lake Miwok, Pomoan, and Yukian (RMP; BLM 2006).

Colusa will establish an APE in accordance with the BLM and will survey for potential cultural resources within this area. Surveys will be conducted according to a Work Plan prepared with the BLM. Colusa does not anticipate any unavoidable impacts to cultural resources resulting from the project.

4.1.4 Native American Tribal Concerns

BLM will conduct a consultation program with Native American tribes, groups, or traditional cultural practitioners with traditional ties to the project area. Formal consultation under Section 106 of the National Historic Preservation Act between BLM and federally recognized tribes will take place as part of the NEPA process. The purpose of this program will be to determine whether traditional cultural properties exist in the project site.

4.1.5 Recreation and Off-Highway Vehicle Conflicts

The Ukiah FO manages primarily undeveloped land areas for a diverse array of activities including camping, hiking, horseback riding, hunting, fishing, mountain biking, wildlife watching, photography, boating, off-highway vehicle (OHV) use, and other outdoor recreation. These activities are permitted throughout the project ROW.

Motorized vehicle use is permitted in the project ROW only on Walker Ridge Road, the sole designated "open" route in the Indian Valley region. However, unauthorized OHV use is known to occur throughout the project area.

During the construction phase of the project there may be short term and temporary public access impacts. For instance, if a public road requires maintenance then there is potential for an impact to public access while work on the road is occurring. Mitigation can be applied to reduce or avoid impacts to the extent feasible.

The public will have access and use of public roads during the operational phase of the project. No impacts to public access are expected as a result of project operation. Colusa is considering the use of security gates at or near each turbine. Gates would be located such that they would not interfere with access and use of public roads.

The substation and interconnection site will have an approximate 6 to 8-foot perimeter fence. No public access will be granted to these sites.

Nearly all of the Ukiah FO lands fall within the CDFW's Zone A (North Unit 160), which sets the hunting seasons for game species. Hunting is permitted on BLM lands under the jurisdiction of the Ukiah FO and will likely occur throughout the project area, including within the ROW. To ensure the safety of authorized hunters and construction workers, Colusa would consult with BLM and CDFW about proposed construction activities in the ROW during hunting seasons, which include the following:

- For deer in Zone A (Unit 160), archery season was open from July 14 to August 5, and the general season will be from August 11 to September 23.
- For elk hunting, the Cache Creek Period 1 bull will be open October 13 to 28, and Period 2 antlerless will be October 20 to November 4.
- Hunting for wild pig is open all year.
- Upland game birds have multiple seasons, based on species, including Zone Q2 for quail from September 29 to January 27, 2019, and archery only open August 18 to September 7. For wild turkey the season will open from November 10 to December 9, and again from March 30 to May 5, 2019, with archery open from May 6 to May 19, 2019. The seasons for mourning dove are open from September 1 to 15 and from November 10 to December 24. Open season for band-tailed pigeon follows the southern zone dates of December 15 to 23.

All lands within the project area are categorized according to the BLM's Visual Resource Management (VRM) classification system (Figure 10). The overarching goal of the VRM system is to ensure that any development or changes in the landscape of the decision area achieve the scenic goals and objectives of the assigned VRM class. The objectives of the VRM classes are:

- **Class I.** To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II.** To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- **Class III.** To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- **Class IV.** To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high (RMP; BLM 2009).

The BLM's Indian Valley Management Area contains different VRM classifications for Middlecountry Zones and Frontcountry Zones. Middlecountry Zones are natural-appearing landscapes, except for primitive roads, and often serve as the buffer between Frontcountry and Backcountry Zones. All Middlecountry Zones within the Indian Valley planning area are categorized as VRM Class II (RMP; BLM 2006). Frontcountry Zones serve as the transition areas between Middlecountry zones and adjacent private lands and represent a broad mix of uses and tools for management. Frontcountry Zones within the Indian Valley Management Area are categorized in a variety of ways:

- Areas visible from interior observation points are categorized as VRM Class IV.
- Areas visible from Key Travel Routes (KTRs) and Key Observation Points (KOPs) are managed as VRM Class II for exterior observation points north, west, and southwest of Indian Valley Reservoir.
- Areas visible from KTRs and KOPs are managed as VRM Class IV for exterior observation points east and southeast of Indian Valley Reservoir (RMP; BLM 2006).

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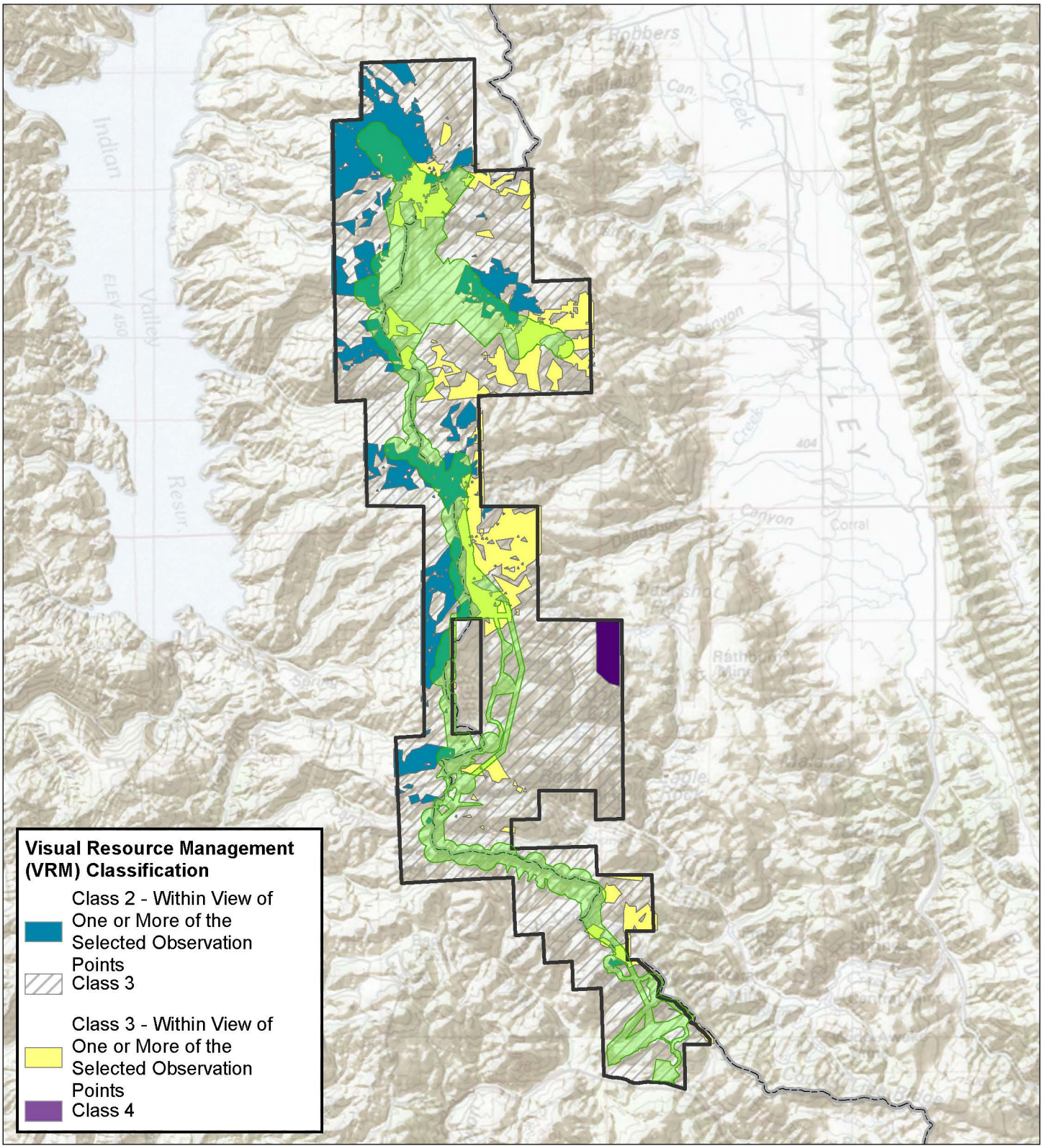

