APPENDIX Q

Biological Resources: *Humboldt Wind Energy Project—Updated Habitat Assessment and Auditory and Visual Disturbance Analysis for Northern Spotted Owl and Marbled Murrelet*

Stantec

Memo

To:	Humboldt County Planning & Building Department 3015 H Street Eureka, CA 95501	From:	Erec DeVost Stantec Consulting Services Inc. 1383 North McDowell Boulevard Suite 250 Petaluma, CA 94954-7118
Date:	January 25, 2019		

Reference: **Humboldt Wind Energy Project – Updated Habitat Assessment and Auditory and Visual Disturbance Analysis for Northern Spotted Owl and Marbled Murrelet**

INTRODUCTION

This memo provides updated results of the Humboldt Wind Energy Project (project) habitat assessment for northern spotted owl (*Strix occidentalis caurina*) (NSO) and marbled murrelet (*Brachyramphus marmoratus*) (MAMU) to include three potential alternative areas: Stafford Gen-Tie Alternative, Jordan Creek Access Road Alternative, and Bridgeville Gen-Tie Alternative. In addition, the auditory and visual disturbance analyses for both species were updated to account for blasting and helicopter activities that may occur during construction of the project and to include three potential alternative areas. The methods for this updated information followed those previously used for the project and described in the Marbled Murrelet Habitat Assessment and Auditory and Visual Disturbance Analysis Report (Stantec 2018a) and Northern Spotted Owl Habitat Assessment and Auditory and Visual Disturbance Analysis Report (Stantec 2018b), with some exceptions as included below.

NORTHERN SPOTTED OWL HABITAT ASSESSMENT

METHODS

The updated habitat assessment for NSO focused on the three potential project alternatives: Stafford Gen-Tie Alternative, Jordan Creek Access Road Alternative, and the Bridgeville Gen-Tie Alternative. As described in the original habitat assessment (Stantec 2018b), the assessment was conducted following guidelines provided in the NSO Protocol (USFWS 2012).

The project area for the updated habitat assessment, which encompasses the area of potential activity, includes a 400-foot-wide corridor centered on the Jordan Creek Access Road Alternative and a 200-foot-wide corridor centered on the Stafford Gen-tie and Bridgeville Gen-tie Alternatives. The survey area for the habitat assessment was derived per the U.S. Fish and Wildlife Service (USFWS) NSO Protocol, which recommends a 0.7-mile survey radius for projects located in the California Coast physiographic province redwood zone. As such, Stantec assessed a 0.7-mile buffer around the project area for all three alternative areas (areas of potential activity) for NSO habitat. Collectively, the total acreage of the alternative analysis area encompasses approximately 10,927 acres (ac) (Table 1).

Stantec used desktop resources to evaluate and map NSO functional nesting, roosting, and foraging habitats in the survey area. Biologists conducted the desktop-level habitat mapping using current ESRI aerial imagery as a base map. To assess NSO habitat present within the three alternative analysis areas, Stantec reviewed: 1) Humboldt Redwood Company, LLC's (HRC) existing NSO habitat maps and occurrence records for their managed timberlands where it overlapped with the survey area; 2) California Department of Fish and Wildlife Biogeographic Information and Observation System California Natural Diversity Database NSO occurrence records; and 3) USFWS online Critical Habitat Portal to determine whether designated critical habitat for NSO

Reference: **Humboldt Wind Energy Project – Updated Habitat Assessment and Auditory and Visual Disturbance Analysis for Northern Spotted Owl and Marbled Murrelet**

occurs in the survey area or vicinity. Following this review, Stantec developed habitat spatial data using ESRI ArcGIS/Arcinfo and generally mapped and characterized habitats using definitions for functional nesting, roosting, and foraging habitats provided in California Forest Practice Rules 2017 (California Department of Forestry and Fire Protection 2017):

- Functional nesting habitat is habitat with a dominant and codominant tree canopy closure of at least 40 percent and a total canopy (including dominant, codominant, and intermediates) of at least 60 percent. Usually the stand is distinctly multi-layered with an average stem diameter in dominant and codominant conifers and hardwoods >11-inch (in) diameter at breast height (DBH). The stand usually consists of several tree species (including hardwoods) of mixed sizes. All nests, snags, down logs, and decadent trees shall also be considered as part of the habitat. Nesting substrates are provided by broken top trees, cavities, or platforms such as those created by a hawk or squirrel nest, mistletoe broom, accumulated debris. Owls are known to nest in less than optimal habitat. Nesting areas may also be associated with characteristics of topographic relief and aspect which alter microclimates.

