Appendices

Appendix A

Visual Simulations

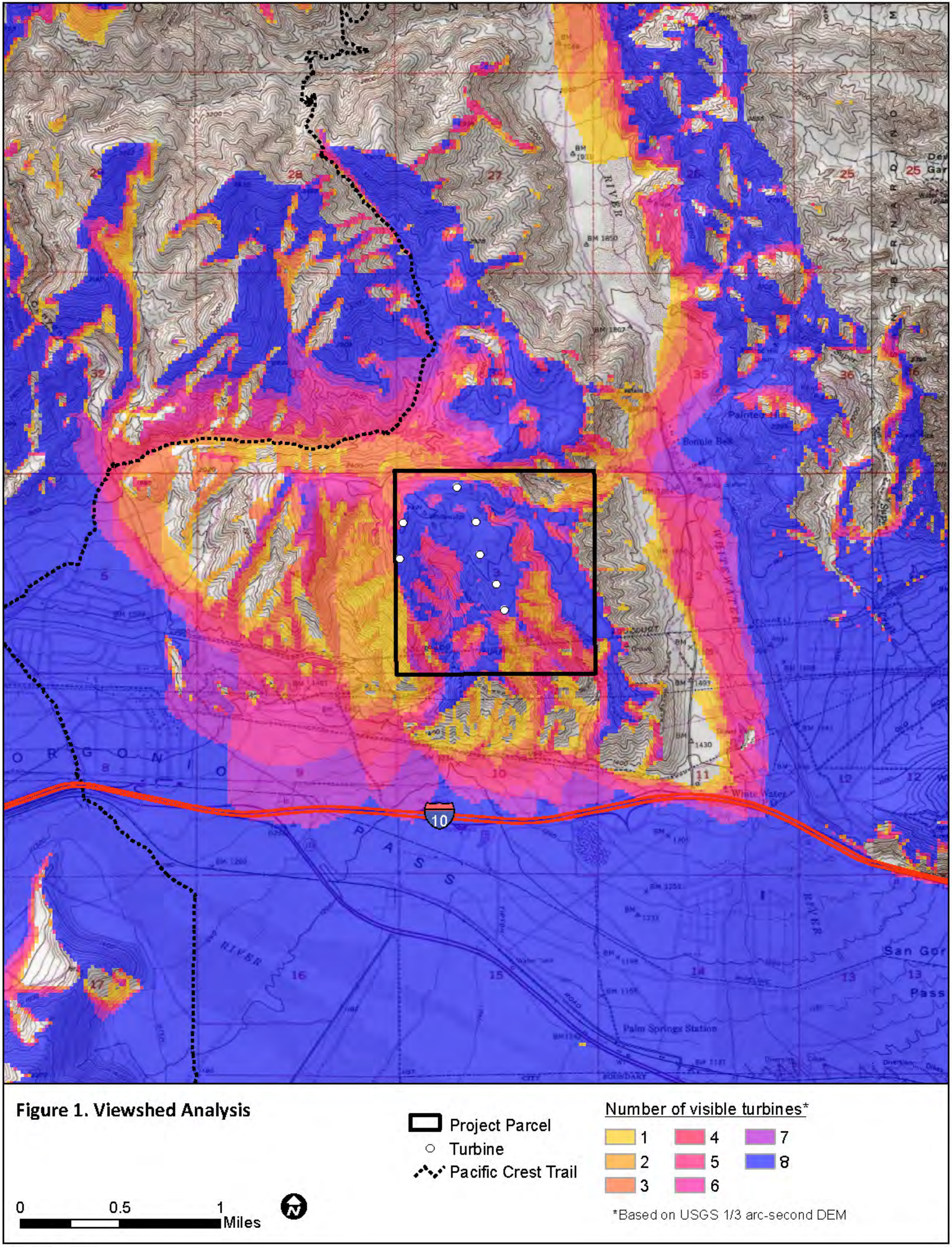

Figure 1. Viewshed Analysis

Michael Clayton & Associates

LEGEND

❷➤ Key Observation Point (KOP)

▭ Alta Mesa Project Boundary

KOP Map

Alta Mesa Repower Project
Aesthetics
Figure 2

This image presents the **Existing View** to the southwest from **KOP 1** on Whitewater Canyon Road at the south end of the residential community of Bonnie Bell. This view captures a portion of the ridge that forms the western border of Whitewater Canyon. The landscape appears relatively undeveloped, though further to the south along the ridge are electric transmission line structures and wind turbine generators (WTGs) that are visible to the north.

KOP 1
Bonnie Bell

Existing View

AM Wind Repower Project
Aesthetics
Figure 3a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 1** on Whitewater Canyon Road at the south end of the residential community of Bonnie Bell. As shown in the simulation, portions of seven of the eight proposed WTGs would be visible in this frame of view. The viewing distances from KOP 1 to the visible WTGs would range from approximately 1.1 miles to approximately 1.4 miles. The structures would be visually noticeable features along the ridgeline.

KOP 1
Bonnie Bell

Visual Simulation

AM Wind Repower Project
Aesthetics
Figure 3b

This image presents the **Existing View** to the northeast from **KOP 2** on Haugen-Lehmann Way in the rural residential community of White Water. This view captures a portion of the sparsely vegetated hillslopes and ridge that border the eastern perimeter of the residential community. The ridges northeast of the community presently host numerous wind turbine generators as is apparent in the image.

KOP 2
White Water

Existing View

AM Wind Repower Project
Aesthetics
Figure 4a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 2** on Haugen-Lehmann Way in the rural residential community of White Water. As shown in the simulation, portions of the eight proposed WTGs would be visible along the ridgeline bordering the eastern perimeter of the residential community. The proposed Project also includes removal of the existing, lower-capacity WTGs (single-pole support structures) presently on site.

KOP 2
White Water

Visual Simulation

AM Wind Repower Project
Aesthetics
Figure 4b

This image presents the **Existing View** to the north from **KOP 3** on Snow Creek Road, just north of the rural residential enclave of Snow Creek Village. This expansive view to the north across San Gorgonio Pass captures a portion of the ridge north of I-10 where the proposed Project would be located. The grouping of WTGs extending above the ridgeline in the center of the image would be replaced by proposed Project. The landscape is decidedly rural in character but hosts numerous energy facilities.

KOP 3
Snow Creek Village

Existing View

AM Wind Repower Project
Aesthetics
Figure 5a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 3** on Snow Creek Road, just north of the rural residential enclave of Snow Creek Village. As shown in the simulation, portions of the eight proposed Alta Mesa WTGs would be prominently visible along the ridgeline of the San Bernardino Mountains north of 1-10. The proposed Project also includes removal of the numerous, existing, lower-capacity WTGs (single-pole support structures presently on site.	**KOP 3** **Snow Creek Village** **Visual Simulation**	**AM Wind Repower Project** **Aesthetics** **Figure 5b**

This image presents the **Existing View** to the south from **KOP 4** on the Pacific Crest Trail, approximately 1.25 miles north of the location of the proposed Project. The imposing form of Mount San Jacinto in the background, is the dominant feature in a landscape that, while predominantly natural in appearance, hosts several wind farms with numerous WTGs that exhibit a contrasting industrial character, as shown in this image.

KOP 4
Pacific Crest Trail
Existing View

AM Wind Repower Project
Aesthetics
Figure 6a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 4** on the Pacific Crest Trail, approximately 1.25 miles north of the location of the proposed Project. As shown in the simulation, portions of all eight WTGs would be visible along the ridgelines in the center of the image The proposed Project includes the removal of numerous, existing, lower-capacity WTGs (single-pole support structures) presently on site.	**KOP 4** **Pacific Crest Trail** **Visual Simulation**	**AM Wind Repower Project** **Aesthetics** **Figure 6b**

This image presents the **Existing View** to the east-northeast from **KOP 5** in Cabazon at the Circle K parking lot, adjacent to the Main Street off-ramp from 1-10, approximately 6.7 miles west-southwest of the location of the proposed Project. This view encompasses an urban freeway landscape of off-ramps and overpasses, backdropped by the southeast extent of the San Bernardino Mountains. Existing WTGs are faintly visible along the ridgelines upon which the proposed Project would be located.

KOP 5
Cabazon

Existing View

AM Wind Repower Project
Aesthetics
Figure 7a

This image presents the **Visual Simulation** of the proposed Project as viewed from **KOP 5** in Cabazon at the Circle **K** parking lot, adjacent to the Main Street off-ramp from 1-10. As shown in the simulation, portions of all eight WTGs would be visible (though not prominent) along the distant ridgelines visible above the Main Street overpass in the center of the image. The proposed Project also includes removal of the existing, lower-capacity WTGs (tubular support structures) presently on site.

KOP 5
Cabazon

Visual Simulation

AM Wind Repower Project
Aesthetics
Figure 7b

This image presents the **Existing View** to the north from **KOP 6** on SR-111, approximately 0.8 mile east of Snow Creek Road and approximately 1.9 miles south of the location of the proposed Project. This view encompasses the southeastern extent of the San Bernardino Mountains and the ridges north of I-10 where the proposed Project would be located. The grouping of WTGs extending above the ridgeline in the center of the image would be replaced by the proposed Project.

KOP 6
SR-111

Existing View

AM Wind Repower Project
Aesthetics
Figure 8a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 6** on SR-111, approximately 0.8 mile east of Snow Creek Road. As shown in the simulation, portions of all eight WTGs would be prominently visible along the ridgeline north of 1-10. The proposed Project also includes removal of the numerous, existing, lower-capacity WTGs (single-pole support structures) presently on site.	**KOP 6** SR-111 **Visual Simulation**	**AM Wind Repower Project** **Aesthetics** **Figure 8b**

This image presents the **Existing View** to the east from **KOP 7** on Rushmore Avenue near Penland Road in the rural residential community of White Water (west). This view captures a portion of the sparsely vegetated hillslopes and ridges that border the eastern perimeter of the residential community. The ridges northeast of the community presently host numerous wind turbine generators, the closest string of which is approximately 2.7 miles east of KOP 7.

KOP 7
White Water West

Existing View

AM Wind Repower Project
Aesthetics
Figure 9a

This image presents a **Visual Simulation** of the proposed Project as viewed from **KOP 7** on Rushmore Avenue near Penland Road in the rural residential community of White Water (west). As shown in the simulation, portions of the eight proposed WTGs would be prominently visible along the ridgeline bordering the eastern perimeter of the residential community. The proposed Project also includes removal of the existing, lower-capacity WTGs (single-pole support structures) presently on site.

KOP 7
White Water West

Visual Simulation

AM Wind Repower Project
Aesthetics
Figure 9b

Latitude: 33.946581°   Longitude: -116.642462°

This image presents a **Cumulative Simulation** of the **revised** Alta Mesa and Mesa Wind Repower projects as viewed from **KOP 1** on Whitewater Canyon Road at the south end of the residential community of Bonnie Bell. As shown in the simulation, portions of seven Alta Mesa WTGs would be visible along the ridgelines west of Bonnie Bell. Portions of three Mesa Wind Project WTGs (right center to far right of image would also be visible along the ridgeline. All of the existing turbines would be removed from the ridges.	**KOP 1** **Bonnie Bell** **Cumulative Simulation**	**Alta Mesa & Mesa Wind Repower Projects** **Figure 10a**

Latitude: 33.928230˚ Longitude: -116.689077°

This image presents a **Cumulative Simulation** of both the proposed Alta Mesa and Mesa Wind Repower Projects as viewed from **KOP 2** on Haugen-Lehmann Way in the rural residential community of White Water. As shown in the simulation, portions of seven Alta Mesa WTGs would be visible along the ridgeline bordering the eastern perimeter of the residential community. Two (left-center) Mesa Wind WTGs would be visible on the ridge to the northeast of the community. All existing turbines would be removed.	**KOP 2** **White Water** Cumulative Simulation	Alta Mesa & Mesa Wind Repower Projects **Figure 10b**

This image presents a **Cumulative Simulation** of both the proposed Alta Mesa and Mesa Wind Repower Projects as viewed from KOP 3 on Snow Creek Road, just north of the rural residential enclave of Snow Creek Village. As shown in the simulation, portions of seven Alta Mesa WTGs would be visible in the central part of the image. Two Mesa Wind WTGs would be prominently visible in the left side of image while the blade tips of a third Mesa WTG rotor would be partially visible in the central part of the image.

KOP 3
Snow Creek Village

Cumulative Simulation

Alta Mesa & Mesa Wind
Repower Projects
Figure 10c

Appendix B

Air Quality

Mesa Wind Repower - CEQA Tech Support

Salton Sea Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	1,300.00	1000sqft	29.84	1,300,000.00	0

1.2 Other Project Characteristics

Urbanization Rural

Wind Speed (m/s) 3.4

Precipitation Freq (Days) 20

Climate Zone 10

Operational Year 2022

Utility Company

CO2 Intensity (lb/MWhr) 0

CH4 Intensity (lb/MWhr) 0

N2O Intensity (lb/MWhr) 0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Existing wind project repower. Decommissioning and removing the legacy towers is not included in this CEQA emissions estimate.

Land Use - Total site estimated disturbance of up to 107 acres. Equiv of 1.3 million sq ft.