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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the

Type II Wind Testing ROW

Maximum Disturbance Limits

County Boundary

Figure No.
10

DRAFT

Title
Visual Resource Management (VRM) Classification

Client/Project
Walker Ridge

Project Location
Colusa and Lake Counties, California

0 0.5 1 Miles

N

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Any modification to the landscape that occurs as a result of the project could affect visual resources. Recreational use of BLM lands places a high value on visual resources. The BLM has established mitigation measures addressing potential visual impacts of energy generation on federal lands in the western U.S. These environmental design concepts and techniques can be applied to minimize visual contrast and thus reduce or eliminate any potential adverse changes to existing visual resources (RMP; BLM 2006).

4.1.6 Aviation and/or Military Issues

No major commercial or military airports are located near the project site. Regional airports in the vicinity are Antelope Valley Ranch Airport (39° 08' 46" N, 122° 21' 14" W) 6.1 miles east of the project ROW, Moller Airport (39° 17' 18" N, 122° 11' 21" W) 18.3 miles northeast, and Mysterious Valley Airport (38° 44' 57" N, 122° 22' 03" W) 19.3 miles south of the project ROW (Google Earth 2009).

The Department of Defense (DOD) Preliminary Screening Tool was used to identify potential impacts on military operations, long-range radar systems, and weather radar systems (FAA 2009). The project would likely impact Air Defense and Homeland Security long-range radar systems. Furthermore, the DOD Preliminary Screening Tool suggests the project would likely impact Weather System Radar 1988 Doppler operations, as the turbines are likely to be located in the radar line of sight. Confirmation of the likelihood of these potential impacts would require an aeronautical study that would be undertaken and/or funded by Colusa. To facilitate this aeronautical study, Colusa would send a site-specific plan to the FAA detailing each turbine location in the proposed layout. Upon review of the individual effects of each turbine and the cumulative effects of the entire turbine layout, the FAA will issue their opinion on potential effects of the project on military operations.

Slow-speed low-altitude training routes are conducted at or below 1,500 feet above ground level. Therefore, Colusa would initiate consultation with the FAA to determine whether the project would impact the slow-speed low-altitude training route that crosses the project site. Risk associated with the presence of military training routes is relatively low, because FAA does not require DOD approval before issuing its opinion. After the project was constructed, the DOD would likely request approval from the FAA to move the MTR away from the project or to raise the floor of the MTR so that the project would not impact the use of the MTR.

4.1.7 Other Environmental Considerations

4.1.7.1 Air Quality

The majority of a wind energy generation facility's adverse contributions to air quality would occur during the construction phase, largely resulting from construction equipment emissions and dust generation. However, because the project would not result in significant emissions during operation, it would not contribute to a long-term cumulative increase in air pollutants. In fact, the project could result in a positive cumulative benefit to air quality in the region because it would introduce a non-fossil-fuel-based energy source. Therefore, the project's long-term air quality benefits would outweigh temporary construction impacts.

4.1.7.2 Noise

The project site is on public lands with few residential or commercial uses nearby. The closest receptor, a cabin used part-time, is located 0.84 miles outside of the project area. Noise from wind facility operation would be limited to low-

level vibration and noise from turbine propellers, and some short-term noise during maintenance and decommissioning activities. In addition, noise generated during construction could temporarily disturb recreational users and wildlife. The current Lake County General Plan provides general noise guidelines focused on regulating noise near residential development, with no specific provisions for undeveloped lands (Lake County 2008). Lake County noise standards for developed areas are listed in Zoning Ordinance Section 41.11 and evaluated through the building permit process. These standards do not restrict construction noise between 7 a.m. and 7 p.m., and are generally only applicable to residential, commercial, and industrial zones in which noise receptors (residences, businesses, schools, hospitals, etc.) may be present. These standards would not, therefore, be applicable to the project. The Colusa County General Plan was produced in 2012 and contains noise level performance standards for projects (Colusa County 2012). Like Lake County, Colusa County has no specific provisions for undeveloped lands; however, there are standards for all sensitive land uses, residential, commercial, agricultural, industrial, and high noise traffic corridor. The maximum noise level for the high noise traffic corridor is 65 dBA at any time.

Construction and operational noise will be analyzed for impacts to sensitive receptors. Based on the results of this analysis, WTGs would follow agency policy for noise and be sited away from residences and other populated areas, and operational noise is anticipated to be a minimal issue in the project area. WTG operations are typically indistinguishable from background noise (the wind itself), and noise from construction activities would be expected to be in the normal noise range for industrial construction sites.