- Functional roosting habitat during the territorial breeding season consists of stands where average stem diameter is >11-in DBH among dominant and codominant trees. Hardwoods and conifers provide an average of at least 40 percent canopy closure, but the stand can have a high degree of variability. Stand size and configuration must be sufficient to provide multiple perch sites which are suitable for protection from various environmental conditions, including wind, heat, and precipitation.

- Functional foraging habitat is dependent upon the presence and availability of prey on the forest floor or in the canopy; presence of accessible perching limbs; and adjacency to stands with canopy closures >40 percent. Average stem diameter is usually >6-in DBH for hardwoods and >11-in DBH for conifers among dominants, and codominants, and the total overhead canopy closure, including intermediate trees is at least 40 percent. Where overall canopy closure is >80 percent, foraging habitat is limited to areas with ample flight space below limbs and among stems. Foraging habitat is smaller size classes and lower percentage canopy closures must be justified by local information.

Table 1. Approximate Acreages of the Survey Area by Alternative Analysis Area

Alternative Analysis Areas	Approximate Acreage of the Survey Area
Stafford Gen-Tie Alternative	5,613
Jordan Creek Access Road Alternative	2,829
Bridgeville Gen-Tie Alternative	2,485
Total Acreage of Survey Area	**10,927**

RESULTS

Stantec documented 9,276 ac of combined NSO habitats (i.e., nesting, roosting, and foraging) in the survey area and 1,651 ac of non-habitat (Figure 1). Of the 9,276 ac of NSO habitat in the survey area, 271 ac occurs within the project area, including 47 ac of functional nesting habitat (Table 2).

Reference: **Humboldt Wind Energy Project – Updated Habitat Assessment and Auditory and Visual Disturbance Analysis for Northern Spotted Owl and Marbled Murrelet**

Table 2. Northern Spotted Owl Habitats in the Three Alternative Analysis Areas (Stafford Gen-Tie Alternative, Jordan Creek Access Road Alternative, and the Bridgeville Gen-Tie Alternative)

Habitat Classification	Stafford Gen-Tie Alternative		Jordan Creek Access Road Alternative		Bridgeville Gen-Tie Alternative	
	Survey Area (ac)	Project Area (ac)	Survey Area (ac)	Project Area (ac)	Survey Area (ac)	Project Area (ac)
Nesting	896	22	778	10	208	15
Roosting	1217	13	741	29	824	15
Foraging	2929	76	1076	80	608	12
TOTAL[1]	**5042**	**111**	**2595**	**119**	**1640**	**42**

[1]Appoximate values provided

MARBLED MURRELET HABITAT ASSESSMENT

METHODS

This habitat assessment for MAMU also focused on the three alternative analysis areas (Stafford Gen-Tie Alternative, Jordan Creek Access Road Alternative, and Bridgeville Gen-Tie Alternative) for the project. The assessment was conducted following the general procedure described in *Methods for Surveying Marbled Murrelet in Forests: A Revised Protocol for Land Management and Research* (hereinafter, "protocol") (Evans Mack et al. 2003) and consisted of database and literature review as well as a desktop-level habitat assessment and on-the-ground evaluation.

The study area included the three alternative areas and a 0.25-mile radius around each as specified in the protocol and in *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (USFWS 2006). Table 3 below provides the approximate acreages of the study area by alternative analysis area. All three alternative analysis study areas overlap the original study area to some extent. Forest stands identified in the original report that overlap the alternative analysis study areas include stands 27, 28, 55–65, and 97. Please refer to the original report (Stantec 2018a) for information on those forest stands. Collectively, the total acreage of the three alternative analysis study areas encompass approximately 3,226 ac.

Table 3. Approximate Acreages of the Marbled Murrelet Study Area by Alternative Analysis Area

Alternative Analysis Areas	Approximate Acreage of the Study Area
Stafford Gen-Tie Alternative	1,632
Jordan Creek Access Road Alternative	865
Bridgeville Gen-Tie Alternative	729
Total Acreage of Study Area	**3,226**

The Eel River is a known flyway for MAMU transiting from the ocean to potential nesting habitats in Humboldt Redwoods State Park or other forests south and along the river. To avoid potential for collision with power

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lines associated with the project crossing the river, the proposed gen-tie will cross the river by using one of three options: 1) lines will be placed under the river; 2) lines will be placed on an existing structure that crosses the river (e.g., bridge), or; 3) lines will be typical overhead lines but will be placed in the "shadow" of an existing structure. Consequently, this analysis does not consider risk to the Eel River flyway.