Construction Phase - Phasing approximate per POD dated October 2019, excluding removing legacy towers

Off-road Equipment - Roadway Improvements - Estd Offroad Equipment ct 5

Off-road Equipment - Install New WTGs - Estd Offroad Equipment ct 16

Off-road Equipment - Ph 2a for on-road only

Off-road Equipment - Restoration Revegetation - Estd Offroad Equipment ct 3

Off-road Equipment - Future year decommissioning new WTGs - Estd Offroad Equipment ct 6

Trips and VMT - approx up to 400 Light Duty vehicles daily and overall 10,580 Heavy Duty haul trips

On-road Fugitive Dust - final fraction of average trip is unpaved

Grading - Total disturbance up to 107 ac. Temp site disturbance approx 82 acres

Vehicle Trips - Operational mobile sources under 100 trips daily

Road Dust - final fraction of worker trip is unpaved

Consumer Products - no consumer products in operational phase

Area Coating - no architectural coatings needed in operation phase

Energy Use - no energy use applicable in operational phase

Water And Wastewater - no water use applicable in operational phase

Solid Waste - no solid waste applicable in operational phase

Construction Off-road Equipment Mitigation - Mitigation includes offroad Tier 3 fleet or higher, stabilizer is 84% effective per Table XI-D, watering 2x daily is 55% effective PM10 control per Rule 403, unpaved travel speed limit 15 mph

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	40
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	20.00	198.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblEnergyUse	LightingElect	2.93	0.00
tblEnergyUse	NT24E	5.02	0.00
tblEnergyUse	NT24NG	17.13	0.00
tblEnergyUse	T24E	2.20	0.00
tblEnergyUse	T24NG	15.36	0.00
tblGrading	AcresOfGrading	66.00	107.00
tblGrading	AcresOfGrading	0.00	107.00
tblGrading	MaterialExported	0.00	2,000.00
tblGrading	MaterialExported	0.00	2,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	RoadPercentPave	50	90
tblSolidWaste	SolidWasteGenerationRate	1,612.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	140.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00

tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripNumber	198.00	2,888.00
tblTripsAndVMT	HaulingTripNumber	0.00	7,960.00
tblTripsAndVMT	HaulingTripNumber	0.00	500.00
tblTripsAndVMT	HaulingTripNumber	198.00	792.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,120.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	13.00	50.00
tblTripsAndVMT	WorkerTripNumber	546.00	250.00
tblTripsAndVMT	WorkerTripNumber	546.00	0.00
tblTripsAndVMT	WorkerTripNumber	8.00	50.00
tblTripsAndVMT	WorkerTripNumber	15.00	50.00
tblVehicleTrips	ST_TR	1.49	0.05
tblVehicleTrips	SU_TR	0.62	0.05
tblVehicleTrips	WD_TR	3.82	0.05
tblWater	IndoorWaterUseRate	300,625,000.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.5171	5.4952	3.9711	0.0142	42.1621	0.1942	42.3562	4.3427	0.1801	4.5229	0.0000	1,295.8566	1,295.8566	0.1733	0.0000	1,300.1892
2022	0.6489	5.9072	5.6252	0.0170	62.5967	0.2265	62.8232	6.3332	0.2108	6.5439	0.0000	1,536.4140	1,536.4140	0.2294	0.0000	1,542.1492
2023	0.0290	0.1961	0.3247	8.2000e-004	3.8812	8.1500e-003	3.8893	0.3933	7.7600e-003	0.4011	0.0000	74.1452	74.1452	9.1800e-003	0.0000	74.3746
2053	0.1811	0.7218	2.0029	4.9300e-003	14.8443	0.0152	14.8594	1.4983	0.0152	1.5135	0.0000	423.5210	423.5210	0.0143	0.0000	423.8786
Maximum	**0.6489**	**5.9072**	**5.6252**	**0.0170**	**62.5967**	**0.2265**	**62.8232**	**6.3332**	**0.2108**	**6.5439**	**0.0000**	**1,536.4140**	**1,536.4140**	**0.2294**	**0.0000**	**1,542.1492**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2827	4.4334	4.7119	0.0142	7.1837	0.1538	7.3375	0.8193	0.1534	0.9727	0.0000	1,295.8560	1,295.8560	0.1733	0.0000	1,300.1886
2022	0.3864	5.4056	6.7133	0.0170	10.4666	0.2225	10.6891	1.1310	0.2222	1.3532	0.0000	1,536.4132	1,536.4132	0.2294	0.0000	1,542.1484
2023	0.0188	0.2304	0.3528	8.2000e-004	0.6662	0.0116	0.6778	0.0723	0.0116	0.0839	0.0000	74.1451	74.1451	9.1800e-003	0.0000	74.3745
2053	0.0986	2.0334	2.6214	4.9300e-003	2.4734	0.1072	2.5806	0.2639	0.1072	0.3710	0.0000	423.5205	423.5205	0.0143	0.0000	423.8781
Maximum	**0.3864**	**5.4056**	**6.7133**	**0.0170**	**10.4666**	**0.2225**	**10.6891**	**1.1310**	**0.2222**	**1.3532**	**0.0000**	**1,536.4132**	**1,536.4132**	**0.2294**	**0.0000**	**1,542.1484**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**42.84**	**1.77**	**-20.76**	**0.00**	**83.16**	**-11.52**	**82.82**	**81.81**	**-19.46**	**78.58**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-1-2021**	**9-30-2021**	3.6809	2.8681
2	**10-1-2021**	**12-31-2021**	2.2843	1.8029
3	**1-1-2022**	**3-31-2022**	1.9627	1.7076
4	**4-1-2022**	**6-30-2022**	1.9751	1.7172
5	**7-1-2022**	**9-30-2022**	2.2543	2.0044
6	**10-1-2022**	**12-31-2022**	0.3675	0.3642
7	**1-1-2023**	**3-31-2023**	0.2161	0.2391
8	**4-1-2023**	**6-30-2023**	0.0096	0.0106

127	**1-1-2053**	**3-31-2053**	0.2232	0.5271
128	**4-1-2053**	**6-30-2053**	0.2257	0.5330
129	**7-1-2053**	**9-30-2053**	0.2282	0.5389
		Highest	3.6809	2.8681

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0286	0.2597	0.3505	1.4000e-003	8.8581	9.3000e-004	8.8591	0.8964	8.7000e-004	0.8973	0.0000	130.5661	130.5661	7.7800e-003	0.0000	130.7607
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0297**	**0.2598**	**0.3624**	**1.4000e-003**	**8.8581**	**9.7000e-004**	**8.8591**	**0.8964**	**9.1000e-004**	**0.8973**	**0.0000**	**130.5893**	**130.5893**	**7.8400e-003**	**0.0000**	**130.7855**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0286	0.2597	0.3505	1.4000e-003	8.8581	9.3000e-004	8.8591	0.8964	8.7000e-004	0.8973	0.0000	130.5661	130.5661	7.7800e-003	0.0000	130.7607
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0297**	**0.2598**	**0.3624**	**1.4000e-003**	**8.8581**	**9.7000e-004**	**8.8591**	**0.8964**	**9.1000e-004**	**0.8973**	**0.0000**	**130.5893**	**130.5893**	**7.8400e-003**	**0.0000**	**130.7855**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	1 Roadway Improvements	Grading	7/1/2021	8/31/2021	5	44	1 Roadway Improvements
2	2 Installing New WTGs	Building Construction	7/1/2021	10/5/2022	5	330	2 Installing New WTGs
3	2a Delivering New WTGs Components	Building Construction	7/1/2021	10/5/2022	5	330	2a Delivering New WTGs Components
4	3 Restoration	Site Preparation	7/1/2022	4/4/2023	5	198	3 Restoration
5	4 Decommissioning New WTGs	Trenching	1/1/2053	12/30/2053	5	260	4 Decommissioning New WTGs

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
1 Roadway Improvements	Excavators	1	8.00	158	0.38
1 Roadway Improvements	Graders	1	8.00	187	0.41
1 Roadway Improvements	Rubber Tired Dozers	1	8.00	247	0.40
1 Roadway Improvements	Scrapers	1	8.00	367	0.48
1 Roadway Improvements	Tractors/Loaders/Backhoes	1	8.00	97	0.37
2 Installing New WTGs	Bore/Drill Rigs	1	8.00	221	0.50
2 Installing New WTGs	Cranes	2	10.00	231	0.29
2 Installing New WTGs	Forklifts	3	10.00	89	0.20
2 Installing New WTGs	Generator Sets	1	8.00	84	0.74
2 Installing New WTGs	Graders	1	8.00	187	0.41
2 Installing New WTGs	Other Construction Equipment	2	8.00	172	0.42

2 Installing New WTGs	Other Material Handling Equipment	1	8.00	168	0.40
2 Installing New WTGs	Rollers	2	8.00	80	0.38
2 Installing New WTGs	Tractors/Loaders/Backhoes	2	8.00	97	0.37
2 Installing New WTGs	Welders	1	8.00	46	0.45
2a Delivering New WTGs Components	Cranes	0	7.00	231	0.29
2a Delivering New WTGs Components	Forklifts	0	8.00	89	0.20
2a Delivering New WTGs Components	Generator Sets	0	8.00	84	0.74
2a Delivering New WTGs Components	Tractors/Loaders/Backhoes	0	7.00	97	0.37
2a Delivering New WTGs Components	Welders	0	8.00	46	0.45
3 Restoration	Air Compressors	1	8.00	78	0.48
3 Restoration	Other Material Handling Equipment	1	8.00	168	0.40
3 Restoration	Rubber Tired Dozers	0	8.00	247	0.40
3 Restoration	Skid Steer Loaders	1	8.00	65	0.37
3 Restoration	Tractors/Loaders/Backhoes	0	8.00	97	0.37
4 Decommissioning New WTGs	Air Compressors	1	8.00	78	0.48
4 Decommissioning New WTGs	Concrete/Industrial Saws	1	8.00	81	0.73
4 Decommissioning New WTGs	Cranes	1	8.00	231	0.29
4 Decommissioning New WTGs	Excavators	1	8.00	158	0.38
4 Decommissioning New WTGs	Rubber Tired Dozers	1	8.00	247	0.40
4 Decommissioning New WTGs	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
1 Roadway Improvements	5	50.00	10.00	2,888.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2 Installing New WTGs	16	250.00	10.00	7,960.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2a Delivering New WTGs Components	0	0.00	0.00	500.00	14.60	6.20	140.00	LD_Mix	HDT_Mix	HHDT
3 Restoration	3	50.00	2.00	792.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
4 Decommissioning New WTGs	6	50.00	2.00	3,120.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 1 Roadway Improvements - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1894	0.0000	0.1894	0.0790	0.0000	0.0790	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0626	0.6963	0.4035	8.5000e-004		0.0298	0.0298		0.0274	0.0274	0.0000	74.6040	74.6040	0.0241	0.0000	75.2073
Total	**0.0626**	**0.6963**	**0.4035**	**8.5000e-004**	**0.1894**	**0.0298**	**0.2191**	**0.0790**	**0.0274**	**0.1064**	**0.0000**	**74.6040**	**74.6040**	**0.0241**	**0.0000**	**75.2073**

3.2 1 Roadway Improvements - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0154	0.6209	0.0959	2.8400e-003	1.2797	2.6800e-003	1.2824	0.1407	2.5600e-003	0.1433	0.0000	270.7431	270.7431	6.5200e-003	0.0000	270.9061
Vendor	6.4000e-004	0.0204	4.8900e-003	5.0000e-005	0.1909	4.0000e-005	0.1909	0.0193	4.0000e-005	0.0193	0.0000	5.2134	5.2134	4.0000e-004	0.0000	5.2233
Worker	6.3800e-003	4.8500e-003	0.0484	1.1000e-004	2.2450	7.0000e-005	2.2451	0.2259	7.0000e-005	0.2259	0.0000	9.8918	9.8918	4.0000e-004	0.0000	9.9017
Total	**0.0224**	**0.6461**	**0.1492**	**3.0000e-003**	**3.7157**	**2.7900e-003**	**3.7184**	**0.3859**	**2.6700e-003**	**0.3886**	**0.0000**	**285.8484**	**285.8484**	**7.3200e-003**	**0.0000**	**286.0312**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0852	0.0000	0.0852	0.0355	0.0000	0.0355	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0208	0.4087	0.4925	8.5000e-004		0.0173	0.0173		0.0173	0.0173	0.0000	74.6040	74.6040	0.0241	0.0000	75.2072
Total	**0.0208**	**0.4087**	**0.4925**	**8.5000e-004**	**0.0852**	**0.0173**	**0.1025**	**0.0355**	**0.0173**	**0.0528**	**0.0000**	**74.6040**	**74.6040**	**0.0241**	**0.0000**	**75.2072**

