

Sand Hill Wind Repowering Project

Appendix A-4. Assessment of Turbines 31 through 40

March 2019

Turbine 31

Turbine 31 has two locations for the four layouts, Site 31A (Layouts 1, 2, and 3) and Site 31B (Layout 4). Site 31B is approximately 75 feet southwest of Site 31A (Figure A-31).

Topographical Description

Sites 31A and 31B are both on relatively low-profile hilly terrain. Both are on a relatively flat and broad, low-profile ridge/hilltop (Plate 71).

Proximity to Other Potential Risk Factors

There is an overhead powerline within 100 to 200 feet (which would be removed) and a transmission line corridor within 450 feet.

Relative Risk and Determination

Both sites are considered low-risk. There are no topographic features in the immediate vicinity that would influence predictable raptor movement. Site 31A is closer to the east-facing slope and thus is considered somewhat slightly riskier. Placement of the turbine pad at this location could slightly change the configuration of the slope edge, but not sufficient to influence raptor movement. Access road construction would also not affect raptor use or movements.

Recommendation

Site 31B is the recommended site because it is more centrally located on the flat, broad hilltop. No relocation is recommended. This is generally consistent with Smallwood and Neher (2018).



Plate 71. Looking south from Site 31B



Figure A-31
Location of Alternative Sites for Turbine 31 at the Sand Hill Wind Project

Turbine 32

Turbine 32 has only one location (Site 32A) for the four layouts (Figure A-32). A second location was initially noted, but because they are within 8 feet of each other, they are considered here as the same site.

Topographical Description

Site 32A is on a flat, broad northwest-southeast-oriented ridge top/plateau with no features in the immediate area that would influence raptor flight patterns (Plate 72).

Proximity to Other Potential Risk Factors

There is an overhead powerline within 50 feet (which will be removed) and a fence line within 6 feet of the site.

Relative Risk and Determination

Site 32A is considered a low risk site due to the flat terrain and lack of topographical features in the immediate area that would influence raptor use or flight patterns. Access road and turbine pad construction would also not affect raptor use or movements.

Recommendation

Site 32A is the recommended site. There are no recommendations for relocation. This is generally consistent with Smallwood and Neher (2018).



Plate 72. Looking north-northeast from Site 32A.