4.2 DESIGN CRITERIA (APPLICANT PROPOSED MEASURES)

Colusa recognizes that the project may adversely impact environmental resources during construction and operation. Therefore, the following general Applicant Proposed Measures (APMs) are proposed, by resource area, to reduce impacts. As detailed field surveys are completed and additional site-specific potential impacts are revealed, the list of APMs will be updated with specific measures to reduce these potential impacts. This might include updating the list to address potential impacts to resource areas that are not listed below. The APMs for each of the resource areas are summarized in Table 4-2 at the end of this chapter.

4.2.1 Special Status and Sensitive Species and Habitats

During project siting, Colusa identified certain categories of environmental disturbance and estimated the associated acreage. The project was sited to minimize disturbance and thus potential loss of special status species and habitats by maximizing use of previously disturbed areas.

APM BIO-1: Avoid or minimize impacts to special-status plants within the ACEC.

AMP BIO-2: Post construction monitoring for birds and bats. Colusa will conduct post construction mortality surveys for bird and bat populations.

APM BIO-3: Special-status plant protection outside ACEC. Where impacts to special-status plants cannot be avoided, Colusa will minimize impacts to the greatest extent feasible and offset impacts as necessary.

4.2.2 Special Land Use Designations

The project would involve upgrades to Walker Ridge Road, which currently traverses an ACEC. APM BIO-1 would reduce impacts to this land use.

4.2.3 Cultural and Historic Resource Sites and Values

Colusa will establish an APE in accordance with the BLM and will survey for potential cultural resources within this area. Surveys will be conducted according to a Work Plan prepared with the BLM. Colusa does not anticipate any unavoidable impacts to cultural resources resulting from the project as proposed; however, Colusa proposes the following measures as part of an Unanticipated Discovery Plan (UDP).

APM CUL-1: Unanticipated discovery of cultural resources. If unanticipated cultural resources, including historic and prehistoric sites, are discovered during any phase of project construction, Colusa will immediately cease all work within 100 feet of the find and immediately notify the BLM Ukiah FO archaeologist. Colusa may not resume work until the BLM Ukiah archaeologist has evaluated the area and permits work to continue.

APM CUL-2: Unanticipated discovery of human remains. Colusa will cease work upon the discovery of human remains and associated funerary objects and immediately contact the BLM Ukiah FO archaeologist and the county sheriff. Work within 200 feet of the remains may not resume until the BLM Ukiah FO archaeologist has given permission.

Additionally, Archaeological monitors that meet the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61) will be present during construction. Additionally, a Tribal Participation Plan (TPP) will be prepared for use during construction activities.

4.2.4 Native American Tribal Concerns

Impacts to sites, properties, or objects of importance to Native Americans are not anticipated; however, APM CUL-1 will be implemented in the event cultural resource sites or objects of importance to Native Americans are discovered during project construction.

4.2.5 Recreation and OHV Conflicts

As proposed, the project is not anticipated to be incompatible with the recreational uses of the area. Colusa will analyze potential impacts to recreational activities. To improve on the area's current recreational facilities, Colusa proposes the measures described below.

APM REC-1: Signage. Colusa will post signs on Walker Ridge Road alerting the public to the presence of the project.

APM REC-2: Maintenance of roads. Colusa will maintain Walker Ridge Road where it crosses the project ROW.

APM REC-3: Vista points. At the request of the BLM, Colusa may construct up to three interpretive areas adjacent to Walker Ridge Road to inform the public about the project and the landforms of Lake and Colusa counties. Platforms would be positioned to showcase the Sutter Buttes, Mt. Konocti, and the project itself.

4.2.6 Visual Resource Management Designations

Colusa will assess the potential impacts to visual character and quality from the proposed Walker Ridge Wind Generation Project in a VIA. Construction of the project would introduce new structures into the landscape, thereby altering the viewshed. To minimize the amount of contrast introduced by the project, Colusa proposes the measures described below.

4.2.7 Aviation and/or Military Conflicts

The project is not expected to result in adverse effects on FFA or DOD resources. However, to reduce the risk of potential aviation-related safety hazards (which is considered to be extremely low) Colusa proposes the measures described below.

APM AMC-1: Lighting. Colusa will comply with FAA's aircraft safety lighting requirements for structures greater than 200 feet tall. Lights used to meet FAA requirements will, to some extent, be shielded from ground-level view due to a constrained (3- to 5-degree) vertical beam.

APM AMC-2: Non-reflective paint. If allowed by FAA regulations, non-reflective paint will be used to minimize glare from turbines.

4.2.8 Other Environmental Considerations

4.2.8.1 Air Quality

Emissions that could affect air quality would primarily occur during the construction phase of the project. To reduce these effects, Colusa proposes the measures described below.

APM AQ-1: Minimize disturbance. Colusa will minimize grading and vegetation removal and limit surface disturbance during construction to the time just before construction. Colusa will revegetate disturbed areas as soon as possible after disturbance.

APM AQ-2: Dust abatement plan. Colusa will prepare and comply with a dust abatement plan in cooperation with the Lake County Air Quality Management District and Colusa County Air Pollution Control District. The plan will address emissions of fugitive dust during construction and operation of the project. The dust abatement plan will include provisions for monitoring and managing fugitive dust and will follow the protocols established by the California Air Resources Board (CARB). Examples of measures that would be implemented include (1) minimizing ground disturbance to reduce dust generation, (2) using dust suppression measures including watering the site and covering stockpiles of exposed soil, (3) planting temporary ground cover vegetation in areas that may be exposed for prolonged periods (several months), and (4) limiting vehicle traffic and reducing speed limits.

APM AQ-3: Vehicle emissions standards. Colusa will ensure that construction and maintenance vehicles comply with EPA and CARB emissions standards.

APM AQ-4: Minimize idling time. Colusa will limit construction equipment and vehicle idling times to no more than 5 minutes.

APM AQ-5: Equipment operation and maintenance. Colusa will ensure that construction equipment and vehicles are properly maintained and operated in accordance with manufacturer's instructions, to minimize emissions.

Table 4-2 Colusa Proposed Measures

Resource	Measure
Special-Status Species	Colusa will avoid or minimize impacts to special-status plants within the ACEC. Colusa will conduct post-construction mortality surveys for birds and bats. Where impacts to special-status plants cannot be avoided, Colusa will minimize impacts to the greatest extent feasible and offset impacts as necessary.