Database and Literature Review; Desktop-Level Assessment

Stantec reviewed the following databases and literature: 1) HRC's existing MAMU habitat data and old-growth maps, and timber harvest data; 2) California Department of Fish and Wildlife Biogeographical Information and Observation System California Natural Diversity Database (CNDDB) MAMU occurrence records for the study area and vicinity (CDFW 2018); 3) USFWS online Critical Habitat Portal to determine whether designated critical habitat for MAMU occurs in the study area; and 4) scientific literature on characteristics of MAMU habitat. Additionally, we interviewed the professional forester for HRC to discuss stand ages and timber harvest history across the study area and vicinity.

Following review of background information, a desktop-level assessment was performed for potential MAMU nesting habitat in the study area and habitat spatial data was prepared using ESRI ArcGIS/Arcinfo. The spatial data was developed through interpretation of ESRI aerial imagery of the study area and vicinity and relied in part on HRC's existing MAMU habitat and forest stand maps and California Department of Fish and Wildlife's CNDDB occurrence records for MAMU. The desktop-level assessment primarily focused on identifying mature or older closed canopy coniferous forest stands or groups of trees in the study area. In some cases, forest stands identified in the study area also extended outside the study area. Where this occurred, the portion of the stand outside the study area was also mapped to provide a thorough evaluation of the entire stand and not just an evaluation of the portion of the stand within the study area; this expansion of the area evaluated was done so the risk assessment based on stand size considered the true extent of the stand and to identify potential to attract MAMU to cross segments of the study area. Fourteen coniferous forest stands, or groups of trees, were identified during the desktop-level assessment and were evaluated for potential to support MAMU nesting (Attachment A). Due to the sensitive nature of showing locations of these stands, and in consideration of revealing specifics of private lands (especially as we extended the analysis beyond the alternative analysis areas), no figures are included with this report depicting the specific locations of these stands. Rather, the location of each stand is referenced to one of the three alternative analysis areas (Attachment A). Eight of the 14 tree stands were identified as having poor potential to support MAMU nesting based on stand size, very high perimeter to area ratios (long narrow bands), significant openings in the canopy, or lacking co-dominant big trees. Additionally, adjacent harvest activity was used to infer stand age and previous entrance into the stands. See prior report (Stantec 2018a) for a discussion of stand size importance to MAMU.

On-The-Ground Evaluation

On-the-ground evaluations were conducted between December 17 and 20, 2018, to assess potential MAMU habitat within the forest stands identified in Attachment A.

Stantec followed the guidelines provided in the protocol to evaluate potential MAMU nesting habitat in the study area. Per the protocol, MAMU habitat is broadly defined as mature or old-growth coniferous forests, or younger coniferous forests with platforms. Platforms are characterized as greater than 4-in diameter and relatively flat and at least 33 feet up in the live crown of a coniferous tree. Platforms may include, but are not

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limited to: branches; moss, lichen, or duff covered branches; mistletoe or witch's brooms; tree deformities; and squirrel nests. The field effort included evaluating coniferous forest stands or groups of trees.

Data collected during on-the-ground evaluations included:

- Location and extent of habitat
- Topographic position of habitat on slope based on the following five categories: 1) Canyon bottom; 2) Lower 1/3 of slope; 3) Middle 1/3 of slope; 4) upper 1/3 of slope, or; 5) Ridgetop
- Percent canopy cover based on the following four categories: 1) 0–25%; 2) 26–50%; 3) 51–75%, or; 4) 76–100%
- Dominant and co-dominant tree species present
- DBH of largest tree
- Average DBH per forest stand
- Understory characteristics including dominant/co-dominant plant species
- Aspect and percent slope
- Platform(s) present or absent. When present, included type and general description of the platform(s)

We evaluated the 6 coniferous forest stands that were identified during the desktop-level assessment. These 6 stands were primarily located within or adjacent to the project area and from a desktop perspective, appear to be the stands that could most likely to possibly support MAMU nesting. In many instances, additional stands that were not evaluated on-the-ground were assessed from vantage points (e.g., ridgetops, clearings) that provided an unobstructed view of the stand, especially when they were on adjacent land ownerships that were not part of the project.

Evaluation of Marbled Murrelet Nesting Habitat

Stantec used existing information on MAMU habitat characteristics provided in scientific literature; the data collected during on-the-ground evaluations; and ESRI ArcGIS/Arcinfo analytical tools to assess habitat quality and potential MAMU use of the habitat for nesting. Parameters used to evaluate forest stands or groups of trees included:

- Stand size
- Stand perimeter length
- Stand position on slope
- DBH of largest coniferous tree in stand
- Average DBH of stand
- Platform type(s) and characteristics
- Historical and recent timber management activities and forest landscape changes
- CNDDB occurrence records for MAMU
- Stand age as described by HRC manager/forester

RESULTS AND DISCUSSION

MAMU are known to occur in the region and to nest in the general project vicinity. The CNDDB contains one occurrence record indicating occupied status (e.g., eggshell fragments, subcanopy flights) for MAMU in the survey area. This occurrence record is located west of Highway 101 in the vicinity of Stands 65–69 identified

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in the Humboldt Wind Energy Project Marbled Murrelet Habitat Assessment and Auditory and Visual Disturbance Analysis Report dated November 5, 2018.