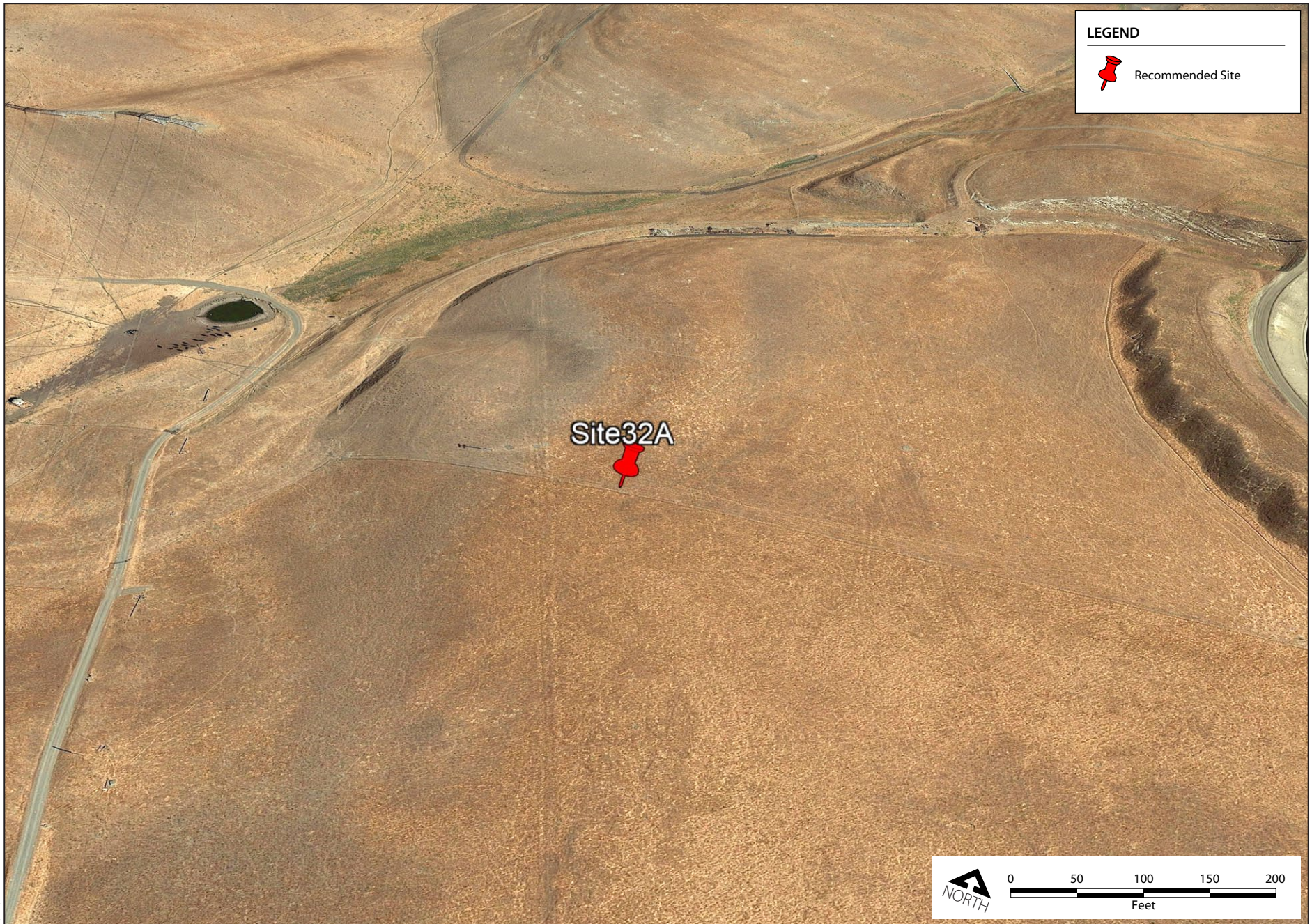


Figure A-32
Location of Alternative Sites for Turbine 32 at the Sand Hill Wind Project

Turbine 33

Turbine 33 has only one location (Site 33A) for the four layouts (Figure A-33).

Topographical Description

Site 33A is on a broad, flat, ridge top/plateau with no topographic features in the vicinity that would influence raptor use (Plate 73).

Proximity to Other Potential Risk Factors

There is a transmission line approximately 550 feet west.

Relative Risk and Determination

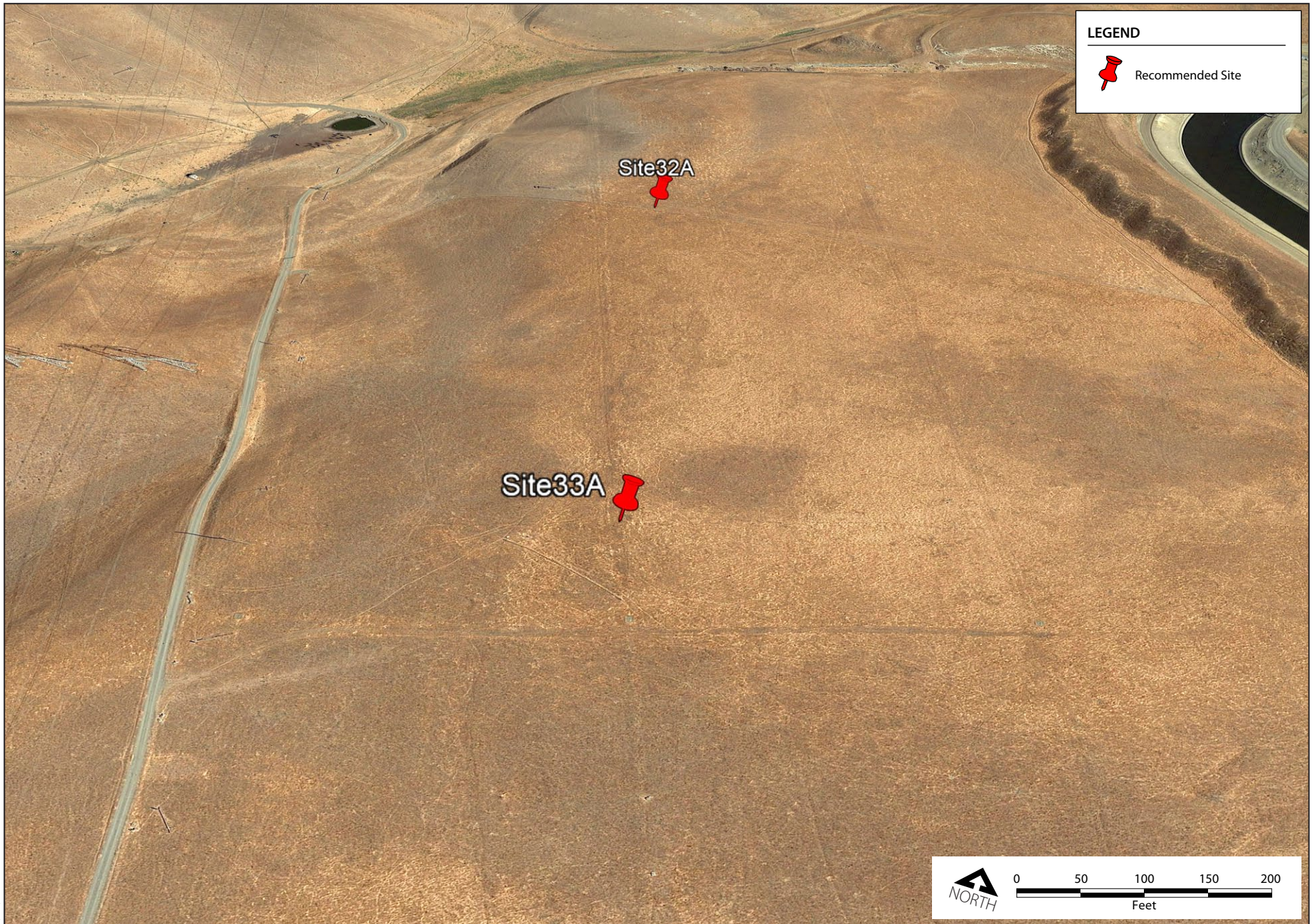
Site 33A is considered a low risk site due to the flat terrain and lack of topographical features that would influence raptor use or flight patterns. Access road and turbine pad construction would also not affect raptor use or movements.