Resource	Measure
Special Land Use Designations	Colusa will reduce impacts to the Indian Valley ACEC by avoiding or minimizing impacts to special-status plant species within the ACEC.
Cultural and Historic Resource Sites and Values	If cultural resources are located during any phase of project construction, Colusa will immediately cease work in the area and notify permitting agencies. Colusa will not resume work in the discovery area until it has been surveyed by a cultural resources specialist and approved by the permitting agencies. Upon the discovery of human remains, work within 200 feet of the discovery will cease; local law enforcement and the county coroner will be notified in the most expeditious manner possible. Unanticipated discoveries will be discussed in more explicit detail in the UDP for this project.
Native American Tribal Concerns	Upon the discovery of previously undocumented prehistoric resources all work in the area will stop within 200 feet of the discovery. BLM and the affected tribes will be notified within 24 hours of the find. Unanticipated discoveries will be discussed in more explicit detail in the UDP for this project. Additionally, a TPP will be prepared for use during construction activities.
Recreation and OHV Usage	Colusa will post signs on Walker Ridge Road alerting the public to the presence of the project. Colusa will maintain Walker Ridge Road where it crosses the project ROW.
Recreational	At the request of the BLM, Colusa may construct up to three interpretive areas adjacent to Walker Ridge Road to inform the public about the project and the landforms of Lake and Colusa counties. Platforms would be positioned to showcase the Sutter Buttes, Mt. Konocti, and the project itself.

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ATTACHMENT A: BARR PRELIMINARY GEOTECHNICAL INVESTIGATION

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Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com *An EEO Employer*

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND

Memorandum

To: Andrew Potokar and Brent Bergland, M.A. Mortenson Company

From: Rob Osburn and Chris Kopchynski, P.E., Barr Engineering Company

Subject: Interim Geotechnical Memorandum

Date: October 23, 2009

Project: 05/06-1001

Under contract with M.A. Mortenson Company (Mortenson), Barr Engineering Company (Barr) completed a preliminary geotechnical investigation of the proposed Walker Ridge Wind Project. This memorandum summarizes the geotechnical field investigation and preliminary assessment of the project. The Walker Ridge Wind Project is located near the towns of Leesville and Wilbur Springs, California, located along the border of Lake and Colusa Counties. The project is currently planned to consist of approximately 42 GE 1.5sle turbines spread evenly along a roughly six mile span of Walker Ridge. A majority of the turbines are presently sited along the primary ridge, with some turbines located on secondary ridges within one to two miles of the main ridge.

The purpose of the preliminary geotechnical investigation was to document the site geological conditions through a series of borings and general site reconnaissance by a geotechnical engineer. To eliminate the need for brush clearing and potential grading, boring locations were selected along Bartlett Springs Road, which spans the length of the project, primarily following the main ridge top. Five borings were originally proposed for the project, however the scope was reduced to four borings after heavy rains and high winds temporarily halted field work in the middle of the drilling activities. Each boring was completed to a depth of 60 feet to obtain an understanding of the geology to a depth roughly equivalent to the width of a generic wind turbine foundation. The field investigation was completed from October 12 through 17, 2009. Figure 1, attached, shows the locations of the borings completed as part of the preliminary geotechnical investigation, as well as the currently proposed turbine layout.

The borings were performed by Pitcher Drilling Company of East Palo Alto, California, with a truck-mounted drill rig using general rotary drilling techniques, including tricone drilling in soft rock, coring with a 101 Geobarrel in soft rock, and coring with an HQ carbide bit in hard rock. When tricone drilling was utilized, split spoons and standard penetration tests (SPTs) were conducted at 2.5 and five foot intervals to obtain relative estimates of the rock strength and collect samples. The 101 Geobarrel was used to collect continuous samples of the soft weak rock that was encountered in a majority of the borings at the site. When more competent layers of rock were encountered, the drillers collected continuous core samples using an HQ carbide bit. Due to the significant variability within the site geology, at least two of the above mentioned drilling techniques where used in each boring to collect samples of the rock.

To: Andrew Potokar and Brent Bergland, M.A. Mortenson Company
From: Rob Osburn and Chris Kopchynski, Barr Engineering Company
Subject: Interim Geotechnical Memorandum
Date: October 23, 2009
Project: 05/06-1001

Site geology along the ridge top largely consists of two distinct formations: the Franciscan Complex and the Ultramafic rocks. The Franciscan Complex is primarily composed of siltstone (greywacke), shale, and to a lesser extent, sandstone. The Ultramafic rocks commonly found along the Walker Ridge area consist almost entirely of serpentinite. Figure 2 shows the general site geology of the project and surrounding area. As is evident in Figure 2, the north and east side of Walker Ridge is predominantly composed of Ultramafic rocks, while the south and west side of the ridge generally consists of the Franciscan Complex. A series of thrust faults transect the site, forming the border between the two geologic formations (Figure 2). The borings completed as part of the preliminary geotechnical investigation found the site geology to match up well with that shown in Figure 2. Borings 1 and 4 encountered Ultramafic rocks, consisting of serpentinite throughout the full depth, while borings 2 and 3 encountered the Franciscan complex, consisting of siltstone and sandstone, with small layers of claystone. Preliminary copies of the borings logs and photographs of selected rock cores are attached with this memorandum.

Reconnaissance of the overall project site was completed by a Barr geotechnical engineer in October 12, 2009. Visual observation of the site geology, when compared with the information provided in Figure 2, confirmed that the two predominant geological formations at the site are the Franciscan Complex and the Ultramafic rocks. Inspection of the road cuts along Bartlett Springs Road found the geology and fault lines to match up well with the information shown in Figure 2. Along no distinct surficial features were noted along the fault lines, the change in geology was noted to match up within a few hundred feet of that shown on the geologic map. A review of almost all road cuts along Bartlett Springs Road found that the rock near the surface is generally weak and easily broken. Limited zones of both serpentinite and sandstone were found to be more resistant, however these zones were both rare and usually less than five feet in thickness. A general review of both the east and west slopes along Walker Ridge was completed to evaluate the general potential for landslides and to note if any evidence of previous landslides in the area was present. No existing or recent landslides were observed from various vantage points along Bartlett Springs Road. A preliminary review of available information regarding landslides indicates that the site is potentially susceptible to debris flow, but this is largely due to the mountainous terrain in the general project area. Our preliminary review has found that there are no reported landslides within the immediate project vicinity, however landslides are documented in the Clear Lake area approximately 20 miles to the west. We are in the process of further reviewing the issue of landslides and our final report will include additional information on the topic.