Designated critical habitat for MAMU occurs in the study area, immediately east of Highway 101 in Humboldt Redwood State Park along the northern end of Avenue of the Giants.

Evaluation of Forest Stands

Fourteen forest stands were identified in the alternative analysis areas including 12 in the Stafford Gen-Tie Alternative and 2 in the Jordan Creek Access Road Alternative. No forest stands were identified in the Bridgeville Gen-Tie Alternative.

Stand size strongly influences the probability of nesting by MAMU; generally contiguous stands 50 ha (124 ac) or larger (Meyer et al. 2002, Meyer et al. 2007) are associated with nesting (although stands recently reduced in size by harvest may still include a nest because of the MAMU's strong fidelity to a site). Therefore, we considered any intact stand ≥124 ac to be potential nesting habitat for MAMU, if it was of sufficient age and had proper structure.

Within the study area, there is only one stand ≥124 ac (Stand 101). Although this stand is >124 ac, it is mostly composed of younger trees and no suitable MAMU nesting platforms were observed (Attachment A). All other stands in the study area are smaller and range in size from 1.5 to 46.2 acres. Based on stand size alone, the remaining stands are too small to provide reliable nesting habitat for MAMU.

A review of Google Earth historical imagery shows that timber operations have occurred throughout the survey areas for the Stafford Gen-Tie Alternative and Jordan Creek Access Road Alternative. The interview with the forester who has been managing these lands for over a decade reported that almost the entire extent of the study area on HRC land has been harvested within the last 80 to 100 years and specifically noted the proximity of these forest stands to the mill in Scotia compared to other HRC owned property. The on-the-ground evaluations found numerous redwood and Douglas-fir stumps in all six stands evaluated. In forest stands where timber harvest occurred more recently, trees were retained along drainages, which resulted in odd shaped stands with relatively high perimeter edges as identified in Attachment A.

CONCLUSION

Based on stand size and other stand characteristics (e.g., younger trees, general lack of suitable platforms), no forest stands were documented in the alternative analysis area that provide suitable nesting habitat for MAMU. All of these forest stands occur within managed timber lands and are fragmented due to recent and past timber harvests and will likely remain fragmented as the land continues to be managed for timber.

UPDATED AUDITORY AND VISUAL DISTURBANCE ANALYSIS

METHODS

The methods for the updated auditory and visual disturbance analysis follow those of the initial assessment, which were based on the USFWS's guidance document *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (USFWS 2006). An ambient sound level of ***Very Low*** was used to reflect existing conditions, similar to the previous assessment. However, for the blasting analysis an anticipated project-related sound level of ***Very High*** was used to derive

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an anticipated auditory harassment distance of 250 meter (m) and for the helicopter analysis an anticipated project-related sound level of ***Extreme*** was used to derive an anticipated auditory harassment distance of 400 m. This is different than the original auditory impact analysis, which used a ***High*** project-related sound level and an auditory harassment distance of 100 m.

The 250-m and 400-m auditory harassment distances were applied to the outer edge of the project footprint and the number of NSO Activity Center locations occurring within these buffers were tallied. NSO Activity Center data was derived from Annual Monitoring Reports prepared by HRC, which include the results of long-term monitoring for NSO within HRC ownership. HRC conducts annual NSO monitoring on one-fifth of the property. As a result, NSO Activity Centers documented between 2014-2018 were considered in this analysis.

These analyses were completed for the preferred project layout and two potential alternative areas (Stafford Gen-Tie Alternative and Jordan Creek Access Road Alternative). The Bridgeville Gen-Tie Alternative is not located within HRC property and therefore, there were no available results from long-term NSO surveys,

RESULTS

NORTHERN SPOTTED OWL

One NSO activity center occurs within the 250-m buffer around the preferred project area. This activity center is located along the preferred access road and was documented in 2018. No NSO activity centers were documented within the 250-m buffer of the Jordan Creek Access Road Alternative and the Stafford Gen-Tie Alternative. No additional activity centers are located within the 400-m buffer around the preferred or alternative project areas.