3.2 1 Roadway Improvements - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0154	0.6209	0.0959	2.8400e-003	0.2674	2.6800e-003	0.2700	0.0397	2.5600e-003	0.0423	0.0000	270.7431	270.7431	6.5200e-003	0.0000	270.9061
Vendor	6.4000e-004	0.0204	4.8900e-003	5.0000e-005	0.0315	4.0000e-005	0.0316	3.3700e-003	4.0000e-005	3.4100e-003	0.0000	5.2134	5.2134	4.0000e-004	0.0000	5.2233
Worker	6.3800e-003	4.8500e-003	0.0484	1.1000e-004	0.3685	7.0000e-005	0.3685	0.0386	7.0000e-005	0.0387	0.0000	9.8918	9.8918	4.0000e-004	0.0000	9.9017
Total	**0.0224**	**0.6461**	**0.1492**	**3.0000e-003**	**0.6673**	**2.7900e-003**	**0.6701**	**0.0817**	**2.6700e-003**	**0.0844**	**0.0000**	**285.8484**	**285.8484**	**7.3200e-003**	**0.0000**	**286.0312**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3153	3.2493	2.5582	4.9500e-003		0.1570	0.1570		0.1457	0.1457	0.0000	431.2693	431.2693	0.1269	0.0000	434.4423
Total	**0.3153**	**3.2493**	**2.5582**	**4.9500e-003**		**0.1570**	**0.1570**		**0.1457**	**0.1457**	**0.0000**	**431.2693**	**431.2693**	**0.1269**	**0.0000**	**434.4423**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0170	0.6845	0.1057	3.1300e-003	3.4964	2.9500e-003	3.4994	0.3768	2.8200e-003	0.3796	0.0000	298.4924	298.4924	7.1900e-003	0.0000	298.6722
Vendor	1.9200e-003	0.0610	0.0147	1.6000e-004	0.5727	1.2000e-004	0.5728	0.0578	1.1000e-004	0.0579	0.0000	15.6403	15.6403	1.1900e-003	0.0000	15.6700
Worker	0.0958	0.0727	0.7260	1.6400e-003	33.6754	1.0900e-003	33.6765	3.3881	1.0100e-003	3.3891	0.0000	148.3774	148.3774	5.9400e-003	0.0000	148.5258
Total	**0.1147**	**0.8183**	**0.8464**	**4.9300e-003**	**37.7446**	**4.1600e-003**	**37.7487**	**3.8226**	**3.9400e-003**	**3.8266**	**0.0000**	**462.5101**	**462.5101**	**0.0143**	**0.0000**	**462.8679**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1226	2.4750	3.2100	4.9500e-003		0.1291	0.1291		0.1291	0.1291	0.0000	431.2688	431.2688	0.1269	0.0000	434.4418
Total	**0.1226**	**2.4750**	**3.2100**	**4.9500e-003**		**0.1291**	**0.1291**		**0.1291**	**0.1291**	**0.0000**	**431.2688**	**431.2688**	**0.1269**	**0.0000**	**434.4418**

3.3 2 Installing New WTGs - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0170	0.6845	0.1057	3.1300e-003	0.7061	2.9500e-003	0.7091	0.0983	2.8200e-003	0.1011	0.0000	298.4924	298.4924	7.1900e-003	0.0000	298.6722
Vendor	1.9200e-003	0.0610	0.0147	1.6000e-004	0.0946	1.2000e-004	0.0947	0.0101	1.1000e-004	0.0102	0.0000	15.6403	15.6403	1.1900e-003	0.0000	15.6700
Worker	0.0958	0.0727	0.7260	1.6400e-003	5.5269	1.0900e-003	5.5280	0.5792	1.0100e-003	0.5802	0.0000	148.3774	148.3774	5.9400e-003	0.0000	148.5258
Total	**0.1147**	**0.8183**	**0.8464**	**4.9300e-003**	**6.3276**	**4.1600e-003**	**6.3318**	**0.6876**	**3.9400e-003**	**0.6916**	**0.0000**	**462.5101**	**462.5101**	**0.0143**	**0.0000**	**462.8679**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4243	4.2580	3.7812	7.4200e-003		0.2026	0.2026		0.1880	0.1880	0.0000	647.0516	647.0516	0.1900	0.0000	651.8024
Total	**0.4243**	**4.2580**	**3.7812**	**7.4200e-003**		**0.2026**	**0.2026**		**0.1880**	**0.1880**	**0.0000**	**647.0516**	**647.0516**	**0.1900**	**0.0000**	**651.8024**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0238	0.8993	0.1533	4.6400e-003	3.5067	3.6400e-003	3.5103	0.3805	3.4800e-003	0.3839	0.0000	442.5199	442.5199	0.0102	0.0000	442.7756
Vendor	2.6700e-003	0.0864	0.0203	2.4000e-004	0.8591	1.5000e-004	0.8592	0.0867	1.4000e-004	0.0869	0.0000	23.2635	23.2635	1.6500e-003	0.0000	23.3049
Worker	0.1344	0.0994	1.0024	2.3800e-003	50.5131	1.5900e-003	50.5147	5.0821	1.4600e-003	5.0836	0.0000	214.4141	214.4141	8.1200e-003	0.0000	214.6169
Total	**0.1609**	**1.0851**	**1.1759**	**7.2600e-003**	**54.8789**	**5.3800e-003**	**54.8842**	**5.5493**	**5.0800e-003**	**5.5544**	**0.0000**	**680.1975**	**680.1975**	**0.0200**	**0.0000**	**680.6974**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1839	3.7125	4.8151	7.4200e-003		0.1937	0.1937		0.1937	0.1937	0.0000	647.0508	647.0508	0.1900	0.0000	651.8016
Total	**0.1839**	**3.7125**	**4.8151**	**7.4200e-003**		**0.1937**	**0.1937**		**0.1937**	**0.1937**	**0.0000**	**647.0508**	**647.0508**	**0.1900**	**0.0000**	**651.8016**

3.3 2 Installing New WTGs - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0238	0.8993	0.1533	4.6400e-003	0.7164	3.6400e-003	0.7200	0.1020	3.4800e-003	0.1055	0.0000	442.5199	442.5199	0.0102	0.0000	442.7756
Vendor	2.6700e-003	0.0864	0.0203	2.4000e-004	0.1419	1.5000e-004	0.1420	0.0152	1.4000e-004	0.0153	0.0000	23.2635	23.2635	1.6500e-003	0.0000	23.3049
Worker	0.1344	0.0994	1.0024	2.3800e-003	8.2904	1.5900e-003	8.2920	0.8688	1.4600e-003	0.8703	0.0000	214.4141	214.4141	8.1200e-003	0.0000	214.6169
Total	**0.1609**	**1.0851**	**1.1759**	**7.2600e-003**	**9.1486**	**5.3800e-003**	**9.1540**	**0.9860**	**5.0800e-003**	**0.9911**	**0.0000**	**680.1975**	**680.1975**	**0.0200**	**0.0000**	**680.6974**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.1700e-003	0.0853	0.0139	4.4000e-004	0.5125	4.3000e-004	0.5129	0.0552	4.1000e-004	0.0556	0.0000	41.6248	41.6248	6.3000e-004	0.0000	41.6405
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.1700e-003**	**0.0853**	**0.0139**	**4.4000e-004**	**0.5125**	**4.3000e-004**	**0.5129**	**0.0552**	**4.1000e-004**	**0.0556**	**0.0000**	**41.6248**	**41.6248**	**6.3000e-004**	**0.0000**	**41.6405**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.1700e-003	0.0853	0.0139	4.4000e-004	0.1035	4.3000e-004	0.1039	0.0144	4.1000e-004	0.0148	0.0000	41.6248	41.6248	6.3000e-004	0.0000	41.6405
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.1700e-003**	**0.0853**	**0.0139**	**4.4000e-004**	**0.1035**	**4.3000e-004**	**0.1039**	**0.0144**	**4.1000e-004**	**0.0148**	**0.0000**	**41.6248**	**41.6248**	**6.3000e-004**	**0.0000**	**41.6405**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0300e-003	0.1100	0.0201	6.5000e-004	0.5140	5.3000e-004	0.5145	0.0558	5.0000e-004	0.0563	0.0000	61.7014	61.7014	9.1000e-004	0.0000	61.7240
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0300e-003**	**0.1100**	**0.0201**	**6.5000e-004**	**0.5140**	**5.3000e-004**	**0.5145**	**0.0558**	**5.0000e-004**	**0.0563**	**0.0000**	**61.7014**	**61.7014**	**9.1000e-004**	**0.0000**	**61.7240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0300e-003	0.1100	0.0201	6.5000e-004	0.1050	5.3000e-004	0.1055	0.0150	5.0000e-004	0.0155	0.0000	61.7014	61.7014	9.1000e-004	0.0000	61.7240
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0300e-003**	**0.1100**	**0.0201**	**6.5000e-004**	**0.1050**	**5.3000e-004**	**0.1055**	**0.0150**	**5.0000e-004**	**0.0155**	**0.0000**	**61.7014**	**61.7014**	**9.1000e-004**	**0.0000**	**61.7240**

3.5 3 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0569	0.0000	0.0569	6.1500e-003	0.0000	6.1500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0399	0.3309	0.4958	7.7000e-004		0.0174	0.0174		0.0166	0.0166	0.0000	67.4621	67.4621	0.0161	0.0000	67.8636
Total	**0.0399**	**0.3309**	**0.4958**	**7.7000e-004**	**0.0569**	**0.0174**	**0.0743**	**6.1500e-003**	**0.0166**	**0.0227**	**0.0000**	**67.4621**	**67.4621**	**0.0161**	**0.0000**	**67.8636**

3.5 3 Restoration - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.6100e-003	0.0987	0.0168	5.1000e-004	0.3492	4.0000e-004	0.3496	0.0380	3.8000e-004	0.0384	0.0000	48.5512	48.5512	1.1200e-003	0.0000	48.5792
Vendor	3.5000e-004	0.0114	2.6800e-003	3.0000e-005	0.1137	2.0000e-005	0.1137	0.0115	2.0000e-005	0.0115	0.0000	3.0783	3.0783	2.2000e-004	0.0000	3.0838
Worker	0.0178	0.0132	0.1326	3.1000e-004	6.6841	2.1000e-004	6.6843	0.6725	1.9000e-004	0.6727	0.0000	28.3720	28.3720	1.0700e-003	0.0000	28.3988
Total	**0.0208**	**0.1233**	**0.1521**	**8.5000e-004**	**7.1470**	**6.3000e-004**	**7.1476**	**0.7219**	**5.9000e-004**	**0.7225**	**0.0000**	**80.0015**	**80.0015**	**2.4100e-003**	**0.0000**	**80.0618**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0256	0.0000	0.0256	2.7700e-003	0.0000	2.7700e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0178	0.3747	0.5501	7.7000e-004		0.0223	0.0223		0.0223	0.0223	0.0000	67.4620	67.4620	0.0161	0.0000	67.8635
Total	**0.0178**	**0.3747**	**0.5501**	**7.7000e-004**	**0.0256**	**0.0223**	**0.0479**	**2.7700e-003**	**0.0223**	**0.0251**	**0.0000**	**67.4620**	**67.4620**	**0.0161**	**0.0000**	**67.8635**

3.5 3 Restoration - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.6100e-003	0.0987	0.0168	5.1000e-004	0.0716	4.0000e-004	0.0720	0.0103	3.8000e-004	0.0107	0.0000	48.5512	48.5512	1.1200e-003	0.0000	48.5792
Vendor	3.5000e-004	0.0114	2.6800e-003	3.0000e-005	0.0188	2.0000e-005	0.0188	2.0100e-003	2.0000e-005	2.0300e-003	0.0000	3.0783	3.0783	2.2000e-004	0.0000	3.0838
Worker	0.0178	0.0132	0.1326	3.1000e-004	1.0970	2.1000e-004	1.0972	0.1150	1.9000e-004	0.1152	0.0000	28.3720	28.3720	1.0700e-003	0.0000	28.3988
Total	**0.0208**	**0.1233**	**0.1521**	**8.5000e-004**	**1.1874**	**6.3000e-004**	**1.1880**	**0.1272**	**5.9000e-004**	**0.1278**	**0.0000**	**80.0015**	**80.0015**	**2.4100e-003**	**0.0000**	**80.0618**

3.5 3 Restoration - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0569	0.0000	0.0569	6.1500e-003	0.0000	6.1500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.1574	0.2532	4.0000e-004		7.9500e-003	7.9500e-003		7.5700e-003	7.5700e-003	0.0000	34.5064	34.5064	8.1500e-003	0.0000	34.7103
Total	**0.0194**	**0.1574**	**0.2532**	**4.0000e-004**	**0.0569**	**7.9500e-003**	**0.0648**	**6.1500e-003**	**7.5700e-003**	**0.0137**	**0.0000**	**34.5064**	**34.5064**	**8.1500e-003**	**0.0000**	**34.7103**

3.5 3 Restoration - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.6000e-004	0.0281	7.6400e-003	2.5000e-004	0.3476	9.0000e-005	0.3477	0.0374	9.0000e-005	0.0375	0.0000	24.1398	24.1398	4.4000e-004	0.0000	24.1508
Vendor	1.4000e-004	4.5000e-003	1.1900e-003	2.0000e-005	0.0581	0.0000	0.0581	5.8700e-003	0.0000	5.8700e-003	0.0000	1.5395	1.5395	8.0000e-005	0.0000	1.5415
Worker	8.5400e-003	6.1600e-003	0.0626	1.5000e-004	3.4186	1.0000e-004	3.4187	0.3439	1.0000e-004	0.3440	0.0000	13.9595	13.9595	5.0000e-004	0.0000	13.9720
Total	**9.6400e-003**	**0.0387**	**0.0715**	**4.2000e-004**	**3.8243**	**1.9000e-004**	**3.8245**	**0.3872**	**1.9000e-004**	**0.3874**	**0.0000**	**39.6388**	**39.6388**	**1.0200e-003**	**0.0000**	**39.6643**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0256	0.0000	0.0256	2.7700e-003	0.0000	2.7700e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.1200e-003	0.1917	0.2813	4.0000e-004		0.0114	0.0114		0.0114	0.0114	0.0000	34.5064	34.5064	8.1500e-003	0.0000	34.7102
Total	**9.1200e-003**	**0.1917**	**0.2813**	**4.0000e-004**	**0.0256**	**0.0114**	**0.0370**	**2.7700e-003**	**0.0114**	**0.0142**	**0.0000**	**34.5064**	**34.5064**	**8.1500e-003**	**0.0000**	**34.7102**