Recommendation

Site 33A is the recommended site. There are no recommendations for relocation. This is generally consistent with Smallwood and Neher (2018).



Plate 73. Looking east from Site 33A.



1/07/2019

SOURCE: Google Earth 2018.

Figure A-33
Location of Alternative Sites for Turbine 33 at the Sand Hill Wind Project

Turbine 34

Turbine 34 has only one location (Site 34A) for the four layouts (Figure A-34). A second location was initially noted, but it is within 10 feet of Site 34A, so they are considered here as the same site.

Topographical Description

Site 34A is within and at the lowest point is an east-west-oriented swale leading up toward a saddle on the east. Elevation increases in all directions surrounding the site (Plates 74 and 75).

Proximity to Other Potential Risk Factors

A transmission line is 580 feet from Site 34A.

Relative Risk and Determination

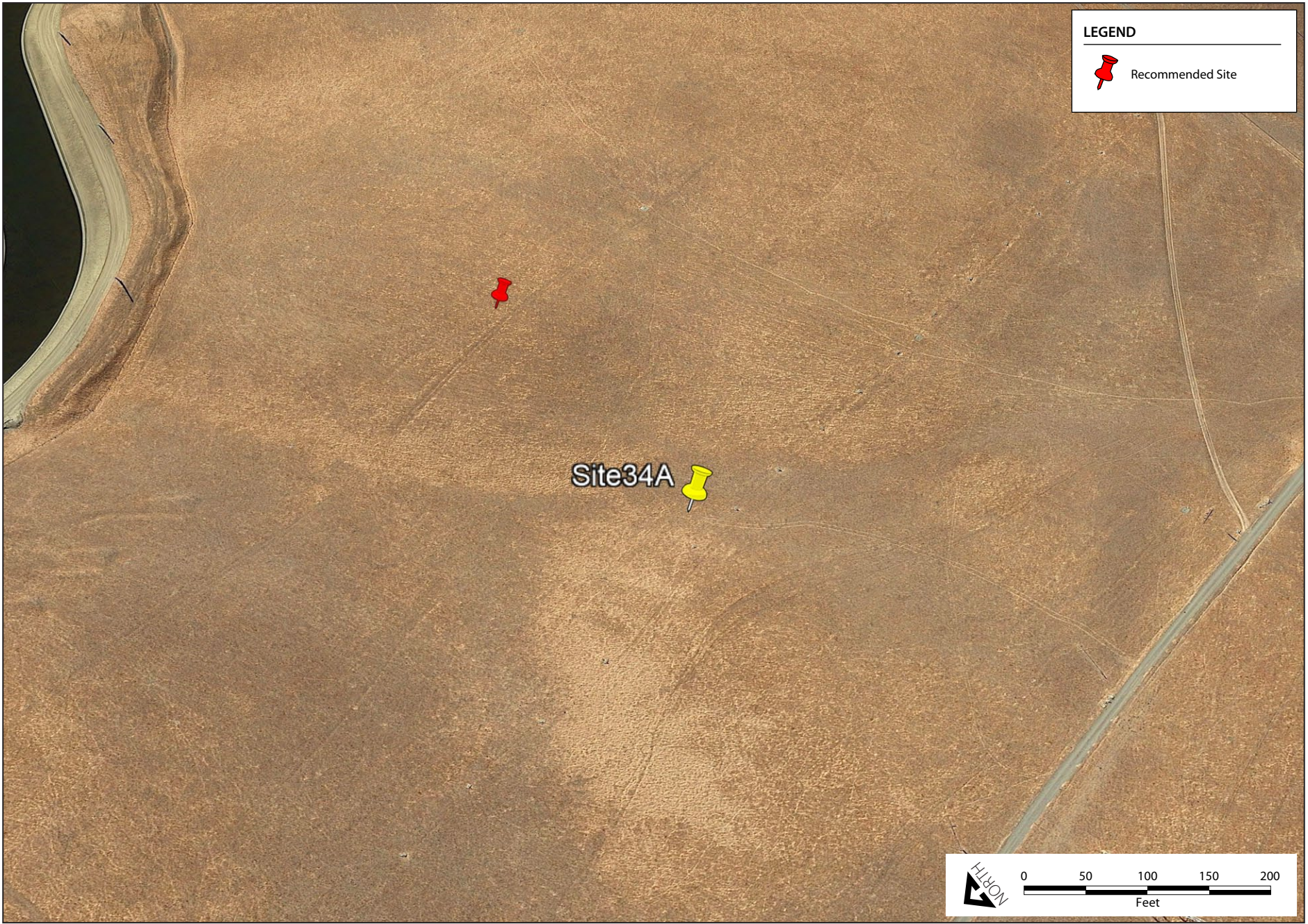
Site 34A is considered a high-risk site due to its position within the swale and at the base of upward slopes on all sides.