MARBLED MURRELET

Five forest stands representing MAMU habitat have been mapped in the Project area, though 2 of these 5 (Stands 66 and 68) are recently fragmented and represent marginal habitat for MAMU. All five of these stands occur within 250 m (and 400 m) of the project area and auditory harassment could occur if construction activities take place during the breeding season. Should construction activities take place outside of the mid-day period and during the MAMU nesting period, a larger buffer of 400 m would apply for sound generated by blasting. One stand (Stand 76) is located on the back side of a hill from the project area, which may limit the anticipated auditory impacts of the project on MAMU. Additionally, this stand is associated with the project's gen-tie and it is unlikely that blasting would be necessary in this location during construction, which further limits the potential for the project to have auditory impacts to MAMU that may be nesting in that stand.

Our analysis took a conservative approach and assumed an ambient sound level of ***Very Low*** for MAMU, despite the fact that 4 of the 5 mapped MAMU habitats occur immediately adjacent to Highway 101. Guidance in USFWS (2006) indicates that ambient noise conditions in these 4 stands is more likely to be ***High*** due to "…high speed highway traffic including RVs, large trusks and buses, large street and trail (not racing) motorcycles...". The use of a ***High*** ambient sound level and a predicted ***Very High*** project-related sound level results in a decrease of the potential harassment distance to 50 m for MAMU at these 4 stands and may represent a more realistic evaluation of potential effects given the conditions at those 4 stands.

Reference: **Humboldt Wind Energy Project – Updated Habitat Assessment and Auditory and Visual Disturbance Analysis for Northern Spotted Owl and Marbled Murrelet**

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January 25, 2019

Humboldt County Planning & Building Department3015 H StreetEureka, CA 95501
Attachment A. Alternative Analysis Areas – Additional Forest Stands Evaluated for Potential to Support Marbled Murrelet Nesting

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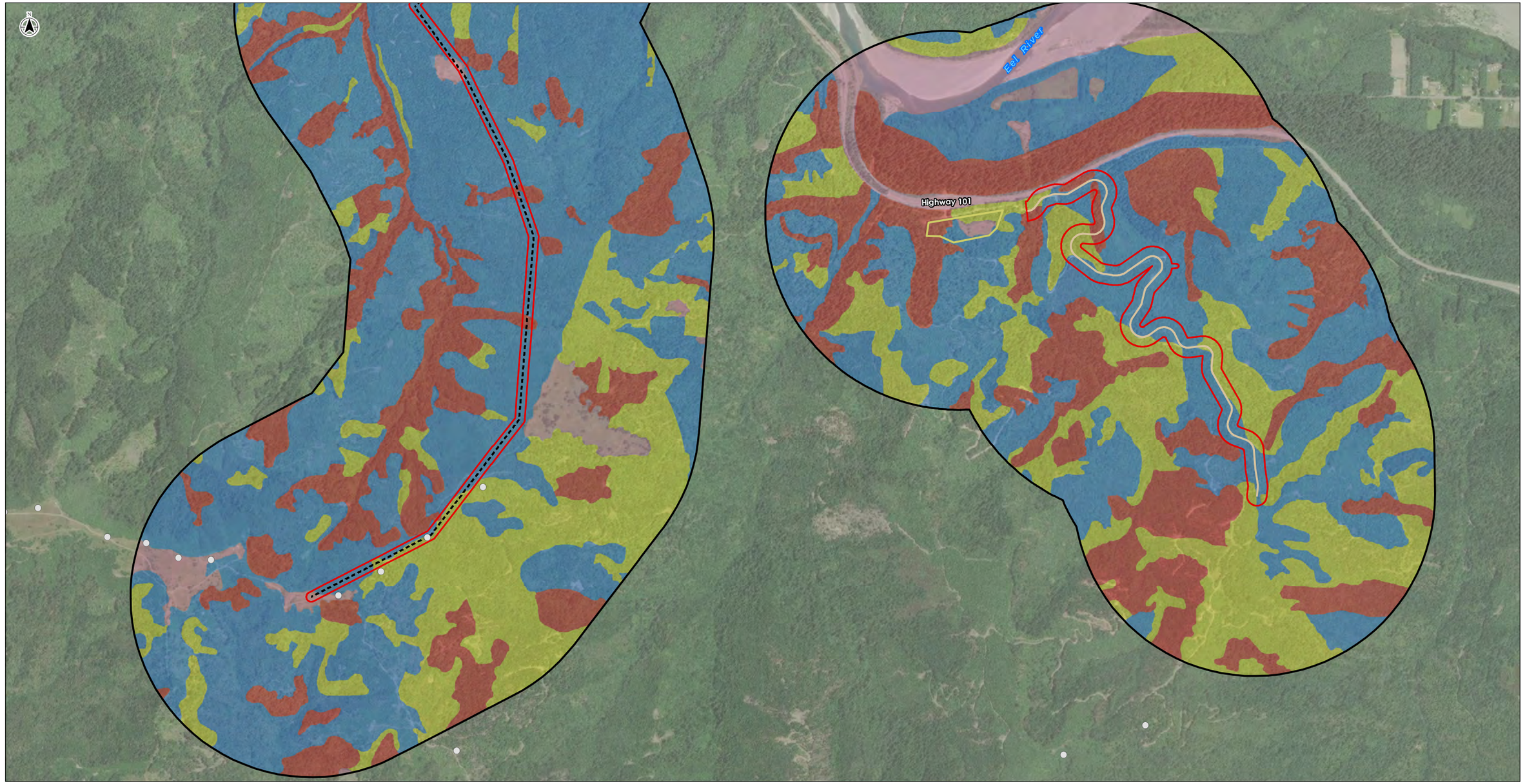
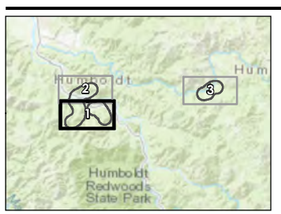
Attachment A. Alternative Analysis Areas – Additional Forest Stands Evaluated for Potential to Support Marbled Murrelet Nesting