3.5 3 Restoration - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.6000e-004	0.0281	7.6400e-003	2.5000e-004	0.0699	9.0000e-005	0.0700	9.6700e-003	9.0000e-005	9.7600e-003	0.0000	24.1398	24.1398	4.4000e-004	0.0000	24.1508
Vendor	1.4000e-004	4.5000e-003	1.1900e-003	2.0000e-005	9.6000e-003	0.0000	9.6000e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	1.5395	1.5395	8.0000e-005	0.0000	1.5415
Worker	8.5400e-003	6.1600e-003	0.0626	1.5000e-004	0.5611	1.0000e-004	0.5612	0.0588	1.0000e-004	0.0589	0.0000	13.9595	13.9595	5.0000e-004	0.0000	13.9720
Total	**9.6400e-003**	**0.0387**	**0.0715**	**4.2000e-004**	**0.6406**	**1.9000e-004**	**0.6408**	**0.0695**	**1.9000e-004**	**0.0697**	**0.0000**	**39.6388**	**39.6388**	**1.0200e-003**	**0.0000**	**39.6643**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1811	0.7218	2.0029	4.9300e-003		0.0152	0.0152		0.0152	0.0152	0.0000	423.5210	423.5210	0.0143	0.0000	423.8786
Total	**0.1811**	**0.7218**	**2.0029**	**4.9300e-003**		**0.0152**	**0.0152**		**0.0152**	**0.0152**	**0.0000**	**423.5210**	**423.5210**	**0.0143**	**0.0000**	**423.8786**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling					1.3624	0.0000	1.3624	0.1448	0.0000	0.1448	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor					0.2252	0.0000	0.2252	0.0226	0.0000	0.0226	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker					13.2566	0.0000	13.2566	1.3310	0.0000	1.3310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**14.8443**	**0.0000**	**14.8443**	**1.4983**	**0.0000**	**1.4983**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0986	2.0334	2.6214	4.9300e-003		0.1072	0.1072		0.1072	0.1072	0.0000	423.5205	423.5205	0.0143	0.0000	423.8781
Total	**0.0986**	**2.0334**	**2.6214**	**4.9300e-003**		**0.1072**	**0.1072**		**0.1072**	**0.1072**	**0.0000**	**423.5205**	**423.5205**	**0.0143**	**0.0000**	**423.8781**

3.6 4 Decommissioning New WTGs - 2053

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling					0.2687	0.0000	0.2687	0.0356	0.0000	0.0356	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor					0.0368	0.0000	0.0368	3.8100e-003	0.0000	3.8100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker					2.1678	0.0000	2.1678	0.2244	0.0000	0.2244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**2.4734**	**0.0000**	**2.4734**	**0.2639**	**0.0000**	**0.2639**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0286	0.2597	0.3505	1.4000e-003	8.8581	9.3000e-004	8.8591	0.8964	8.7000e-004	0.8973	0.0000	130.5661	130.5661	7.7800e-003	0.0000	130.7607
Unmitigated	0.0286	0.2597	0.3505	1.4000e-003	8.8581	9.3000e-004	8.8591	0.8964	8.7000e-004	0.8973	0.0000	130.5661	130.5661	7.7800e-003	0.0000	130.7607

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	65.00	65.00	65.00	235,792	235,792
Total	65.00	65.00	65.00	235,792	235,792

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	13.80	6.20	6.20	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.490441	0.036099	0.183975	0.121725	0.015214	0.005252	0.022424	0.112230	0.002972	0.001873	0.006187	0.000783	0.000825

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Manufacturing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Manufacturing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248
Unmitigated	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248
Total	**1.1100e-003**	**1.1000e-004**	**0.0120**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0232**	**0.0232**	**6.0000e-005**	**0.0000**	**0.0248**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1100e-003	1.1000e-004	0.0120	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0232	0.0232	6.0000e-005	0.0000	0.0248
Total	**1.1100e-003**	**1.1000e-004**	**0.0120**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0232**	**0.0232**	**6.0000e-005**	**0.0000**	**0.0248**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Manufacturing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Manufacturing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Manufacturing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Manufacturing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Mesa Wind Repower - CEQA Tech Support

Salton Sea Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	1,300.00	1000sqft	29.84	1,300,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	3.4	**Precipitation Freq (Days)**	20
Climate Zone	10			**Operational Year**	2022

Utility Company

CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Existing wind project repower. Decommissioning and removing the legacy towers is not included in this CEQA emissions estimate.

Land Use - Total site estimated disturbance of up to 107 acres. Equiv of 1.3 million sq ft.

Construction Phase - Phasing approximate per POD dated October 2019, excluding removing legacy towers

Off-road Equipment - Roadway Improvements - Estd Offroad Equipment ct 5

Off-road Equipment - Install New WTGs - Estd Offroad Equipment ct 16

Off-road Equipment - Ph 2a for on-road only

Off-road Equipment - Restoration Revegetation - Estd Offroad Equipment ct 3

Off-road Equipment - Future year decommissioning new WTGs - Estd Offroad Equipment ct 6

Trips and VMT - approx up to 400 Light Duty vehicles daily and overall 10,580 Heavy Duty haul trips

On-road Fugitive Dust - final fraction of average trip is unpaved

Grading - Total disturbance up to 107 ac. Temp site disturbance approx 82 acres

Vehicle Trips - Operational mobile sources under 100 trips daily

Road Dust - final fraction of worker trip is unpaved

Consumer Products - no consumer products in operational phase

Area Coating - no architectural coatings needed in operation phase

Energy Use - no energy use applicable in operational phase

Water And Wastewater - no water use applicable in operational phase

Solid Waste - no solid waste applicable in operational phase

Construction Off-road Equipment Mitigation - Mitigation includes offroad Tier 3 fleet or higher, stabilizer is 84% effective per Table XI-D, watering 2x daily is 55% effective PM10 control per Rule 403, unpaved travel speed limit 15 mph

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	40
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	20.00	198.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblEnergyUse	LightingElect	2.93	0.00
tblEnergyUse	NT24E	5.02	0.00
tblEnergyUse	NT24NG	17.13	0.00
tblEnergyUse	T24E	2.20	0.00
tblEnergyUse	T24NG	15.36	0.00
tblGrading	AcresOfGrading	66.00	107.00
tblGrading	AcresOfGrading	0.00	107.00
tblGrading	MaterialExported	0.00	2,000.00
tblGrading	MaterialExported	0.00	2,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	RoadPercentPave	50	90
tblSolidWaste	SolidWasteGenerationRate	1,612.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	140.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00

tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripNumber	198.00	2,888.00
tblTripsAndVMT	HaulingTripNumber	0.00	7,960.00
tblTripsAndVMT	HaulingTripNumber	0.00	500.00
tblTripsAndVMT	HaulingTripNumber	198.00	792.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,120.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	13.00	50.00
tblTripsAndVMT	WorkerTripNumber	546.00	250.00
tblTripsAndVMT	WorkerTripNumber	546.00	0.00
tblTripsAndVMT	WorkerTripNumber	8.00	50.00
tblTripsAndVMT	WorkerTripNumber	15.00	50.00
tblVehicleTrips	ST_TR	1.49	0.05
tblVehicleTrips	SU_TR	0.62	0.05
tblVehicleTrips	WD_TR	3.82	0.05
tblWater	IndoorWaterUseRate	300,625,000.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	10.6925	122.0836	80.1376	0.3357	800.1036	3.9277	804.0313	84.1872	3.6393	87.8265	0.0000	34,102.8117	34,102.8117	3.9453	0.0000	34,201.4443
2022	7.1322	61.4767	63.2738	0.1831	707.7193	2.3805	710.0998	71.5527	2.2175	73.7702	0.0000	18,287.8052	18,287.8052	2.6708	0.0000	18,354.5741
2023	0.9065	5.8262	10.1751	0.0250	121.3032	0.2433	121.5466	12.2773	0.2315	12.5088	0.0000	2,493.4880	2,493.4880	0.3039	0.0000	2,501.0865
2053	1.3930	5.5521	15.4072	0.0379	120.7664	0.1167	120.8831	12.1839	0.1167	12.3007	0.0000	3,591.1689	3,591.1689	0.1213	0.0000	3,594.2010
Maximum	**10.6925**	**122.0836**	**80.1376**	**0.3357**	**800.1036**	**3.9277**	**804.0313**	**84.1872**	**3.6393**	**87.8265**	**0.0000**	**34,102.8117**	**34,102.8117**	**3.9453**	**0.0000**	**34,201.4443**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	5.8758	97.2827	94.0563	0.3357	138.6120	2.9380	141.5500	16.6768	2.9288	19.6057	0.0000	34,102.8117	34,102.8117	3.9453	0.0000	34,201.4443
2022	4.3672	56.6369	74.5457	0.1831	118.0722	2.3663	120.4385	12.7107	2.3626	15.0734	0.0000	18,287.8052	18,287.8052	2.6708	0.0000	18,354.5741
2023	0.6011	6.8487	11.0150	0.0250	20.4431	0.3470	20.7900	2.2101	0.3466	2.5567	0.0000	2,493.4880	2,493.4880	0.3039	0.0000	2,501.0865
2053	0.7583	15.6416	20.1644	0.0379	20.0895	0.8245	20.9139	2.1377	0.8245	2.9621	0.0000	3,591.1689	3,591.1689	0.1213	0.0000	3,594.2010
Maximum	**5.8758**	**97.2827**	**94.0563**	**0.3357**	**138.6120**	**2.9380**	**141.5500**	**16.6768**	**2.9288**	**19.6057**	**0.0000**	**34,102.8117**	**34,102.8117**	**3.9453**	**0.0000**	**34,201.4443**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**42.35**	**9.50**	**-18.22**	**0.00**	**83.02**	**2.89**	**82.71**	**81.28**	**-4.15**	**78.44**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1908	1.4114	2.3093	8.2000e-003	48.6764	5.0800e-003	48.6815	4.9266	4.7700e-003	4.9313		838.7264	838.7264	0.0480		839.9272
Total	**0.2032**	**1.4127**	**2.4422**	**8.2100e-003**	**48.6764**	**5.5500e-003**	**48.6819**	**4.9266**	**5.2400e-003**	**4.9318**		**839.0109**	**839.0109**	**0.0488**	**0.0000**	**840.2305**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1908	1.4114	2.3093	8.2000e-003	48.6764	5.0800e-003	48.6815	4.9266	4.7700e-003	4.9313		838.7264	838.7264	0.0480		839.9272
Total	**0.2032**	**1.4127**	**2.4422**	**8.2100e-003**	**48.6764**	**5.5500e-003**	**48.6819**	**4.9266**	**5.2400e-003**	**4.9318**		**839.0109**	**839.0109**	**0.0488**	**0.0000**	**840.2305**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	1 Roadway Improvements	Grading	7/1/2021	8/31/2021	5	44	1 Roadway Improvements
2	2 Installing New WTGs	Building Construction	7/1/2021	10/5/2022	5	330	2 Installing New WTGs
3	2a Delivering New WTGs Components	Building Construction	7/1/2021	10/5/2022	5	330	2a Delivering New WTGs Components
4	3 Restoration	Site Preparation	7/1/2022	4/4/2023	5	198	3 Restoration
5	4 Decommissioning New WTGs	Trenching	1/1/2053	12/30/2053	5	260	4 Decommissioning New WTGs

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
1 Roadway Improvements	Excavators	1	8.00	158	0.38
1 Roadway Improvements	Graders	1	8.00	187	0.41
1 Roadway Improvements	Rubber Tired Dozers	1	8.00	247	0.40
1 Roadway Improvements	Scrapers	1	8.00	367	0.48
1 Roadway Improvements	Tractors/Loaders/Backhoes	1	8.00	97	0.37

2 Installing New WTGs	Bore/Drill Rigs	1	8.00	221	0.50
2 Installing New WTGs	Cranes	2	10.00	231	0.29
2 Installing New WTGs	Forklifts	3	10.00	89	0.20
2 Installing New WTGs	Generator Sets	1	8.00	84	0.74
2 Installing New WTGs	Graders	1	8.00	187	0.41
2 Installing New WTGs	Other Construction Equipment	2	8.00	172	0.42
2 Installing New WTGs	Other Material Handling Equipment	1	8.00	168	0.40
2 Installing New WTGs	Rollers	2	8.00	80	0.38
2 Installing New WTGs	Tractors/Loaders/Backhoes	2	8.00	97	0.37
2 Installing New WTGs	Welders	1	8.00	46	0.45
2a Delivering New WTGs Components	Cranes	0	7.00	231	0.29
2a Delivering New WTGs Components	Forklifts	0	8.00	89	0.20
2a Delivering New WTGs Components	Generator Sets	0	8.00	84	0.74
2a Delivering New WTGs Components	Tractors/Loaders/Backhoes	0	7.00	97	0.37
2a Delivering New WTGs Components	Welders	0	8.00	46	0.45
3 Restoration	Air Compressors	1	8.00	78	0.48
3 Restoration	Other Material Handling Equipment	1	8.00	168	0.40
3 Restoration	Rubber Tired Dozers	0	8.00	247	0.40
3 Restoration	Skid Steer Loaders	1	8.00	65	0.37
3 Restoration	Tractors/Loaders/Backhoes	0	8.00	97	0.37
4 Decommissioning New WTGs	Air Compressors	1	8.00	78	0.48
4 Decommissioning New WTGs	Concrete/Industrial Saws	1	8.00	81	0.73
4 Decommissioning New WTGs	Cranes	1	8.00	231	0.29
4 Decommissioning New WTGs	Excavators	1	8.00	158	0.38
4 Decommissioning New WTGs	Rubber Tired Dozers	1	8.00	247	0.40
4 Decommissioning New WTGs	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
1 Roadway Improvements	5	50.00	10.00	2,888.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2 Installing New WTGs	16	250.00	10.00	7,960.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2a Delivering New WTGs Components	0	0.00	0.00	500.00	14.60	6.20	140.00	LD_Mix	HDT_Mix	HHDT
3 Restoration	3	50.00	2.00	792.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
4 Decommissioning New WTGs	6	50.00	2.00	3,120.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 1 Roadway Improvements - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6082	0.0000	8.6082	3.5898	0.0000	3.5898			0.0000			0.0000
Off-Road	2.8453	31.6479	18.3417	0.0386		1.3527	1.3527		1.2445	1.2445		3,738.0399	3,738.0399	1.2090		3,768.2638
Total	**2.8453**	**31.6479**	**18.3417**	**0.0386**	**8.6082**	**1.3527**	**9.9609**	**3.5898**	**1.2445**	**4.8343**		**3,738.0399**	**3,738.0399**	**1.2090**		**3,768.2638**