Recommendation

Risk can be reduced at Site 34A by relocating the site upslope to the east-southeast approximately 350 feet (37.775806/121.589371) to the hilltop. This will move the site out of the swale and onto the hill/ridge top, where there is otherwise flat, open terrain (Plate 76). Although the risk determination is consistent with Smallwood and Neher (2018), they did not recommend a relocation alternative.



Plate 74. Looking east through the swale from Site 34A.



1/07/2019

SOURCE: Google Earth 2018.

Figure A-34
Location of Alternative Sites for Turbine 34 at the Sand Hill Wind Project



Plate 75. Looking west, upslope from Site 34A.



Plate 76. Looking northwest from recommended relocation site for Site 34A outside and south of the swale

Turbine 35

Turbine 35 has only one location (Site 35A) for the four layouts (Figure A-35). A second location was initially noted, but it is within 10 feet of Site 35A, so they are considered here as the same site.

Topographical Description

Site 35A is on a broad, flat ridge top that slopes gently (5%) eastward (Plate 77). There are no other topographic features in the immediate vicinity of the site.

Proximity to Other Potential Risk Factors

None.

Relative Risk and Determination

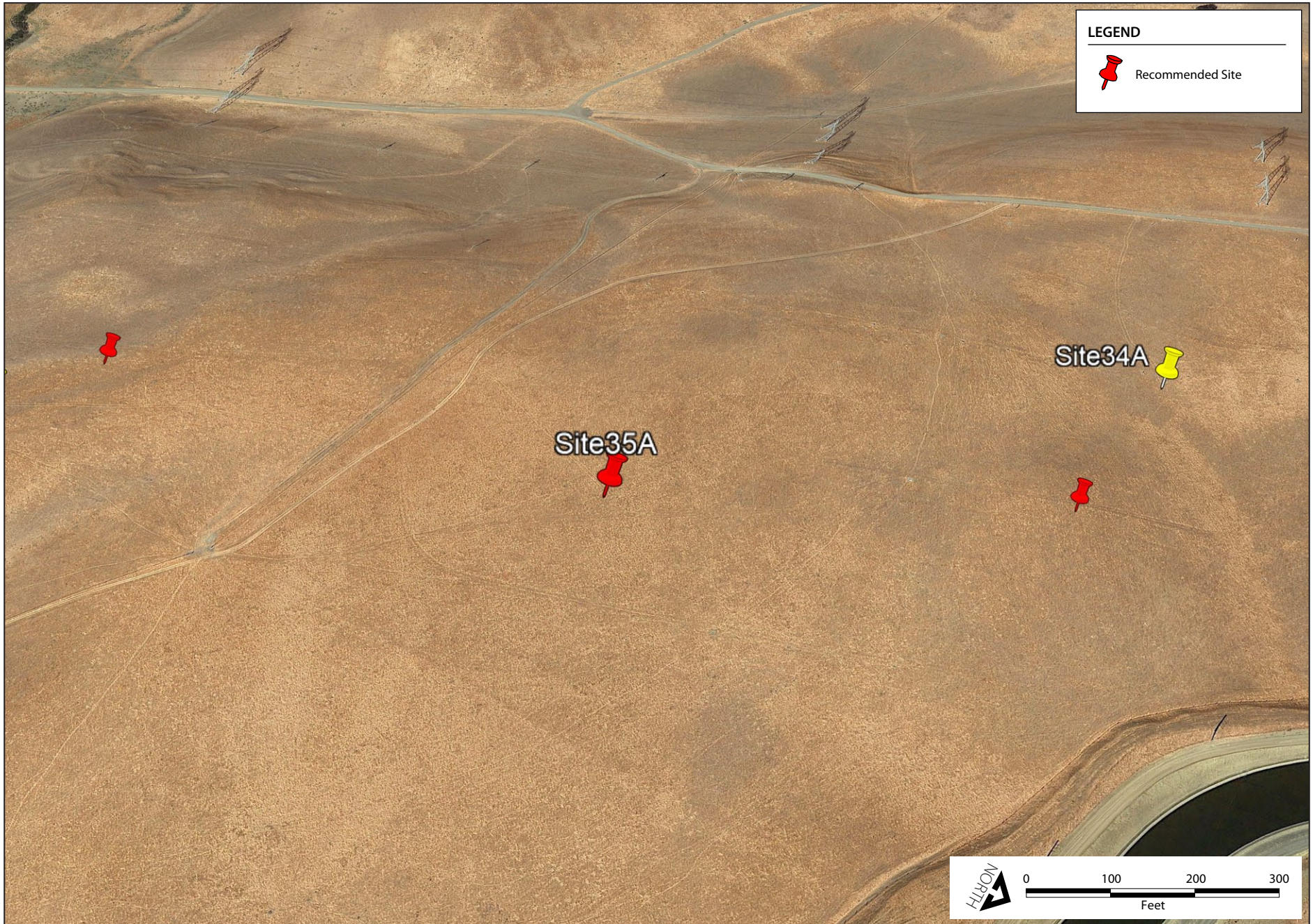
Site 35A is considered a relatively low-risk site due to the flat terrain with no other topographic features that will influence or that can be used to clearly predict raptor movement through the site. Access road and turbine pad construction would also not affect raptor use or movements.