In terms of wind turbine foundation design and construction, the following preliminary information can be provided.

- The shallow rock present along road cuts at the site and observed in the borings is generally weak and soft. Aside from the occasional layer of competent sandstone or serpentinite (encountered at depths of 40 to 60 feet in the borings), foundation excavation should generally consist of ripping the rock. In some cases where the rock is very soft, it may also be possible to traditionally excavate the foundations with a large trackhoe.
- While the rock at the site is generally weak and soft, it should be able to provide adequate support for a typical spread footing foundation.
- In some areas along the ridge top, significant cut will be necessary to establish a large enough pad on which to construct a foundation.
- A series of faults run across the site, separating the Franciscan Complex from the Ultramafic rocks. Further review will be necessary to evaluate turbine siting relative to the location of these faults and foundation design will need to account for the local seismicity of the site.

- While no evidence of landslides was observed at the site, the presence of soft and weak rock indicates that there may be a general risk of landslides at the site. Site grading following foundation construction will be important in allowing precipitation to run off and preventing water from infiltrating the weak rock. Water pressure build up in weak, permeable rock layers is a common cause of landslides in California.

This memorandum serves to briefly summarize the initial findings of the preliminary geotechnical investigation completed by Barr. Laboratory testing on soil and rock samples collected from the field investigation is currently ongoing. A preliminary geotechnical report will be issued at a later date summarizing our findings and preliminary recommendations for the proposed Walker Ridge Wind Project site.

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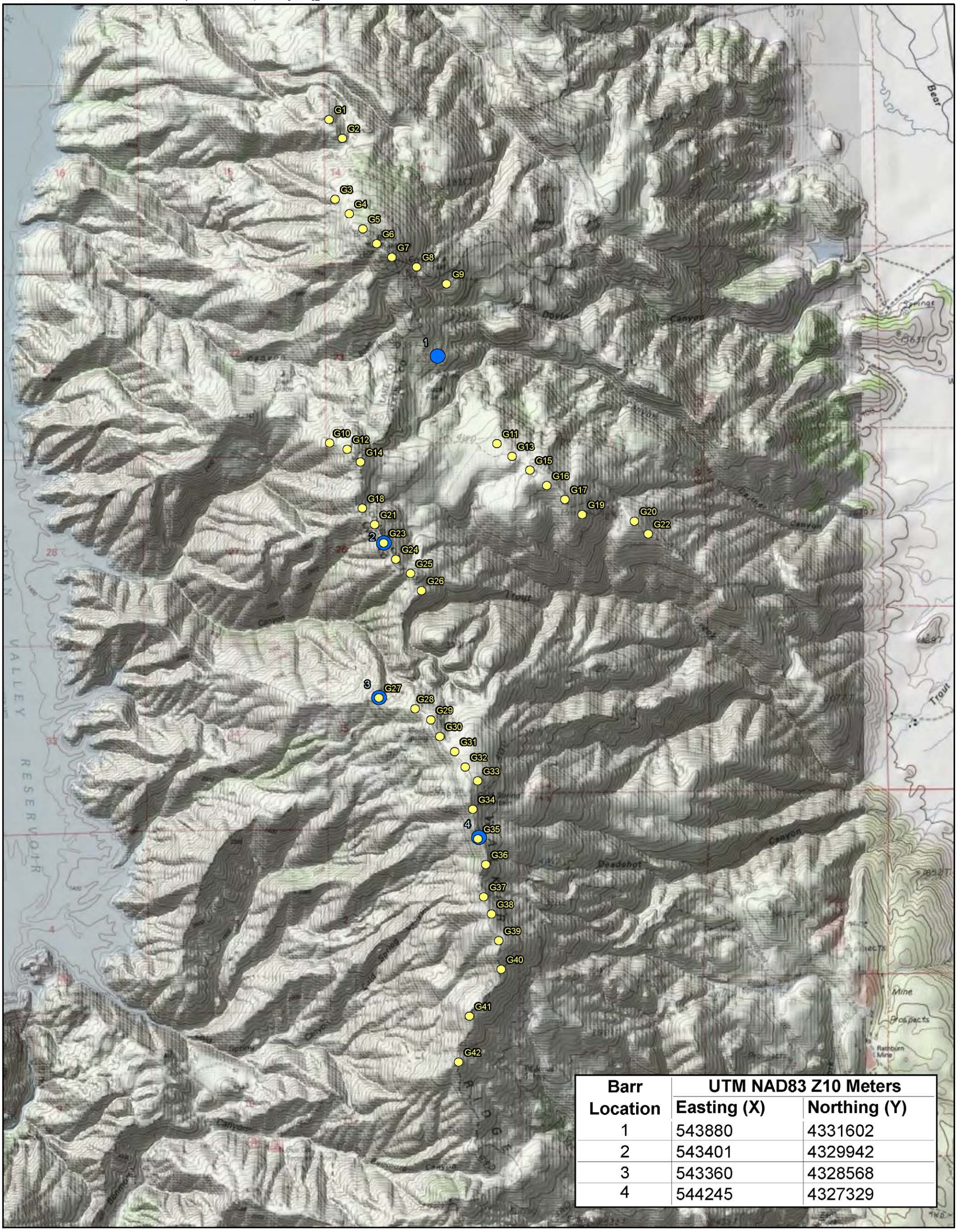


Barr Location	UTM NAD83 Z10 Meters	
	Easting (X)	Northing (Y)
1	543880	4331602
2	543401	4329942
3	543360	4328568
4	544245	4327329

Current Turbine Layout (8/14/2009 Coords.)