3.2 1 Roadway Improvements - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6924	26.9404	4.2125	0.1297	61.3800	0.1214	61.5014	6.7228	0.1161	6.8389		13,632.2967	13,632.2967	0.3144		13,640.1571
Vendor	0.0287	0.9187	0.2070	2.5400e-003	9.1779	1.7800e-003	9.1797	0.9261	1.7000e-003	0.9278		266.3903	266.3903	0.0189		266.8617
Worker	0.3390	0.2179	2.7755	5.5200e-003	107.9394	3.3200e-003	107.9427	10.8558	3.0500e-003	10.8588		548.3647	548.3647	0.0231		548.9425
Total	**1.0600**	**28.0769**	**7.1950**	**0.1377**	**178.4973**	**0.1265**	**178.6237**	**18.5046**	**0.1209**	**18.6255**		**14,447.0517**	**14,447.0517**	**0.3564**		**14,455.9613**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.8737	0.0000	3.8737	1.6154	0.0000	1.6154			0.0000			0.0000
Off-Road	0.9472	18.5790	22.3845	0.0386		0.7859	0.7859		0.7859	0.7859	0.0000	3,738.0399	3,738.0399	1.2090		3,768.2638
Total	**0.9472**	**18.5790**	**22.3845**	**0.0386**	**3.8737**	**0.7859**	**4.6596**	**1.6154**	**0.7859**	**2.4013**	**0.0000**	**3,738.0399**	**3,738.0399**	**1.2090**		**3,768.2638**

3.2 1 Roadway Improvements - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6924	26.9404	4.2125	0.1297	12.6958	0.1214	12.8172	1.8647	0.1161	1.9808		13,632.2967	13,632.2967	0.3144		13,640.1571
Vendor	0.0287	0.9187	0.2070	2.5400e-003	1.5134	1.7800e-003	1.5152	0.1613	1.7000e-003	0.1630		266.3903	266.3903	0.0189		266.8617
Worker	0.3390	0.2179	2.7755	5.5200e-003	17.6960	3.3200e-003	17.6994	1.8506	3.0500e-003	1.8537		548.3647	548.3647	0.0231		548.9425
Total	**1.0600**	**28.0769**	**7.1950**	**0.1377**	**31.9053**	**0.1265**	**32.0317**	**3.8766**	**0.1209**	**3.9975**		**14,447.0517**	**14,447.0517**	**0.3564**		**14,455.9613**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7766	49.2318	38.7612	0.0749		2.3791	2.3791		2.2081	2.2081		7,202.9249	7,202.9249	2.1198		7,255.9193
Total	**4.7766**	**49.2318**	**38.7612**	**0.0749**		**2.3791**	**2.3791**		**2.2081**	**2.2081**		**7,202.9249**	**7,202.9249**	**2.1198**		**7,255.9193**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2544	9.9005	1.5481	0.0477	55.9265	0.0446	55.9711	6.0074	0.0427	6.0501		5,009.8376	5,009.8376	0.1156		5,012.7262
Vendor	0.0287	0.9187	0.2070	2.5400e-003	9.1779	1.7800e-003	9.1797	0.9261	1.7000e-003	0.9278		266.3903	266.3903	0.0189		266.8617
Worker	1.6948	1.0893	13.8776	0.0276	539.6968	0.0166	539.7134	54.2789	0.0153	54.2941		2,741.8233	2,741.8233	0.1156		2,744.7126
Total	**1.9780**	**11.9085**	**15.6326**	**0.0778**	**604.8012**	**0.0630**	**604.8642**	**61.2124**	**0.0596**	**61.2720**		**8,018.0512**	**8,018.0512**	**0.2500**		**8,024.3005**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8579	37.4997	48.6371	0.0749		1.9563	1.9563		1.9563	1.9563	0.0000	7,202.9249	7,202.9249	2.1198		7,255.9193
Total	**1.8579**	**37.4997**	**48.6371**	**0.0749**		**1.9563**	**1.9563**		**1.9563**	**1.9563**	**0.0000**	**7,202.9249**	**7,202.9249**	**2.1198**		**7,255.9193**

3.3 2 Installing New WTGs - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2544	9.9005	1.5481	0.0477	11.1982	0.0446	11.2428	1.5441	0.0427	1.5868		5,009.8376	5,009.8376	0.1156		5,012.7262
Vendor	0.0287	0.9187	0.2070	2.5400e-003	1.5134	1.7800e-003	1.5152	0.1613	1.7000e-003	0.1630		266.3903	266.3903	0.0189		266.8617
Worker	1.6948	1.0893	13.8776	0.0276	88.4802	0.0166	88.4967	9.2532	0.0153	9.2684		2,741.8233	2,741.8233	0.1156		2,744.7126
Total	**1.9780**	**11.9085**	**15.6326**	**0.0778**	**101.1918**	**0.0630**	**101.2548**	**10.9585**	**0.0596**	**11.0182**		**8,018.0512**	**8,018.0512**	**0.2500**		**8,024.3005**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.2856	43.0096	38.1935	0.0750		2.0462	2.0462		1.8994	1.8994		7,204.5683	7,204.5683	2.1159		7,257.4665
Total	**4.2856**	**43.0096**	**38.1935**	**0.0750**		**2.0462**	**2.0462**		**1.8994**	**1.8994**		**7,204.5683**	**7,204.5683**	**2.1159**		**7,257.4665**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2374	8.6914	1.4976	0.0471	37.3878	0.0366	37.4245	4.0425	0.0350	4.0775		4,951.6818	4,951.6818	0.1096		4,954.4218
Vendor	0.0267	0.8682	0.1903	2.5200e-003	9.1779	1.4900e-003	9.1794	0.9261	1.4300e-003	0.9275		264.1890	264.1890	0.0175		264.6265
Worker	1.5815	0.9931	12.7799	0.0266	539.6968	0.0160	539.7128	54.2789	0.0148	54.2936		2,641.2627	2,641.2627	0.1050		2,643.8873
Total	**1.8455**	**10.5528**	**14.4678**	**0.0762**	**586.2625**	**0.0541**	**586.3167**	**59.2474**	**0.0512**	**59.2987**		**7,857.1336**	**7,857.1336**	**0.2321**		**7,862.9356**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8579	37.4997	48.6371	0.0750		1.9563	1.9563		1.9563	1.9563	0.0000	7,204.5683	7,204.5683	2.1159		7,257.4665
Total	**1.8579**	**37.4997**	**48.6371**	**0.0750**		**1.9563**	**1.9563**		**1.9563**	**1.9563**	**0.0000**	**7,204.5683**	**7,204.5683**	**2.1159**		**7,257.4665**

3.3 2 Installing New WTGs - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2374	8.6914	1.4976	0.0471	7.5690	0.0366	7.6056	1.0669	0.0350	1.1020		4,951.6818	4,951.6818	0.1096		4,954.4218
Vendor	0.0267	0.8682	0.1903	2.5200e-003	1.5134	1.4900e-003	1.5149	0.1613	1.4300e-003	0.1627		264.1890	264.1890	0.0175		264.6265
Worker	1.5815	0.9931	12.7799	0.0266	88.4802	0.0160	88.4962	9.2532	0.0148	9.2679		2,641.2627	2,641.2627	0.1050		2,643.8873
Total	**1.8455**	**10.5528**	**14.4678**	**0.0762**	**97.5625**	**0.0541**	**97.6167**	**10.4814**	**0.0512**	**10.5326**		**7,857.1336**	**7,857.1336**	**0.2321**		**7,862.9356**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0327	1.2186	0.2071	6.6300e-003	8.1969	6.4500e-003	8.2034	0.8805	6.1700e-003	0.8866		696.7441	696.7441	0.0102		696.9994
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0327**	**1.2186**	**0.2071**	**6.6300e-003**	**8.1969**	**6.4500e-003**	**8.2034**	**0.8805**	**6.1700e-003**	**0.8866**		**696.7441**	**696.7441**	**0.0102**		**696.9994**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0327	1.2186	0.2071	6.6300e-003	1.6412	6.4500e-003	1.6477	0.2263	6.1700e-003	0.2325		696.7441	696.7441	0.0102		696.9994
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0327**	**1.2186**	**0.2071**	**6.6300e-003**	**1.6412**	**6.4500e-003**	**1.6477**	**0.2263**	**6.1700e-003**	**0.2325**		**696.7441**	**696.7441**	**0.0102**		**696.9994**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0305	1.0496	0.2006	6.5500e-003	5.4798	5.3000e-003	5.4851	0.5925	5.0700e-003	0.5976		688.5477	688.5477	9.8300e-003		688.7935
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0305**	**1.0496**	**0.2006**	**6.5500e-003**	**5.4798**	**5.3000e-003**	**5.4851**	**0.5925**	**5.0700e-003**	**0.5976**		**688.5477**	**688.5477**	**9.8300e-003**		**688.7935**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0305	1.0496	0.2006	6.5500e-003	1.1093	5.3000e-003	1.1146	0.1564	5.0700e-003	0.1614		688.5477	688.5477	9.8300e-003		688.7935
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0305**	**1.0496**	**0.2006**	**6.5500e-003**	**1.1093**	**5.3000e-003**	**1.1146**	**0.1564**	**5.0700e-003**	**0.1614**		**688.5477**	**688.5477**	**9.8300e-003**		**688.7935**

3.5 3 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5747	0.0000	0.5747	0.0621	0.0000	0.0621			0.0000			0.0000
Off-Road	0.6097	5.0512	7.5696	0.0118		0.2653	0.2653		0.2528	0.2528		1,135.3321	1,135.3321	0.2703		1,142.0884
Total	**0.6097**	**5.0512**	**7.5696**	**0.0118**	**0.5747**	**0.2653**	**0.8400**	**0.0621**	**0.2528**	**0.3149**		**1,135.3321**	**1,135.3321**	**0.2703**		**1,142.0884**

3.5 3 Restoration - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0394	1.4413	0.2483	7.8100e-003	5.6274	6.0700e-003	5.6335	0.6097	5.8100e-003	0.6155		821.1332	821.1332	0.0182		821.5875
Vendor	5.3300e-003	0.1737	0.0381	5.0000e-004	1.8356	3.0000e-004	1.8359	0.1852	2.9000e-004	0.1855		52.8378	52.8378	3.5000e-003		52.9253
Worker	0.3163	0.1986	2.5560	5.3100e-003	107.9394	3.2100e-003	107.9426	10.8558	2.9500e-003	10.8587		528.2525	528.2525	0.0210		528.7775
Total	**0.3610**	**1.8136**	**2.8424**	**0.0136**	**115.4023**	**9.5800e-003**	**115.4119**	**11.6507**	**9.0500e-003**	**11.6597**		**1,402.2235**	**1,402.2235**	**0.0427**		**1,403.2903**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2586	0.0000	0.2586	0.0280	0.0000	0.0280			0.0000			0.0000
Off-Road	0.2724	5.7212	8.3979	0.0118		0.3410	0.3410		0.3410	0.3410	0.0000	1,135.3321	1,135.3321	0.2703		1,142.0884
Total	**0.2724**	**5.7212**	**8.3979**	**0.0118**	**0.2586**	**0.3410**	**0.5996**	**0.0280**	**0.3410**	**0.3689**	**0.0000**	**1,135.3321**	**1,135.3321**	**0.2703**		**1,142.0884**

3.5 3 Restoration - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0394	1.4413	0.2483	7.8100e-003	1.1431	6.0700e-003	1.1491	0.1622	5.8100e-003	0.1680		821.1332	821.1332	0.0182		821.5875
Vendor	5.3300e-003	0.1737	0.0381	5.0000e-004	0.3027	3.0000e-004	0.3030	0.0323	2.9000e-004	0.0325		52.8378	52.8378	3.5000e-003		52.9253
Worker	0.3163	0.1986	2.5560	5.3100e-003	17.6960	3.2100e-003	17.6992	1.8506	2.9500e-003	1.8536		528.2525	528.2525	0.0210		528.7775
Total	**0.3610**	**1.8136**	**2.8424**	**0.0136**	**19.1418**	**9.5800e-003**	**19.1514**	**2.0451**	**9.0500e-003**	**2.0541**		**1,402.2235**	**1,402.2235**	**0.0427**		**1,403.2903**