Project Component	Stand #	Stand Size Within Study Area[1] (Acres)	Stand Size Outside Study Area (Acres)	Total Stand Size (Acres)	Stand Perimeter (Miles)	Position on Slope	Dominant/ Co-dominant Tree Species (Scientific Name)	Largest DBH Conifer Tree (ins)	Avg. DBH Conifer Tree (ins)	Percent Canopy Closure	Potential Nest Platform Types	Portion of Stand within the Project Area[2] (Acres)
Stafford Gen-Tie Alternative												
Gen-tie	101	19.4	108.4	127.8	5.5	Middle 1/3 to Upper 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii*	<60	40	0-50	No potential platforms observed	0.9
Gen-tie	102	2.3	4.8	7.1	0.6	Upper 1/3	–	–	–	–	–	0.0
Gen-tie	103	2.5	0.0	2.5	0.2	Lower 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii*	40	28	26-50	No potential platforms observed	0.0
Gen-tie	104	1.5	0.0	1.5	0.2	Ridgetop	–	–	–	–	–	0.0
Gen-tie	105	7.8	0.0	7.8	0.8	Upper 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii Notholithocarpus densiflorus*	57	<40	0-25	Few broken top trees below canopy provide potential platforms	1.1
Gen-tie	106	4.3	5.1	9.4	0.7	Lower 1/3	–	–	–	–	–	0.0
Gen-tie	107	7.3	0.0	7.3	0.4	Upper 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii*	60	<30	0-25	No potential platforms observed	0.0
Gen-tie	108	6.3	0.1	6.4	0.6	Middle 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii*	66	<30	0-25	No potential platforms observed	0.0
Gen-tie	110	1.4	7.2	8.6	0.9	Bottom	–	–	–	–	–	0.0
Gen-tie	111	7.8	2.8	10.6	0.9	Bottom to Lower 1/3	–	–	–	–	–	0.6
Gen-tie	112	8.7	9.4	18.1	1.0	Middle 1/3	–	–	–	–	–	1.6
Gen-tie	115	5.7	0.0	5.7	0.5	Middle 1/3	–	–	–	–	–	1.6
Jordan Creek Access Road Alternative												
Access road	116	37.3	8.9	46.2	1.8	Upper 1/3	*Sequoia sempervirens/ Pseudotsuga menziesii*	65	<40	0-25	No potential nest platforms observed	0.0
Access road	117	2.4	3.2	5.6	0.4	Middle 1/3	–	–	–	–	–	0.0





Project Components

- Proposed Representative Wind Turbine Locations
- Proposed Access Road Alternative
- Proposed Generation Tie-In Line (gen-tie) Alternative
- Substation
- Staging Area
- Survey Area (0.7-mile radius)
- Project Area: Potential Alternatives

Northern Spotted Owl Habitats

- Foraging
- Nesting
- Roosting
- Non-habitat

0 0.25 0.5
Miles
1 inch = 2,000 feet
(At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 10N
2. Base map: ESRI World Imagery Map web mapping service