Recommendation

Site 35A is the recommended site. There are no recommendations for relocation. This is generally consistent with Smallwood and Neher (2018).



Plate 77. Looking east from Site 35A.



SOURCE: Google Earth 2018.

Figure A-35
Location of Alternative Sites for Turbine 35 at the Sand Hill Wind Project

Turbine 36.

Turbine 36 has only one location (Site 36A) for the four layouts (Figure A-36). A second location was initially noted, but it is within 10 feet of Site 36A, so they are considered here as the same site.

Topographical Description

Site 36A is at the south end of the broad and flat north-south-oriented ridge/plateau above Mountain House Road. The southeast-facing slope descends gradually (10%) south and east into a deep ravine (Plate 78). The slope ascends to the northwest where it evens out onto the flat plateau (Plate 79).

Proximity to Other Potential Risk Factors

None.

Relative Risk and Determination

Site 36A is considered a moderate-risk site due to its location on the south-east-facing slope. The site is close to the steeper portion of the south-facing slope, which could pose some risk to birds using the hill contour for movement or foraging. Road and turbine pad construction could also potentially create a shallow bench and berm and could influence raptor movement along the slope.

Recommendation

Risk could be reduced by moving the site at least 200 feet upslope to the northwest (37.771814/121.587380). This would move the site further away from the edge of the south-facing slope. This is generally consistent with Smallwood and Neher (2018).