3.5 3 Restoration - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5747	0.0000	0.5747	0.0621	0.0000	0.0621			0.0000			0.0000
Off-Road	0.5777	4.6986	7.5581	0.0118		0.2373	0.2373		0.2259	0.2259		1,135.4270	1,135.4270	0.2683		1,142.1346
Total	**0.5777**	**4.6986**	**7.5581**	**0.0118**	**0.5747**	**0.2373**	**0.8120**	**0.0621**	**0.2259**	**0.2880**		**1,135.4270**	**1,135.4270**	**0.2683**		**1,142.1346**

3.5 3 Restoration - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0283	0.8112	0.2226	7.5900e-003	10.9536	2.7600e-003	10.9564	1.1742	2.6400e-003	1.1768		798.2511	798.2511	0.0140		798.6014
Vendor	4.2200e-003	0.1345	0.0335	4.9000e-004	1.8356	1.2000e-004	1.8357	0.1852	1.1000e-004	0.1853		51.6584	51.6584	2.5000e-003		51.7209
Worker	0.2962	0.1819	2.3610	5.1100e-003	107.9394	3.1200e-003	107.9425	10.8558	2.8700e-003	10.8586		508.1514	508.1514	0.0191		508.6296
Total	**0.3288**	**1.1275**	**2.6171**	**0.0132**	**120.7285**	**6.0000e-003**	**120.7345**	**12.2152**	**5.6200e-003**	**12.2208**		**1,358.0609**	**1,358.0609**	**0.0356**		**1,358.9518**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2586	0.0000	0.2586	0.0280	0.0000	0.0280			0.0000			0.0000
Off-Road	0.2724	5.7212	8.3979	0.0118		0.3410	0.3410		0.3410	0.3410	0.0000	1,135.4270	1,135.4270	0.2683		1,142.1346
Total	**0.2724**	**5.7212**	**8.3979**	**0.0118**	**0.2586**	**0.3410**	**0.5996**	**0.0280**	**0.3410**	**0.3689**	**0.0000**	**1,135.4270**	**1,135.4270**	**0.2683**		**1,142.1346**

3.5 3 Restoration - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0283	0.8112	0.2226	7.5900e-003	2.1857	2.7600e-003	2.1885	0.2993	2.6400e-003	0.3019		798.2511	798.2511	0.0140		798.6014
Vendor	4.2200e-003	0.1345	0.0335	4.9000e-004	0.3027	1.2000e-004	0.3028	0.0323	1.1000e-004	0.0324		51.6584	51.6584	2.5000e-003		51.7209
Worker	0.2962	0.1819	2.3610	5.1100e-003	17.6960	3.1200e-003	17.6992	1.8506	2.8700e-003	1.8535		508.1514	508.1514	0.0191		508.6296
Total	**0.3288**	**1.1275**	**2.6171**	**0.0132**	**20.1844**	**6.0000e-003**	**20.1904**	**2.1822**	**5.6200e-003**	**2.1878**		**1,358.0609**	**1,358.0609**	**0.0356**		**1,358.9518**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3930	5.5521	15.4072	0.0379		0.1167	0.1167		0.1167	0.1167		3,591.1689	3,591.1689	0.1213		3,594.2010
Total	**1.3930**	**5.5521**	**15.4072**	**0.0379**		**0.1167**	**0.1167**		**0.1167**	**0.1167**		**3,591.1689**	**3,591.1689**	**0.1213**		**3,594.2010**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling					11.0673	0.0000	11.0673	1.1730	0.0000	1.1730			0.0000			0.0000
Vendor					1.8323	0.0000	1.8323	0.1839	0.0000	0.1839			0.0000			0.0000
Worker					107.8668	0.0000	107.8668	10.8270	0.0000	10.8270			0.0000			0.0000
Total					**120.7664**	**0.0000**	**120.7664**	**12.1839**	**0.0000**	**12.1839**			**0.0000**			**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7583	15.6416	20.1644	0.0379		0.8245	0.8245		0.8245	0.8245	0.0000	3,591.1689	3,591.1689	0.1213		3,594.2010
Total	**0.7583**	**15.6416**	**20.1644**	**0.0379**		**0.8245**	**0.8245**		**0.8245**	**0.8245**	**0.0000**	**3,591.1689**	**3,591.1689**	**0.1213**		**3,594.2010**

3.6 4 Decommissioning New WTGs - 2053

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling					2.1666	0.0000	2.1666	0.2848	0.0000	0.2848			0.0000			0.0000
Vendor					0.2994	0.0000	0.2994	0.0310	0.0000	0.0310			0.0000			0.0000
Worker					17.6235	0.0000	17.6235	1.8219	0.0000	1.8219			0.0000			0.0000
Total					**20.0895**	**0.0000**	**20.0895**	**2.1377**	**0.0000**	**2.1377**			**0.0000**			**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1908	1.4114	2.3093	8.2000e-003	48.6764	5.0800e-003	48.6815	4.9266	4.7700e-003	4.9313		838.7264	838.7264	0.0480		839.9272
Unmitigated	0.1908	1.4114	2.3093	8.2000e-003	48.6764	5.0800e-003	48.6815	4.9266	4.7700e-003	4.9313		838.7264	838.7264	0.0480		839.9272

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	65.00	65.00	65.00	235,792	235,792
Total	65.00	65.00	65.00	235,792	235,792

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	13.80	6.20	6.20	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.490441	0.036099	0.183975	0.121725	0.015214	0.005252	0.022424	0.112230	0.002972	0.001873	0.006187	0.000783	0.000825

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

<u>Unmitigated</u>

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Unmitigated	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Total	**0.0124**	**1.2100e-003**	**0.1329**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**		**0.2845**	**0.2845**	**7.5000e-004**		**0.3033**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Total	**0.0124**	**1.2100e-003**	**0.1329**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**		**0.2845**	**0.2845**	**7.5000e-004**		**0.3033**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Mesa Wind Repower - CEQA Tech Support

Salton Sea Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	1,300.00	1000sqft	29.84	1,300,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	3.4	**Precipitation Freq (Days)**	20
Climate Zone	10			**Operational Year**	2022
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Existing wind project repower. Decommissioning and removing the legacy towers is not included in this CEQA emissions estimate.

Land Use - Total site estimated disturbance of up to 107 acres. Equiv of 1.3 million sq ft.

Construction Phase - Phasing approximate per POD dated October 2019, excluding removing legacy towers

Off-road Equipment - Roadway Improvements - Estd Offroad Equipment ct 5

Off-road Equipment - Install New WTGs - Estd Offroad Equipment ct 16

Off-road Equipment - Ph 2a for on-road only

Off-road Equipment - Restoration Revegetation - Estd Offroad Equipment ct 3

Off-road Equipment - Future year decommissioning new WTGs - Estd Offroad Equipment ct 6

Trips and VMT - approx up to 400 Light Duty vehicles daily and overall 10,580 Heavy Duty haul trips

On-road Fugitive Dust - final fraction of average trip is unpaved

Grading - Total disturbance up to 107 ac. Temp site disturbance approx 82 acres

Vehicle Trips - Operational mobile sources under 100 trips daily

Road Dust - final fraction of worker trip is unpaved

Consumer Products - no consumer products in operational phase

Area Coating - no architectural coatings needed in operation phase

Energy Use - no energy use applicable in operational phase

Water And Wastewater - no water use applicable in operational phase

Solid Waste - no solid waste applicable in operational phase

Construction Off-road Equipment Mitigation - Mitigation includes offroad Tier 3 fleet or higher, stabilizer is 84% effective per Table XI-D, watering 2x daily is 55% effective PM10 control per Rule 403, unpaved travel speed limit 15 mph

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	40
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	440.00	330.00
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	20.00	198.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblEnergyUse	LightingElect	2.93	0.00
tblEnergyUse	NT24E	5.02	0.00
tblEnergyUse	NT24NG	17.13	0.00
tblEnergyUse	T24E	2.20	0.00
tblEnergyUse	T24NG	15.36	0.00
tblGrading	AcresOfGrading	66.00	107.00
tblGrading	AcresOfGrading	0.00	107.00
tblGrading	MaterialExported	0.00	2,000.00
tblGrading	MaterialExported	0.00	2,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	HaulingPercentPave	50.00	99.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	RoadPercentPave	50	90
tblSolidWaste	SolidWasteGenerationRate	1,612.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripLength	20.00	140.00
tblTripsAndVMT	HaulingTripLength	20.00	60.00

tblTripsAndVMT	HaulingTripLength	20.00	60.00
tblTripsAndVMT	HaulingTripNumber	198.00	2,888.00
tblTripsAndVMT	HaulingTripNumber	0.00	7,960.00
tblTripsAndVMT	HaulingTripNumber	0.00	500.00
tblTripsAndVMT	HaulingTripNumber	198.00	792.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,120.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	10.00
tblTripsAndVMT	VendorTripNumber	213.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	13.00	50.00
tblTripsAndVMT	WorkerTripNumber	546.00	250.00
tblTripsAndVMT	WorkerTripNumber	546.00	0.00
tblTripsAndVMT	WorkerTripNumber	8.00	50.00
tblTripsAndVMT	WorkerTripNumber	15.00	50.00
tblVehicleTrips	ST_TR	1.49	0.05
tblVehicleTrips	SU_TR	0.62	0.05
tblVehicleTrips	WD_TR	3.82	0.05
tblWater	IndoorWaterUseRate	300,625,000.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	10.4295	124.0572	75.6893	0.3280	800.1036	3.9290	804.0326	84.1872	3.6406	87.8278	0.0000	33,329.4437	33,329.4437	3.9609	0.0000	33,428.4669
2022	6.8769	62.0505	58.8299	0.1772	707.7193	2.3809	710.1003	71.5527	2.2179	73.7706	0.0000	17,693.1999	17,693.1999	2.6589	0.0000	17,759.6723
2023	0.8673	5.8547	9.4769	0.0241	121.3032	0.2434	121.5466	12.2773	0.2316	12.5089	0.0000	2,400.2871	2,400.2871	0.3013	0.0000	2,407.8205
2053	1.3930	5.5521	15.4072	0.0379	120.7664	0.1167	120.8831	12.1839	0.1167	12.3007	0.0000	3,591.1689	3,591.1689	0.1213	0.0000	3,594.2010
Maximum	**10.4295**	**124.0572**	**75.6893**	**0.3280**	**800.1036**	**3.9290**	**804.0326**	**84.1872**	**3.6406**	**87.8278**	**0.0000**	**33,329.4437**	**33,329.4437**	**3.9609**	**0.0000**	**33,428.4669**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	5.6128	99.2563	89.6080	0.3280	138.6120	2.9394	141.5514	16.6768	2.9301	19.6069	0.0000	33,329.4437	33,329.4437	3.9609	0.0000	33,428.4669
2022	4.1118	57.2107	70.1018	0.1772	118.0722	2.3667	120.4390	12.7107	2.3630	15.0738	0.0000	17,693.1998	17,693.1998	2.6589	0.0000	17,759.6723
2023	0.5619	6.8773	10.3167	0.0241	20.4431	0.3470	20.7901	2.2101	0.3466	2.5567	0.0000	2,400.2871	2,400.2871	0.3013	0.0000	2,407.8205
2053	0.7583	15.6416	20.1644	0.0379	20.0895	0.8245	20.9139	2.1377	0.8245	2.9621	0.0000	3,591.1689	3,591.1689	0.1213	0.0000	3,594.2010
Maximum	**5.6128**	**99.2563**	**89.6080**	**0.3280**	**138.6120**	**2.9394**	**141.5514**	**16.6768**	**2.9301**	**19.6069**	**0.0000**	**33,329.4437**	**33,329.4437**	**3.9609**	**0.0000**	**33,428.4669**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**43.55**	**9.38**	**-19.31**	**0.00**	**83.02**	**2.89**	**82.71**	**81.28**	**-4.15**	**78.43**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1433	1.4176	1.7947	7.3600e-003	48.6764	5.1700e-003	48.6816	4.9266	4.8600e-003	4.9314		755.0056	755.0056	0.0480		756.2058
Total	**0.1557**	**1.4188**	**1.9277**	**7.3700e-003**	**48.6764**	**5.6400e-003**	**48.6820**	**4.9266**	**5.3300e-003**	**4.9319**		**755.2901**	**755.2901**	**0.0488**	**0.0000**	**756.5091**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1433	1.4176	1.7947	7.3600e-003	48.6764	5.1700e-003	48.6816	4.9266	4.8600e-003	4.9314		755.0056	755.0056	0.0480		756.2058
Total	**0.1557**	**1.4188**	**1.9277**	**7.3700e-003**	**48.6764**	**5.6400e-003**	**48.6820**	**4.9266**	**5.3300e-003**	**4.9319**		**755.2901**	**755.2901**	**0.0488**	**0.0000**	**756.5091**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	1 Roadway Improvements	Grading	7/1/2021	8/31/2021	5	44	1 Roadway Improvements
2	2 Installing New WTGs	Building Construction	7/1/2021	10/5/2022	5	330	2 Installing New WTGs
3	2a Delivering New WTGs Components	Building Construction	7/1/2021	10/5/2022	5	330	2a Delivering New WTGs Components
4	3 Restoration	Site Preparation	7/1/2022	4/4/2023	5	198	3 Restoration
5	4 Decommissioning New WTGs	Trenching	1/1/2053	12/30/2053	5	260	4 Decommissioning New WTGs