Boring Location

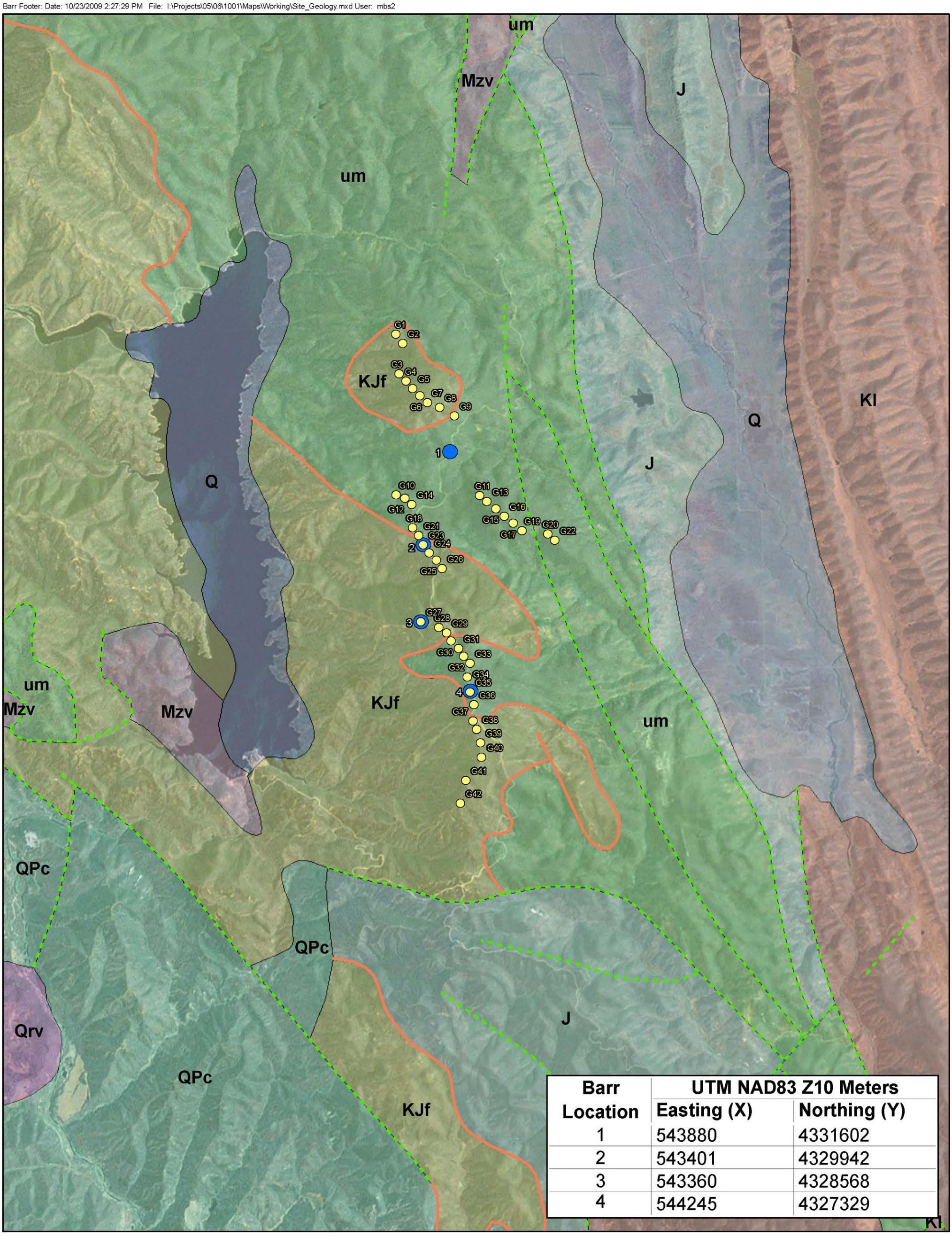
N

Miles

0.5 0 0.5 1

Figure 1

BORING LOCATIONS
Walker Ridge Wind
Mortenson Construction
Lake and Colusa Counties, CA



Barr Location	UTM NAD83 Z10 Meters	
	Easting (X)	Northing (Y)
1	543880	4331602
2	543401	4329942
3	543360	4328568
4	544245	4327329

Proposed Boring Location (1-5)

Thrust Fault

Fault - Sense of displacement unknown

Q - Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly nonmarine, but includes marine deposits near the coast.

KJf - Franciscan complex: Cretaceous and Jurassic sandstone with smaller amounts of shale, chert, limestone, and conglomerate. Includes Franciscan melange, except where separated--see KJfm.

Kl - Lower Cretaceous sandstone, shale, and conglomerate

QPc - Pliocene and/or Pleistocene sandstone, shale, and gravel deposits; in part Miocene.

Qrv - Recent (Holocene) volcanic flow rocks; minor pyroclastic deposits; in part Pleistocene.

J - Shale, sandstone, minor conglomerate, chert, slate, limestone; minor pyroclastic rocks

um - Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase.

Mzv - Undivided Mesozoic volcanic and meta--volcanic rocks. Andesite and rhyolite flow rocks, greenstone, volcanic breccia and other pyroclastic rocks; in part strongly metamorphosed. Includes volcanic rocks of Franciscan Complex: basaltic pillow lava, diabase,

Figure 2

BEDROCK GEOLOGY
Mortenson Construction
Walker Ridge Wind
Lake and Colusa Counties, CA

N

Miles
1 0 1

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-1

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Surface Elev.: 2860.0

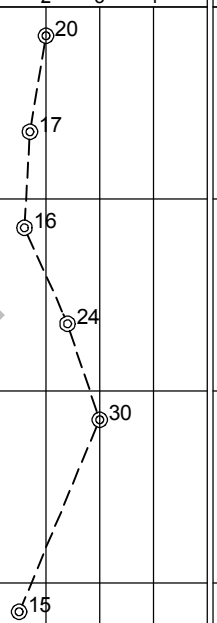
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	
	0	SERPENTINITE, reddish-brown, damp.	2859.7 / 0.3
		SERPENTINITE, Highly fractured, very weak (crumbles easily), occasional harder zones (strong to very strong), damp, light green yellowish-black and gray, poorly cemented wavy laminations.	
2855	5		
			2850.5 / 9.5
2850	10	SERPENTINITE, blocky, fractured, very weak, grayish-green.	
2845	15	Switched to coring with 101 Geobarrel at 16.5 feet. No recovery from 17.5 - 20.5 feet.	
2840	20		2839.5 / 20.5
		SERPENTINITE, flaky, light green and gray, very weak to weak.	2838.5 / 21.5
		SERPENTINITE, green and black, strong (blocks) to very weak (matrix).	
2835	25		
			2832.0 / 28.0
2830	30	SERPENTINITE, hard black blocks with green waxy fractures, blocks are strong to very strong, fractures contain very weak flakes.	

Continued Next Page

Graphic Log | Sample Type & Rec. | SPT, N value or RQD %: 20, 17, 16, 24, 30, 15

STANDARD PENETRATION TEST DATA
N in blows/ft ◎ (10 20 30 40)
SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○ (1 2 3 4)

NATURAL DRY DENSITY (pcf) ✭ (100 110 120)
Water Content, % W_P W_N W_L (20 40 60)



Completion Depth:	60.0
Date Boring Started:	10/14/09
Date Boring Completed:	10/14/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Tricone to 15ft, then 101 Geobarrel

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES: Auger Cutting; Shelby Tube; Split Spoon; Rock Core

WATER LEVELS: While Drilling: ; End of Drilling: ; hrs After Drilling:

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

The stratification lines represent approximate boundaries. The transition may be gradual.