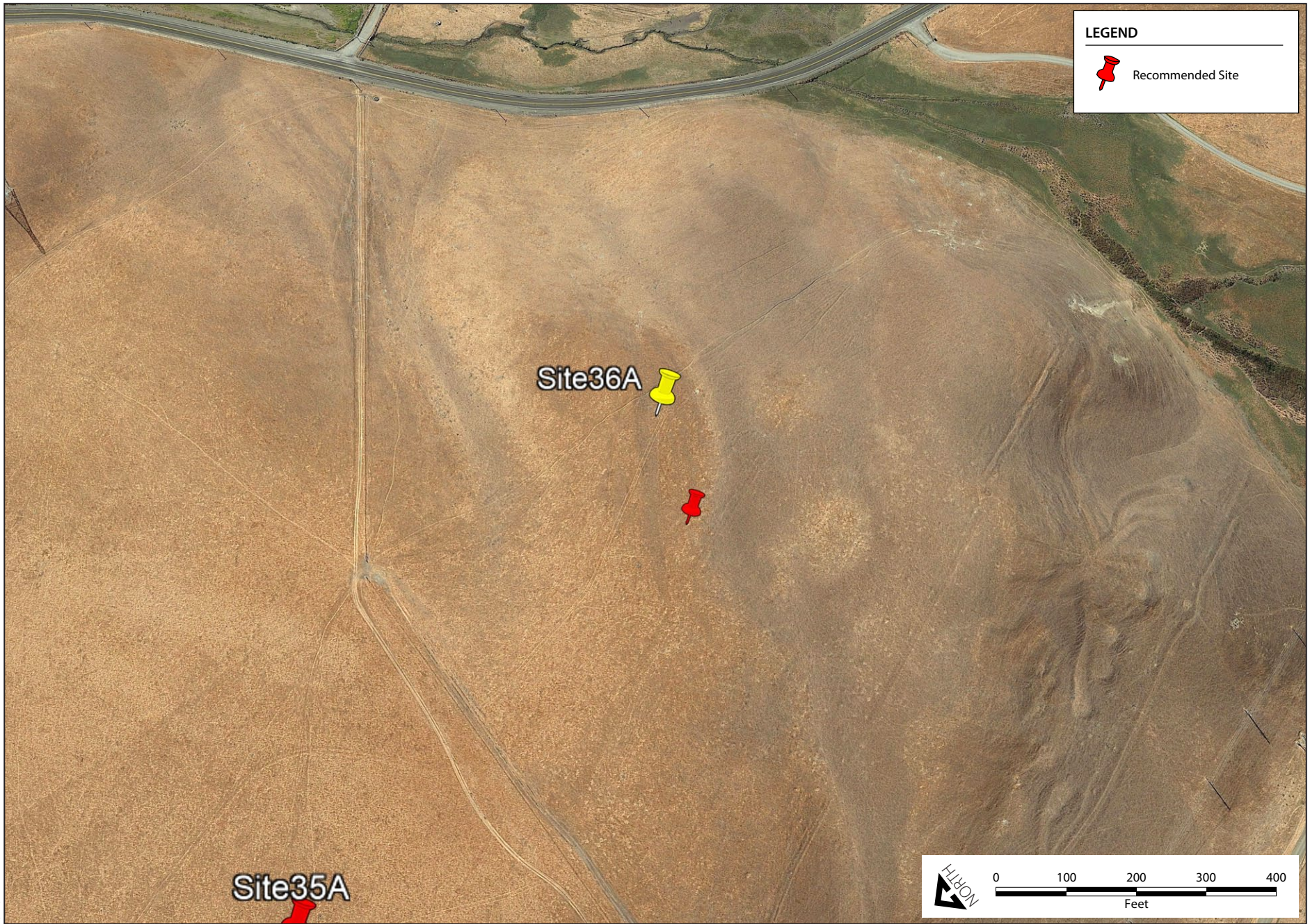


Figure A-36
Location of Alternative Sites for Turbine 36 at the Sand Hill Wind Project



Plate 78. Looking southeast from Site 36A, just upslope from steeper drop-off to south and east.



Plate 79. Looking northwest from Site 36A. Recommended location is just up slope from this site. Note that the slope at this location is not extreme, but the turbine pad would create a shallow bench in close proximity to the steeper slope just south of this location.

Turbine 37

Turbine 37 has only one location (Site 37A) for the four layouts (Figure A-37). A second location was initially noted, but it is within 10 feet of Site 37A, so they are considered here as the same site.

Topographical Description

Site 37A is located at the far north end of a mostly flat plateau with a gradual downward eastern slope on the eastern edge of the APWRA. The site is at the top of a deep north-south swale creating a saddle along the ridge top of the plateau (Plate 80). The surrounding area is generally flat and featureless.

Proximity to Other Potential Risk Factors

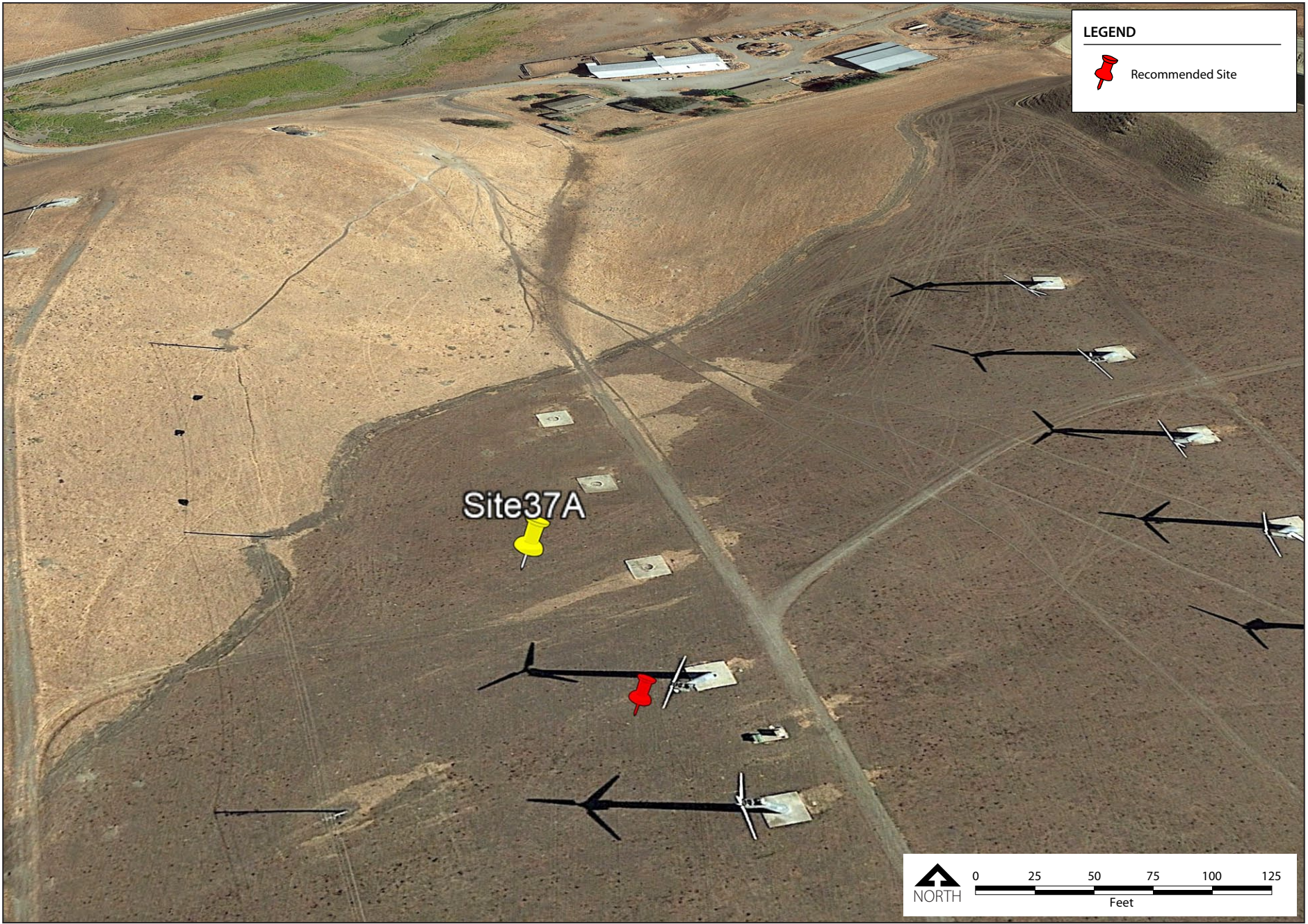
There is a decommissioned meteorological tower with approximately 200 feet and an overhead powerline within 120 feet (both which would be removed), and a transmission line within 540 feet of Site 37A.