Stantec

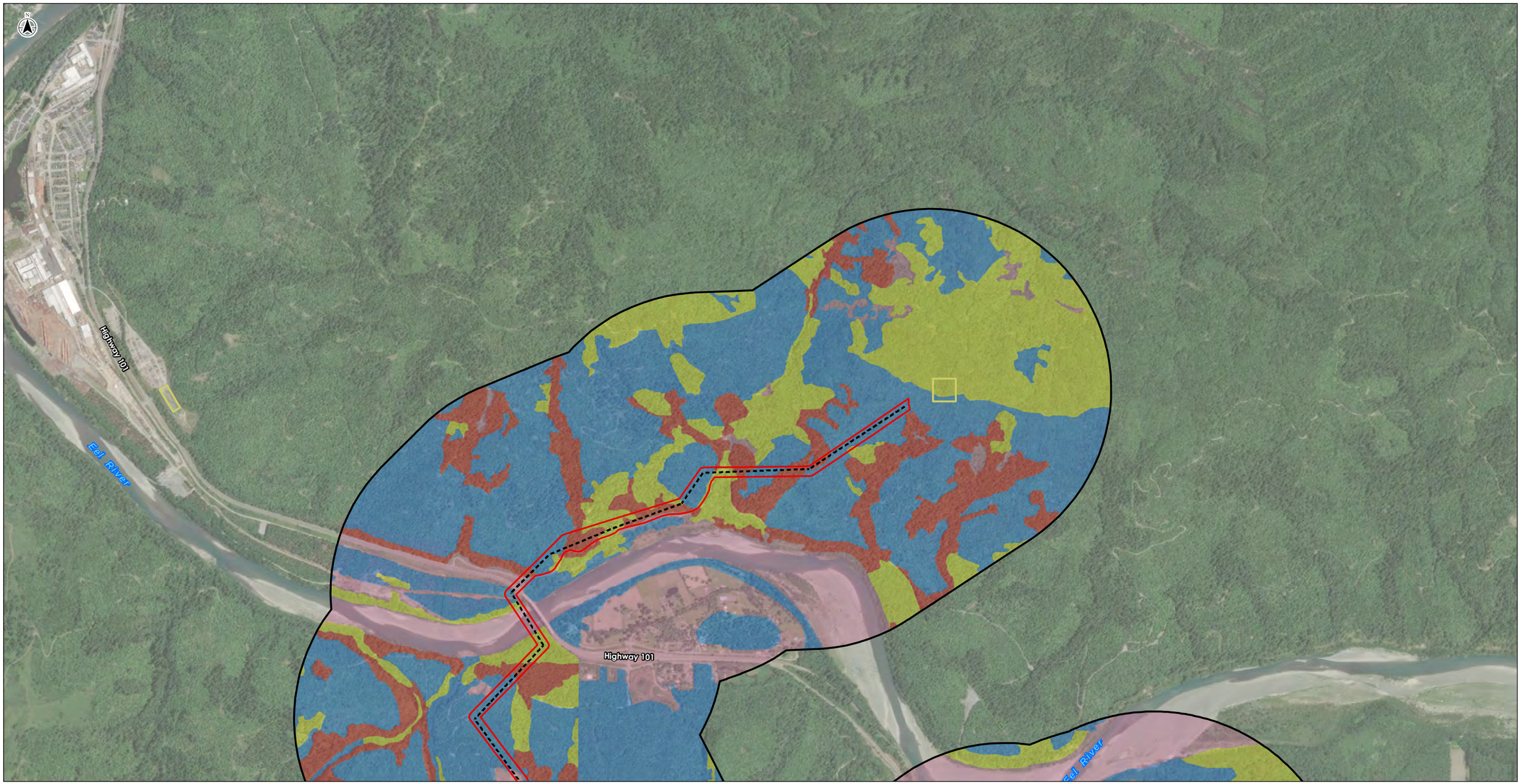
Project Location
Humboldt County, California

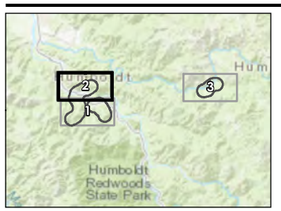
185703758
Prepared by PG on 2019-01-23
Technical Review by DP on 2019-01-23
Independent Review by WC on 2019-01-23