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
1 Roadway Improvements	Excavators	1	8.00	158	0.38
1 Roadway Improvements	Graders	1	8.00	187	0.41
1 Roadway Improvements	Rubber Tired Dozers	1	8.00	247	0.40
1 Roadway Improvements	Scrapers	1	8.00	367	0.48
1 Roadway Improvements	Tractors/Loaders/Backhoes	1	8.00	97	0.37

2 Installing New WTGs	Bore/Drill Rigs	1	8.00	221	0.50
2 Installing New WTGs	Cranes	2	10.00	231	0.29
2 Installing New WTGs	Forklifts	3	10.00	89	0.20
2 Installing New WTGs	Generator Sets	1	8.00	84	0.74
2 Installing New WTGs	Graders	1	8.00	187	0.41
2 Installing New WTGs	Other Construction Equipment	2	8.00	172	0.42
2 Installing New WTGs	Other Material Handling Equipment	1	8.00	168	0.40
2 Installing New WTGs	Rollers	2	8.00	80	0.38
2 Installing New WTGs	Tractors/Loaders/Backhoes	2	8.00	97	0.37
2 Installing New WTGs	Welders	1	8.00	46	0.45
2a Delivering New WTGs Components	Cranes	0	7.00	231	0.29
2a Delivering New WTGs Components	Forklifts	0	8.00	89	0.20
2a Delivering New WTGs Components	Generator Sets	0	8.00	84	0.74
2a Delivering New WTGs Components	Tractors/Loaders/Backhoes	0	7.00	97	0.37
2a Delivering New WTGs Components	Welders	0	8.00	46	0.45
3 Restoration	Air Compressors	1	8.00	78	0.48
3 Restoration	Other Material Handling Equipment	1	8.00	168	0.40
3 Restoration	Rubber Tired Dozers	0	8.00	247	0.40
3 Restoration	Skid Steer Loaders	1	8.00	65	0.37
3 Restoration	Tractors/Loaders/Backhoes	0	8.00	97	0.37
4 Decommissioning New WTGs	Air Compressors	1	8.00	78	0.48
4 Decommissioning New WTGs	Concrete/Industrial Saws	1	8.00	81	0.73
4 Decommissioning New WTGs	Cranes	1	8.00	231	0.29
4 Decommissioning New WTGs	Excavators	1	8.00	158	0.38
4 Decommissioning New WTGs	Rubber Tired Dozers	1	8.00	247	0.40
4 Decommissioning New WTGs	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
1 Roadway Improvements	5	50.00	10.00	2,888.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2 Installing New WTGs	16	250.00	10.00	7,960.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
2a Delivering New WTGs Components	0	0.00	0.00	500.00	14.60	6.20	140.00	LD_Mix	HDT_Mix	HHDT
3 Restoration	3	50.00	2.00	792.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT
4 Decommissioning New WTGs	6	50.00	2.00	3,120.00	14.60	6.20	60.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 1 Roadway Improvements - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6082	0.0000	8.6082	3.5898	0.0000	3.5898			0.0000			0.0000
Off-Road	2.8453	31.6479	18.3417	0.0386		1.3527	1.3527		1.2445	1.2445		3,738.0399	3,738.0399	1.2090		3,768.2638
Total	**2.8453**	**31.6479**	**18.3417**	**0.0386**	**8.6082**	**1.3527**	**9.9609**	**3.5898**	**1.2445**	**4.8343**		**3,738.0399**	**3,738.0399**	**1.2090**		**3,768.2638**

3.2 1 Roadway Improvements - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7120	28.3004	4.5583	0.1281	61.3800	0.1222	61.5022	6.7228	0.1169	6.8397		13,473.4977	13,473.4977	0.3440		13,482.0975
Vendor	0.0303	0.9139	0.2463	2.4300e-003	9.1779	1.8500e-003	9.1798	0.9261	1.7700e-003	0.9279		254.0776	254.0776	0.0212		254.6074
Worker	0.2901	0.2245	1.9411	4.6300e-003	107.9394	3.3200e-003	107.9427	10.8558	3.0500e-003	10.8588		460.3781	460.3781	0.0181		460.8302
Total	**1.0323**	**29.4388**	**6.7457**	**0.1352**	**178.4973**	**0.1274**	**178.6247**	**18.5046**	**0.1218**	**18.6264**		**14,187.9533**	**14,187.9533**	**0.3833**		**14,197.5351**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.8737	0.0000	3.8737	1.6154	0.0000	1.6154			0.0000			0.0000
Off-Road	0.9472	18.5790	22.3845	0.0386		0.7859	0.7859		0.7859	0.7859	0.0000	3,738.0399	3,738.0399	1.2090		3,768.2638
Total	**0.9472**	**18.5790**	**22.3845**	**0.0386**	**3.8737**	**0.7859**	**4.6596**	**1.6154**	**0.7859**	**2.4013**	**0.0000**	**3,738.0399**	**3,738.0399**	**1.2090**		**3,768.2638**

3.2 1 Roadway Improvements - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7120	28.3004	4.5583	0.1281	12.6958	0.1222	12.8180	1.8647	0.1169	1.9816		13,473.4977	13,473.4977	0.3440		13,482.0975
Vendor	0.0303	0.9139	0.2463	2.4300e-003	1.5134	1.8500e-003	1.5153	0.1613	1.7700e-003	0.1630		254.0776	254.0776	0.0212		254.6074
Worker	0.2901	0.2245	1.9411	4.6300e-003	17.6960	3.3200e-003	17.6994	1.8506	3.0500e-003	1.8537		460.3781	460.3781	0.0181		460.8302
Total	**1.0323**	**29.4388**	**6.7457**	**0.1352**	**31.9053**	**0.1274**	**32.0326**	**3.8766**	**0.1218**	**3.9984**		**14,187.9533**	**14,187.9533**	**0.3833**		**14,197.5351**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7766	49.2318	38.7612	0.0749		2.3791	2.3791		2.2081	2.2081		7,202.9249	7,202.9249	2.1198		7,255.9193
Total	**4.7766**	**49.2318**	**38.7612**	**0.0749**		**2.3791**	**2.3791**		**2.2081**	**2.2081**		**7,202.9249**	**7,202.9249**	**2.1198**		**7,255.9193**

3.3 2 Installing New WTGs - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2617	10.4003	1.6752	0.0471	55.9265	0.0449	55.9715	6.0074	0.0430	6.0504		4,951.4793	4,951.4793	0.1264		4,954.6397
Vendor	0.0303	0.9139	0.2463	2.4300e-003	9.1779	1.8500e-003	9.1798	0.9261	1.7700e-003	0.9279		254.0776	254.0776	0.0212		254.6074
Worker	1.4503	1.1225	9.7054	0.0231	539.6968	0.0166	539.7134	54.2789	0.0153	54.2941		2,301.8904	2,301.8904	0.0904		2,304.1509
Total	**1.7422**	**12.4367**	**11.6268**	**0.0727**	**604.8012**	**0.0633**	**604.8646**	**61.2124**	**0.0600**	**61.2724**		**7,507.4472**	**7,507.4472**	**0.2380**		**7,513.3981**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8579	37.4997	48.6371	0.0749		1.9563	1.9563		1.9563	1.9563	0.0000	7,202.9249	7,202.9249	2.1198		7,255.9193
Total	**1.8579**	**37.4997**	**48.6371**	**0.0749**		**1.9563**	**1.9563**		**1.9563**	**1.9563**	**0.0000**	**7,202.9249**	**7,202.9249**	**2.1198**		**7,255.9193**

3.3 2 Installing New WTGs - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.2617	10.4003	1.6752	0.0471	11.1982	0.0449	11.2431	1.5441	0.0430	1.5871		4,951.4793	4,951.4793	0.1264		4,954.6397
Vendor	0.0303	0.9139	0.2463	2.4300e-003	1.5134	1.8500e-003	1.5153	0.1613	1.7700e-003	0.1630		254.0776	254.0776	0.0212		254.6074
Worker	1.4503	1.1225	9.7054	0.0231	88.4802	0.0166	88.4967	9.2532	0.0153	9.2684		2,301.8904	2,301.8904	0.0904		2,304.1509
Total	**1.7422**	**12.4367**	**11.6268**	**0.0727**	**101.1918**	**0.0633**	**101.2552**	**10.9585**	**0.0600**	**11.0185**		**7,507.4472**	**7,507.4472**	**0.2380**		**7,513.3981**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Off-Road	4.2856	43.0096	38.1935	0.0750		2.0462	2.0462		1.8994	1.8994		7,204.5683	7,204.5683	2.1159		7,257.4665
Total	**4.2856**	**43.0096**	**38.1935**	**0.0750**		**2.0462**	**2.0462**		**1.8994**	**1.8994**		**7,204.5683**	**7,204.5683**	**2.1159**		**7,257.4665**

3.3 2 Installing New WTGs - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2443	9.1005	1.6186	0.0465	37.3878	0.0369	37.4248	4.0425	0.0353	4.0778		4,893.4381	4,893.4381	0.1199		4,896.4344
Vendor	0.0282	0.8618	0.2276	2.4100e-003	9.1779	1.5600e-003	9.1795	0.9261	1.4900e-003	0.9276		251.8979	251.8979	0.0197		252.3905
Worker	1.3601	1.0223	8.9164	0.0223	539.6968	0.0160	539.7128	54.2789	0.0148	54.2936		2,217.6834	2,217.6834	0.0824		2,219.7435
Total	**1.6325**	**10.9845**	**10.7626**	**0.0712**	**586.2625**	**0.0545**	**586.3170**	**59.2474**	**0.0516**	**59.2990**		**7,363.0193**	**7,363.0193**	**0.2220**		**7,368.5683**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8579	37.4997	48.6371	0.0750		1.9563	1.9563		1.9563	1.9563	0.0000	7,204.5683	7,204.5683	2.1159		7,257.4665
Total	**1.8579**	**37.4997**	**48.6371**	**0.0750**		**1.9563**	**1.9563**		**1.9563**	**1.9563**	**0.0000**	**7,204.5683**	**7,204.5683**	**2.1159**		**7,257.4665**

3.3 2 Installing New WTGs - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2443	9.1005	1.6186	0.0465	7.5690	0.0369	7.6059	1.0669	0.0353	1.1023		4,893.4381	4,893.4381	0.1199		4,896.4344
Vendor	0.0282	0.8618	0.2276	2.4100e-003	1.5134	1.5600e-003	1.5150	0.1613	1.4900e-003	0.1628		251.8979	251.8979	0.0197		252.3905
Worker	1.3601	1.0223	8.9164	0.0223	88.4802	0.0160	88.4962	9.2532	0.0148	9.2679		2,217.6834	2,217.6834	0.0824		2,219.7435
Total	**1.6325**	**10.9845**	**10.7626**	**0.0712**	**97.5625**	**0.0545**	**97.6171**	**10.4814**	**0.0516**	**10.5329**		**7,363.0193**	**7,363.0193**	**0.2220**		**7,368.5683**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0331	1.3020	0.2140	6.5900e-003	8.1969	6.4700e-003	8.2034	0.8805	6.1900e-003	0.8867		693.0784	693.0784	0.0109		693.3505
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0331**	**1.3020**	**0.2140**	**6.5900e-003**	**8.1969**	**6.4700e-003**	**8.2034**	**0.8805**	**6.1900e-003**	**0.8867**		**693.0784**	**693.0784**	**0.0109**		**693.3505**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0331	1.3020	0.2140	6.5900e-003	1.6412	6.4700e-003	1.6477	0.2263	6.1900e-003	0.2325		693.0784	693.0784	0.0109		693.3505
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0331**	**1.3020**	**0.2140**	**6.5900e-003**	**1.6412**	**6.4700e-003**	**1.6477**	**0.2263**	**6.1900e-003**	**0.2325**		**693.0784**	**693.0784**	**0.0109**		**693.3505**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0309	1.1193	0.2071	6.5100e-003	5.4798	5.3200e-003	5.4851	0.5925	5.0900e-003	0.5976		684.8892	684.8892	0.0105		685.1508
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0309**	**1.1193**	**0.2071**	**6.5100e-003**	**5.4798**	**5.3200e-003**	**5.4851**	**0.5925**	**5.0900e-003**	**0.5976**		**684.8892**	**684.8892**	**0.0105**		**685.1508**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 2a Delivering New WTGs Components - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0309	1.1193	0.2071	6.5100e-003	1.1093	5.3200e-003	1.1146	0.1564	5.0900e-003	0.1615		684.8892	684.8892	0.0105		685.1508
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0309**	**1.1193**	**0.2071**	**6.5100e-003**	**1.1093**	**5.3200e-003**	**1.1146**	**0.1564**	**5.0900e-003**	**0.1615**		**684.8892**	**684.8892**	**0.0105**		**685.1508**

3.5 3 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5747	0.0000	0.5747	0.0621	0.0000	0.0621			0.0000			0.0000
Off-Road	0.6097	5.0512	7.5696	0.0118		0.2653	0.2653		0.2528	0.2528		1,135.3321	1,135.3321	0.2703		1,142.0884
Total	**0.6097**	**5.0512**	**7.5696**	**0.0118**	**0.5747**	**0.2653**	**0.8400**	**0.0621**	**0.2528**	**0.3149**		**1,135.3321**	**1,135.3321**	**0.2703**		**1,142.0884**