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-1

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	SPT, N value or RQD %
2825	35	SERPENTINITE, hard black blocks with green waxy fractures, blocks are strong to very strong, fractures contain very weak flakes.			
2820	40				
2815	45	No recovery from 43.5 - 48.5 feet.			
		2811.5			
		SERPENTINITE, dark gray and black, larger blocky hard clasts (very strong), highly fractured rubble in a fine matrix. 48.5			
2810	50	2810.0			
		SERPENTINITE, medium gray matrix, with gray very fine-grained clasts, very weak to strong wavy and waxy laminations, highly fractured rubble in a fine matrix. 50.0			
2805	55				
		2800.0			
2800	60	End of boring at 60.0 feet below ground surface. 60.0			
	65				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✭
100 110 120

Water Content, %
W_P W_N W_L
20 40 60

Completion Depth:	60.0
Date Boring Started:	10/14/09
Date Boring Completed:	10/14/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Tricone to 15ft, then 101 Geobarrel

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES: Auger Cutting; Shelby Tube; Split Spoon; Rock Core

WATER LEVELS: While Drilling: ; End of Drilling: ; hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-2

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Surface Elev.: 3220.0

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	SPT, N value or RQD %
	0	SILTSTONE, weathered, highly fractured, damp, medium brownish-gray.	33
		3217.0	
	3.0	SILTSTONE, weathered, highly fractured, wavy, damp, medium brownish-gray, black and white bedding.	
3215	5	0.9 foot thick zone at 5 feet is unconsolidated with silt matrix and crushed siltstone.	51
		Switched to coring with 101 Geobarrel from 6.5 to 9.5 feet.	
3210	10		55
		3207.0	
	13.0	SILTSTONE, weathered, highly fractured, gray and medium brown with orange mottling (crushes easily by hand). Driller noted harder drilling at 14 feet.	
3205	15	0.1 foot thick mudstone layer at 15.5 feet.	34
		3203.5	
	16.5	Switched to coring with combination of 101 Geobarrel and HQ at 16.5 feet.	
		SANDSTONE (greywacke) very fine-grained to fine-grained, fractured at 40 degree bedding planes, medium brown, altered, moderately strong to strong.	
3200	20	RQD = 0 (20.5 to 25 feet).	0
		3195.0	
3195	25	SILTSTONE, very weak to strong, medium brownish-gray.	
	25.0		
3190	30	No recovery from 28 to 33 feet.	

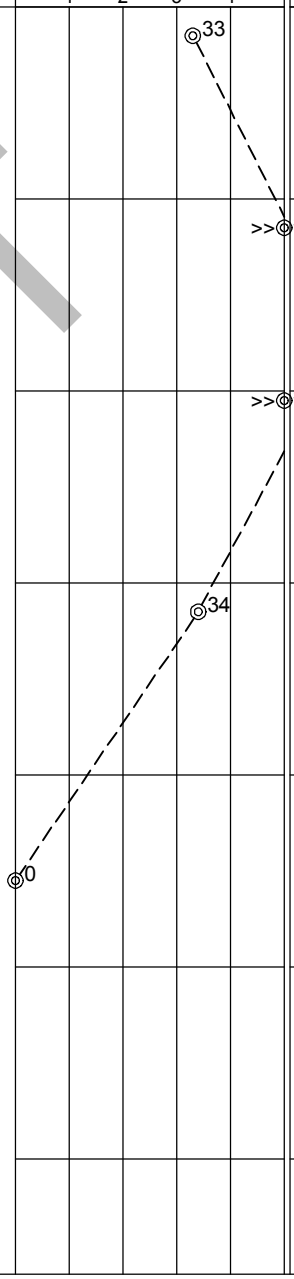
Continued Next Page

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✯
100 110 120

Water Content, %
W_P W_N W_L
20 40 60



Completion Depth:	60.0
Date Boring Started:	10/12/09
Date Boring Completed:	10/13/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Tricone to 15ft, then 101 Geobarrel/HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES

Auger Cutting | Shelby Tube | Split Spoon | Rock Core

WATER LEVELS

While Drilling:
End of Drilling:
hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-2

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

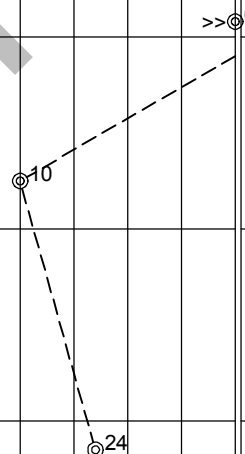
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	SPT, N value or RQD %
		SILTSTONE, very weak to strong, medium brownish-gray.			
3185	35				
		3182.3			
		SANDSTONE (greywacke), very fine to fine-grained, very weak, sub planar, medium brown with gray and black, weathered, some closed joints oriented at 40 to 90 degrees.			
	37.7				
3180	40	RQD = 61 (37.7 to 41.5 feet).			61
		Strong layer from 37.7 to 45 feet.			
		RQD = 10 (41.5 to 45 feet).			10
3175	45				
3170	50	Strong dark gray layer from 49.5 to 51.5 feet.			
		RQD = 24 (49.5 to 52 feet).			24
		3168.5			
	51.5	SANDSTONE matrix, highly fractured, weathered, weak to very weak, irregular, light gray and medium brown.			
3165	55				
		3160.0			
3160	60	End of boring at 60.0 feet below ground surface.			
	60.0				
	65				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✯
100 110 120

Water Content, %
W_P W_N W_L
20 40 60



Completion Depth:	60.0
Date Boring Started:	10/12/09
Date Boring Completed:	10/13/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Tricone to 15ft, then 101 Geobarrel/HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES

Auger Cutting | Shelby Tube | Split Spoon | Rock Core

WATER LEVELS

While Drilling:
End of Drilling:
hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-3