Client/Project
Humboldt Wind, LLC
Humboldt Wind Energy Project

Figure No.
1

Title
Northern Spotted Owl Habitats — Potential Project Alternatives





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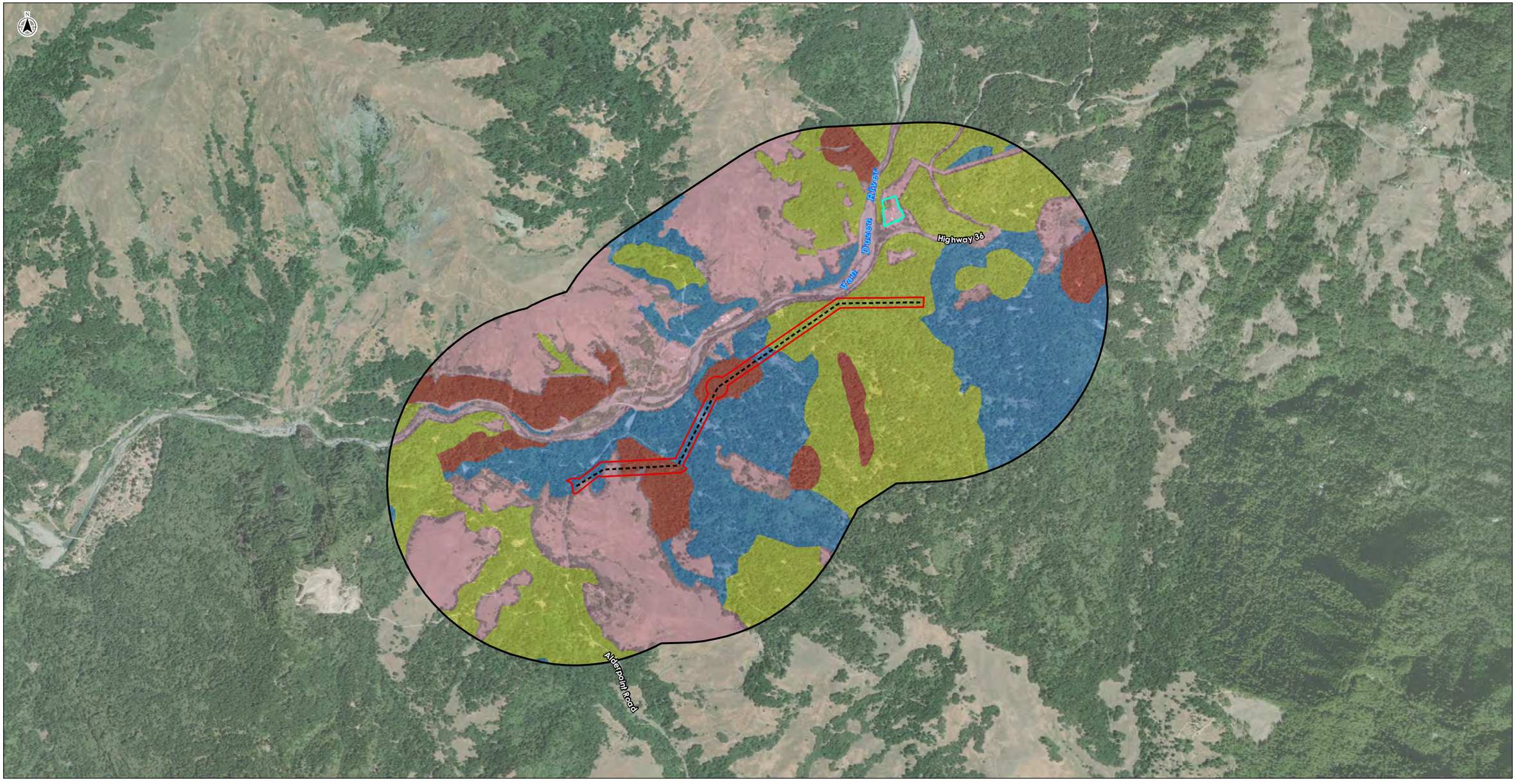
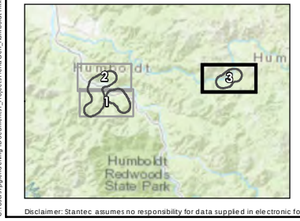
Client/Project
Humboldt Wind, LLC
Humboldt Wind Energy Project

Figure No.
1

Title
Northern Spotted Owl Habitats — Potential Project Alternatives





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- Proposed Access Road Alternative
- Proposed Generation Tie-In Line (gen-tie) Alternative
- Substation
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- Project Area: Potential Alternatives

Northern Spotted Owl Habitats

- Foraging
- Nesting
- Roosting
- Non-habitat

0 0.25 0.5
Miles
1 inch = 2,000 feet
(At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 10N
2. Base map: ESRI World Imagery Map web mapping service

Stantec

Project Location
Humboldt County, California

185703758
Prepared by PG on 2019-01-23
Technical Review by DP on 2019-01-23
Independent Review by WC on 2019-01-23

Client/Project
Humboldt Wind, LLC
Humboldt Wind Energy Project

Figure No.
1

Title
Northern Spotted Owl Habitats — Potential Project Alternatives