Relative Risk and Determination

Because Site 37A is at the top of a deep swale in line of the ridge saddle, it is considered a high-risk site. Raptors moving up through the swale and the saddle will encounter the turbine, which will have rotors that extend across the breadth of the swale/saddle.

Recommendation

To reduce risk at Site 37A, move the turbine 140 feet south-southwest (37.768403/121.580945) (Plate 81). This will move the turbine away from the top of the deep swale and onto flat ground. Alternatively, move the site west about 300 feet toward the existing access road. However, this would place the turbine within 240 feet of a transmission line. This is generally consistent with Smallwood and Neher (2018).



1/07/2019

SOURCE: Google Earth 2018.

Figure A-37
Location of Alternative Sites for Turbine 37 at the Sand Hill Wind Project



Plate 80. Looking north from Site 37A toward the saddle/swale.



Plate 81. Looking northwest from recommended site. Site 37A is located where the person in the background is standing at the top of the swale.

Turbine 38

Turbine 38 has only one location (Site 38A) for the four layouts (Figure A-38). A second location was initially noted, but it is within 10 feet of Site 38A, so they are considered here as the same site.

Topographical Description

Site 38A is located on a mostly flat plateau with a gradual downward eastern slope on the eastern edge of the APWRA (Plate 82). There is a shallow north-south swale about 200 feet west of the site, but otherwise no topographical features in the immediate vicinity.

Proximity to Other Potential Risk Factors

There is an overhead powerline within 30 feet (which would be removed), a transmission line within 540 feet, and a fence line within 200 feet of Site 38A.

Relative Risk and Determination

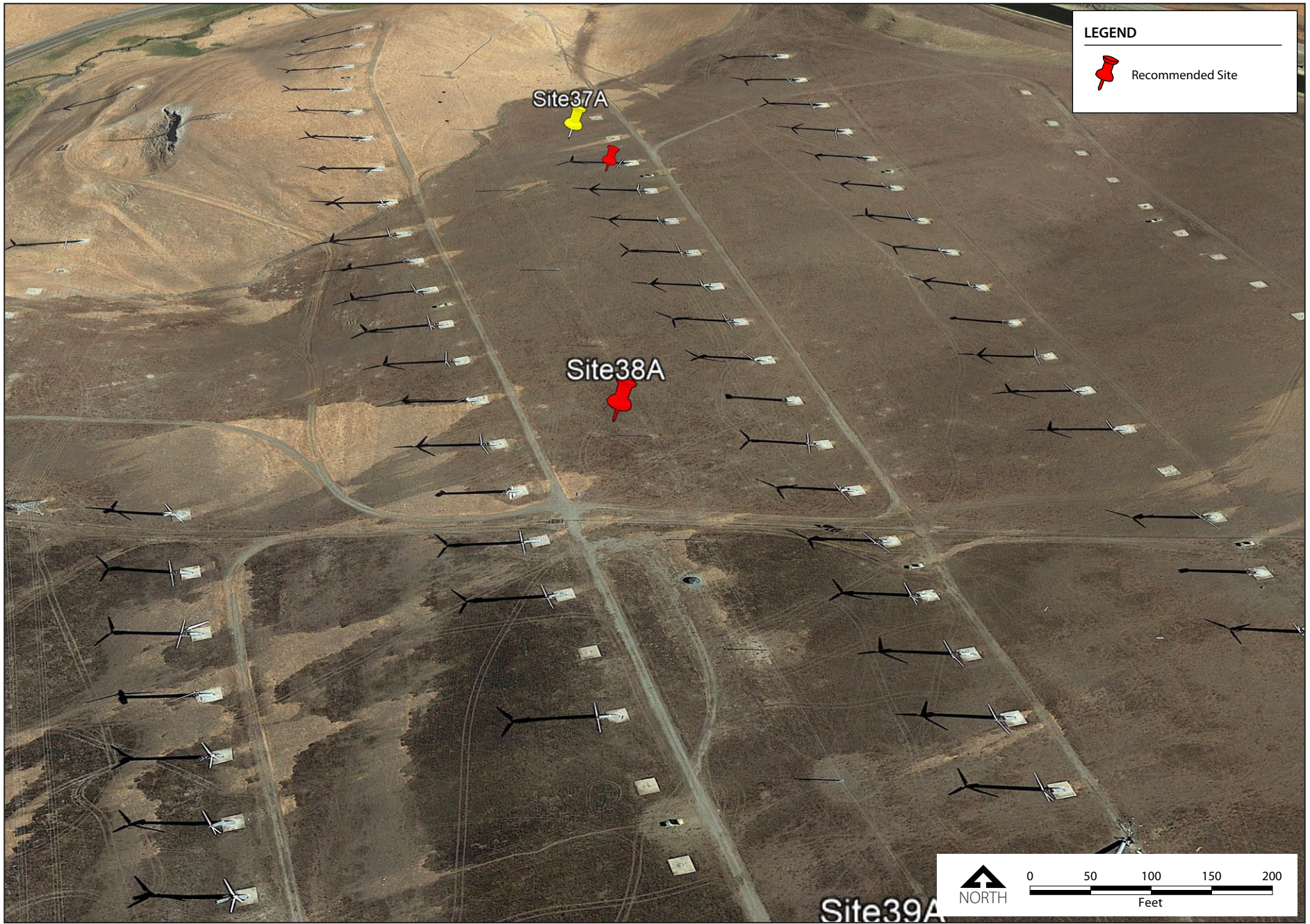
Site 38A is considered a low-risk site. There are no features in the immediate vicinity that would influence predictable raptor movements. Access road and turbine pad construction would also not affect raptor use or movements.