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Surface Elev.: 3230.0

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)		Graphic Log	Sample Type & Rec.	SPT, N value or RQD %
	0	SILTY SAND (SM), reddish-brown, moist, very fine-grained to coarse-grained.	3229.5 0.5			73
		SANDSTONE, light brown, strong, very fine-grained, quartz crystals in fractures.				90
			3225.5			
3225	5	SANDSTONE, with thin siltstone zones, medium brown with orange, hightly fractured zones, filled with quartz crystals.	4.5			50
						62
3220	10					55
			3217.0			
		SILTSTONE, medium brownish-gray, highly fractured, strong clasts in un-lithified matrix.	13.0			
3215	15					50/ 3"
3210	20					50/ 4"
			3206.5			
		CLAYSTONE, medium brown, highly fractured, platy, weak to very weak.	23.5			
3205	25					47
3200	30					58

Continued Next Page

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✯
100 110 120

Water Content, %
W_P W_N W_L
20 40 60

>>◎73
>>◎90
◎50
>>◎62
>>◎55
>>◎50/3"
>>◎50/4"
◎47
>>◎58

Completion Depth:	60.2
Date Boring Started:	10/16/09
Date Boring Completed:	10/16/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Mostly Tricone, some HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES: Auger Cutting; Shelby Tube; Split Spoon; Rock Core

WATER LEVELS: While Drilling: End of Drilling: hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-3

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	SPT, N value or RQD %
		CLAYSTONE, medium brown, highly fractured, platy, weak to very weak.			
3195	35				77/ 11"
		With layers of siltstone from 35 to 41.5 feet.			
3190	40				50/ 4"
		SANDSTONE, light gray, very fine-grained, strong, fractured, quartz crystal filled veins.			
		Switched to HQ coring from 41.5 to 44.8 feet, RQD = 0			0
		SILTSTONE, with claystone layers, medium brown and gray, strong to weak, quartz crystals in fractures.			
3185	45				50/ 3"
		SILTSTONE, fractured, weak, dark gray, with occasional hard clasts.			
3180	50				50/ 5"
3175	55				50/ 4"
3170	60				50/ 2"
		End of boring at 60.2 feet below ground surface.			
	65				

3188.5 / 41.5
3187.0 / 43.0
3182.5 / 47.5
3169.8 / 60.2

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✯
100 110 120

Water Content, %
W_P W_N W_L
20 40 60

>>◎77/11"
>>◎50/4"
◎0
>>◎50/3"
>>◎50/5"
>>◎50/4"
>>◎50/2"

Completion Depth:	60.2
Date Boring Started:	10/16/09
Date Boring Completed:	10/16/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Mostly Tricone, some HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES

Auger Cutting | Shelby Tube
Split Spoon | Rock Core

WATER LEVELS

While Drilling:
End of Drilling:
hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-4

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Surface Elev.: 3500.0

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	SPT, N value or RQD %
	0	SERPENTINITE, light green, fragmented, weathered.	21
		3497.5	
	2.5	SERPENTINITE, light green, flaky, crumbly with dark green clasts, waxy slicks, weak to very weak.	44
3495	5		33
			39
3490	10		48
3485	15		34
3480	20		46
		3479.0	
	21.0	SERPENTINITE, light green, flaky, with strong black clasts, with thin silty zones.	
		3476.0	
	24.0	SERPENTINITE, light green flaky matrix, with dark greenish-black (very strong) clasts of quartzite.	50
3475	25		
3470	30		50/ 5"

Graphic Log | Sample Type & Rec.

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✯
100 110 120

Water Content, %
W_P W_N W_L
20 40 60

21 44 33 39 48 34 46 50 >> 50/5"

Continued Next Page

Completion Depth:	60.0
Date Boring Started:	10/17/09
Date Boring Completed:	10/17/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Mostly Tricone, some HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES: Auger Cutting; Shelby Tube; Split Spoon; Rock Core

WATER LEVELS: While Drilling: End of Drilling: hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG_OF_BORING 05061001_WALKER RIDGE WIND FARM.GPJ BARRLOG.GDT 10/23/09

Barr Engineering Company
4700 W 77th St. Suite 200
Edina, MN 55435

LOG OF BORING B-4

Project: Walker Ridge Wind Project | Location: Leesvile, CA, Lake and Colusa Counties | Client: M.A. Mortenson Company

Barr Project Number: 05/06-1001

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	SPT, N value or RQD %
		SERPENTINITE, light green flaky matrix, with dark greenish-black (very strong) clasts of quartzite.			
3465	35				50/ 4"
					>>50/4"
		3462.5			
	37.5	SERPENTINITE, dark green and and black, very strong, healed and closed veins.			
3460	40				
		Switched to HQ coring from 40 to 45 feet (RQD = 8).			
		3459.6			
	40.4	SERPENTINITE, yellowish green, very weak, flaky, waxy.			8
					8
3455	45				50/ 5"
					>>50/5"
		3452.0			
	48.0	SERPENTINITE, black, very strong, with weak and flaky green zones.			
3450	50				50/ 5"
					>>50/5"
		3445.0			
3445	55				50/ 3"
	55.0	SERPENTINITE, very strong light greenish-gray to dark greenish-black, open and closed fractures with various orientations, irregular and slickened, some heavily fractured zones. Switched to HQ coring from 55.3 to 60 feet (RQD = 18).			18
					>>50/3"
					18
		3440.0			
3440	60	End of boring at 60.0 feet below ground surface.			
	65				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
10 20 30 40

SHEAR STRENGTH, ksf
Q_P × UC △ TV ✳
VS △ VSR ○
1 2 3 4

NATURAL DRY DENSITY (pcf) ✭
100 110 120

Water Content, %
W_P W_N W_L
20 40 60

Completion Depth:	60.0
Date Boring Started:	10/17/09
Date Boring Completed:	10/17/09
Logged By:	BWL
Drilling Contractor:	Pitcher Drilling Company
Drilling Method:	Mostly Tricone, some HQ coring

Remarks: Surface elevation estimated from USGS topo.

SAMPLE TYPES

Auger Cutting | Shelby Tube | Split Spoon | Rock Core

WATER LEVELS

While Drilling:
End of Drilling:
hrs After Drilling:

The stratification lines represent approximate boundaries. The transition may be gradual.

B-1, 16.5-29.5 feet

B-1, 29.5-40.5 feet

B-1, 40.5-60.0 feet

B-2, 6.5-25.0 feet

B-2, 25.0-41.5 feet

B-2, 41.5-53.0 feet

B-2, 53.0-60.0 feet

B-4, 55.0-60.0 feet

B-4, Serpentinite Sample