Recommendation

Site 38A is the recommended site. There is no recommendation for relocation. This is generally consistent with Smallwood and Neher (2018).



Plate 82. Looking east from Site 38A.



1/07/2019

SOURCE: Google Earth 2018.

Figure A-38
Location of Alternative Sites for Turbine 38 at the Sand Hill Wind Project

Turbine 39

Turbine 39 has only one location (Site 39A) for the four layouts (Figure A-39).

Topographical Description

Site 39A is located on a mostly flat plateau with a gradual downward eastern slope on the eastern edge of the APWRA (Plate 83). There are no significant topographical features in the immediate vicinity.

Proximity to Other Potential Risk Factors

There is a distribution line within 30 feet (which would be removed) and a transmission line within 540 feet.

Relative Risk and Determination

Site 39A is considered a low-risk site. There are no features in the immediate vicinity that would influence predictable raptor movements. Access road and turbine pad construction would also not affect raptor use or movements.

Recommendation

Site 39A is the recommended site. There is no recommendation for relocation. This is generally consistent with Smallwood and Neher (2018).



Plate 83. Looking north from Site 39A.



SOURCE: Google Earth 2018.

Figure A-39
Location of Alternative Sites for Turbine 39 at the Sand Hill Wind Project

Turbine 40

Turbine 40 has two alternative locations, Site 40A (the location for layouts 1, 2, and 3); and Site 40B (the location for layout 4) (Figure A-40). However, these sites are only 34 feet from each other on similar terrain, and so are addressed together.

Topographical Description

Sites 40A and B are on a gradual (12%) south-southeast-facing slope at the south end of a long, otherwise flat plateau (Plates 84 and 85). The site is just downslope from a slope break, descending gradually for an additional 1,200 feet before reaching a small drainage at the far southern end of the plateau feature, and ascending gradually to the north-northwest about 250 feet before levelling. From east to west, the plateau extends for about 700 feet before descending. There are no other significant topographical features in the immediate area.

Proximity to Other Potential Risk Factors

There is an overhead powerline within 30 feet (which would be removed) and a transmission line corridor within 700 feet of the site.

Relative Risk and Determination

Because they are below the ridge top, descending slopes along ridges – even on broad plateaus, are often used by raptors as crossing points to access one side of a ridge to the other. Road and turbine pad construction at these locations would also create a shallow bench on the slope.

Because Sites 40A and B are on a descending slope of the plateau – even within an otherwise low-profile topographical landscape, the sites are considered moderate risk.

Recommendation

Risk can be reduced somewhat by relocating the turbine northwestward of Site 40B for approximately 275 feet where the slope begins to level off (37.762312/121.579552). This is generally consistent with Smallwood and Neher (2018); however, they do not recommend relocation to reduce potential risk.



1/07/2019

SOURCE: Google Earth 2018.

Figure A-40
Location of Alternative Sites for Turbine 40 at the Sand Hill Wind Project



Plate 84. Looking south along the gradually descending slope from Site 40A.



Plate 85. Looking upslope to north from Site 40A toward Site 40B, about 34 feet upslope.