3.5 3 Restoration - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0405	1.5091	0.2684	7.7200e-003	5.6274	6.1200e-003	5.6335	0.6097	5.8500e-003	0.6155		811.4747	811.4747	0.0199		811.9715
Vendor	5.6400e-003	0.1724	0.0455	4.8000e-004	1.8356	3.1000e-004	1.8359	0.1852	3.0000e-004	0.1855		50.3796	50.3796	3.9400e-003		50.4781
Worker	0.2720	0.2045	1.7833	4.4600e-003	107.9394	3.2100e-003	107.9426	10.8558	2.9500e-003	10.8587		443.5367	443.5367	0.0165		443.9487
Total	**0.3182**	**1.8859**	**2.0972**	**0.0127**	**115.4023**	**9.6400e-003**	**115.4120**	**11.6507**	**9.1000e-003**	**11.6598**		**1,305.3909**	**1,305.3909**	**0.0403**		**1,306.3983**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2586	0.0000	0.2586	0.0280	0.0000	0.0280			0.0000			0.0000
Off-Road	0.2724	5.7212	8.3979	0.0118		0.3410	0.3410		0.3410	0.3410	0.0000	1,135.3321	1,135.3321	0.2703		1,142.0884
Total	**0.2724**	**5.7212**	**8.3979**	**0.0118**	**0.2586**	**0.3410**	**0.5996**	**0.0280**	**0.3410**	**0.3689**	**0.0000**	**1,135.3321**	**1,135.3321**	**0.2703**		**1,142.0884**

3.5 3 Restoration - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0405	1.5091	0.2684	7.7200e-003	1.1431	6.1200e-003	1.1492	0.1622	5.8500e-003	0.1681		811.4747	811.4747	0.0199		811.9715
Vendor	5.6400e-003	0.1724	0.0455	4.8000e-004	0.3027	3.1000e-004	0.3030	0.0323	3.0000e-004	0.0326		50.3796	50.3796	3.9400e-003		50.4781
Worker	0.2720	0.2045	1.7833	4.4600e-003	17.6960	3.2100e-003	17.6992	1.8506	2.9500e-003	1.8536		443.5367	443.5367	0.0165		443.9487
Total	**0.3182**	**1.8859**	**2.0972**	**0.0127**	**19.1418**	**9.6400e-003**	**19.1514**	**2.0451**	**9.1000e-003**	**2.0542**		**1,305.3909**	**1,305.3909**	**0.0403**		**1,306.3983**

3.5 3 Restoration - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5747	0.0000	0.5747	0.0621	0.0000	0.0621			0.0000			0.0000
Off-Road	0.5777	4.6986	7.5581	0.0118		0.2373	0.2373		0.2259	0.2259		1,135.4270	1,135.4270	0.2683		1,142.1346
Total	**0.5777**	**4.6986**	**7.5581**	**0.0118**	**0.5747**	**0.2373**	**0.8120**	**0.0621**	**0.2259**	**0.2880**		**1,135.4270**	**1,135.4270**	**0.2683**		**1,142.1346**

3.5 3 Restoration - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0291	0.8363	0.2359	7.5000e-003	10.9536	2.7800e-003	10.9564	1.1742	2.6600e-003	1.1769		788.8812	788.8812	0.0152		789.2604
Vendor	4.4300e-003	0.1328	0.0391	4.7000e-004	1.8356	1.2000e-004	1.8357	0.1852	1.2000e-004	0.1853		49.2733	49.2733	2.8000e-003		49.3433
Worker	0.2560	0.1870	1.6438	4.2900e-003	107.9394	3.1200e-003	107.9425	10.8558	2.8700e-003	10.8586		426.7056	426.7056	0.0151		427.0822
Total	**0.2895**	**1.1561**	**1.9188**	**0.0123**	**120.7285**	**6.0200e-003**	**120.7346**	**12.2152**	**5.6500e-003**	**12.2208**		**1,264.8601**	**1,264.8601**	**0.0330**		**1,265.6859**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2586	0.0000	0.2586	0.0280	0.0000	0.0280			0.0000			0.0000
Off-Road	0.2724	5.7212	8.3979	0.0118		0.3410	0.3410		0.3410	0.3410	0.0000	1,135.4270	1,135.4270	0.2683		1,142.1346
Total	**0.2724**	**5.7212**	**8.3979**	**0.0118**	**0.2586**	**0.3410**	**0.5996**	**0.0280**	**0.3410**	**0.3689**	**0.0000**	**1,135.4270**	**1,135.4270**	**0.2683**		**1,142.1346**

3.5 3 Restoration - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0291	0.8363	0.2359	7.5000e-003	2.1857	2.7800e-003	2.1885	0.2993	2.6600e-003	0.3019		788.8812	788.8812	0.0152		789.2604
Vendor	4.4300e-003	0.1328	0.0391	4.7000e-004	0.3027	1.2000e-004	0.3028	0.0323	1.2000e-004	0.0324		49.2733	49.2733	2.8000e-003		49.3433
Worker	0.2560	0.1870	1.6438	4.2900e-003	17.6960	3.1200e-003	17.6992	1.8506	2.8700e-003	1.8535		426.7056	426.7056	0.0151		427.0822
Total	**0.2895**	**1.1561**	**1.9188**	**0.0123**	**20.1844**	**6.0200e-003**	**20.1905**	**2.1822**	**5.6500e-003**	**2.1878**		**1,264.8601**	**1,264.8601**	**0.0330**		**1,265.6859**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3930	5.5521	15.4072	0.0379		0.1167	0.1167		0.1167	0.1167		3,591.1689	3,591.1689	0.1213		3,594.2010
Total	**1.3930**	**5.5521**	**15.4072**	**0.0379**		**0.1167**	**0.1167**		**0.1167**	**0.1167**		**3,591.1689**	**3,591.1689**	**0.1213**		**3,594.2010**

3.6 4 Decommissioning New WTGs - 2053

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling					11.0673	0.0000	11.0673	1.1730	0.0000	1.1730			0.0000			0.0000
Vendor					1.8323	0.0000	1.8323	0.1839	0.0000	0.1839			0.0000			0.0000
Worker					107.8668	0.0000	107.8668	10.8270	0.0000	10.8270			0.0000			0.0000
Total					**120.7664**	**0.0000**	**120.7664**	**12.1839**	**0.0000**	**12.1839**			**0.0000**			**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7583	15.6416	20.1644	0.0379		0.8245	0.8245		0.8245	0.8245	0.0000	3,591.1689	3,591.1689	0.1213		3,594.2010
Total	**0.7583**	**15.6416**	**20.1644**	**0.0379**		**0.8245**	**0.8245**		**0.8245**	**0.8245**	**0.0000**	**3,591.1689**	**3,591.1689**	**0.1213**		**3,594.2010**

3.6 4 Decommissioning New WTGs - 2053

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling					2.1666	0.0000	2.1666	0.2848	0.0000	0.2848			0.0000			0.0000
Vendor					0.2994	0.0000	0.2994	0.0310	0.0000	0.0310			0.0000			0.0000
Worker					17.6235	0.0000	17.6235	1.8219	0.0000	1.8219			0.0000			0.0000
Total					**20.0895**	**0.0000**	**20.0895**	**2.1377**	**0.0000**	**2.1377**			**0.0000**			**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1433	1.4176	1.7947	7.3600e-003	48.6764	5.1700e-003	48.6816	4.9266	4.8600e-003	4.9314		755.0056	755.0056	0.0480		756.2058
Unmitigated	0.1433	1.4176	1.7947	7.3600e-003	48.6764	5.1700e-003	48.6816	4.9266	4.8600e-003	4.9314		755.0056	755.0056	0.0480		756.2058

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	65.00	65.00	65.00	235,792	235,792
Total	65.00	65.00	65.00	235,792	235,792

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	13.80	6.20	6.20	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.490441	0.036099	0.183975	0.121725	0.015214	0.005252	0.022424	0.112230	0.002972	0.001873	0.006187	0.000783	0.000825

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Unmitigated	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Total	**0.0124**	**1.2100e-003**	**0.1329**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**		**0.2845**	**0.2845**	**7.5000e-004**		**0.3033**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0124	1.2100e-003	0.1329	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004		0.2845	0.2845	7.5000e-004		0.3033
Total	**0.0124**	**1.2100e-003**	**0.1329**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**		**0.2845**	**0.2845**	**7.5000e-004**		**0.3033**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

tblProjectCharacteristics

ProjectName	LocationScope	EMFAC_ID	WindSpeed	PrecipitationFrequency	ClimateZone	UrbanizationLevel	OperationalYear	UtilityCompany	CO2IntensityFactor	CH4IntensityFactor	N2OIntensityFactor
Mesa Wind Repower - CEQA Tech Support	AB	SS	3.4	20	10	Rural	2022		0	0	0

tblProjectCharacteristics

TotalPopulation	TotalLotAcreage	UsingHistoricalEnergyUseData	ConstructionPhaseStartDate
0	29.84	0	2021/07/01

tblPollutants

PollutantSelection	PollutantFullName	PollutantName
1	Reactive Organic Gases (ROG)	ROG
1	Nitrogen Oxides (NOx)	NOX
1	Carbon Monoxide (CO)	CO
1	Sulfur Dioxide (SO2)	SO2
1	Particulate Matter 10um (PM10)	PM10
1	Particulate Matter 2.5um (PM2.5)	PM2_5
1	Fugitive PM10um (PM10)	PM10_FUG
1	Fugitive PM2.5um (PM2.5)	PM25_FUG
1	Biogenic Carbon Dioxide (CO2)	CO2_BIO
1	Non-Biogenic Carbon Dioxide (CO2)	CO2_NBIO
1	Carbon Dioxide (CO2)	CO2
1	Methane (CH4)	CH4
1	Nitrous Oxide (N2O)	N2O
1	CO2 Equivalent GHGs (CO2e)	CO2E

tblLandUse

LandUseType	LandUseSubType	LandUseUnitAmount	LandUseSizeMetric	LotAcreage
Industrial	Manufacturing	1300	1000sqft	29.84

tblLandUse

LandUseSquareFeet	Population	BuildingSpaceSquareFeet	GreenSpaceAllowEdit	RecSwimmingAreaAllowEdit
1300000	0	1300000	0	0

tblConstructionPhase

PhaseNumber	PhaseName	PhaseType	PhaseStartDate
1	1 Roadway Improvements	Grading	2021/07/01
2	2 Installing New WTGs	Building Construction	2021/07/01
3	2a Delivering New WTGs Components	Building Construction	2021/07/01
4	3 Restoration	Site Preparation	2022/07/01
5	4 Decommissioning New WTGs	Trenching	2053/01/01

tblConstructionPhase

PhaseEndDate	NumDaysWeek	NumDays	PhaseDescription
2021/08/31	5	44	1 Roadway Improvements
2022/10/05	5	330	2 Installing New WTGs
2022/10/05	5	330	2a Delivering New WTGs Components
2023/04/04	5	198	3 Restoration
2053/12/30	5	260	4 Decommissioning New WTGs

tblOffRoadEquipment

PhaseName	OffRoadEquipmentType
1 Roadway Improvements	Excavators
1 Roadway Improvements	Graders
1 Roadway Improvements	Rubber Tired Dozers
1 Roadway Improvements	Scrapers
1 Roadway Improvements	Tractors/Loaders/Backhoes
2 Installing New WTGs	Bore/Drill Rigs
2 Installing New WTGs	Cranes
2 Installing New WTGs	Forklifts
2 Installing New WTGs	Generator Sets
2 Installing New WTGs	Graders
2 Installing New WTGs	Other Construction Equipment
2 Installing New WTGs	Other Material Handling Equipment
2 Installing New WTGs	Rollers
2 Installing New WTGs	Tractors/Loaders/Backhoes
2 Installing New WTGs	Welders
2a Delivering New WTGs Components	Cranes
2a Delivering New WTGs Components	Forklifts
2a Delivering New WTGs Components	Generator Sets
2a Delivering New WTGs Components	Tractors/Loaders/Backhoes
2a Delivering New WTGs Components	Welders
3 Restoration	Air Compressors
3 Restoration	Other Material Handling Equipment
3 Restoration	Rubber Tired Dozers
3 Restoration	Skid Steer Loaders
3 Restoration	Tractors/Loaders/Backhoes
4 Decommissioning New WTGs	Air Compressors
4 Decommissioning New WTGs	Concrete/Industrial Saws
4 Decommissioning New WTGs	Cranes
4 Decommissioning New WTGs	Excavators
4 Decommissioning New WTGs	Rubber Tired Dozers
4 Decommissioning New WTGs	Tractors/Loaders/Backhoes

tblOffRoadEquipment

OffRoadEquipmentUnitAmount	UsageHours	HorsePower	LoadFactor
1	8	158	0.38
1	8	187	0.41
1	8	247	0.4
1	8	367	0.48
1	8	97	0.37
1	8	221	0.5
2	10	231	0.29
3	10	89	0.2
1	8	84	0.74
1	8	187	0.41
2	8	172	0.42
1	8	168	0.4
2	8	80	0.38
2	8	97	0.37
1	8	46	0.45
0	7	231	0.29
0	8	89	0.2
0	8	84	0.74
0	7	97	0.37
0	8	46	0.45
1	8	78	0.48
1	8	168	0.4
0	8	247	0.4
1	8	65	0.37
0	8	97	0.37
1	8	78	0.48
1	8	81	0.73
1	8	231	0.29
1	8	158	0.38
1	8	247	0.4
1	8	97	0.37

tblTripsAndVMT

PhaseName	WorkerTripNumber	VendorTripNumber	HaulingTripNumber
1 Roadway Improvements	50	10	2888
2 Installing New WTGs	250	10	7960
2a Delivering New WTGs Components	0	0	500
3 Restoration	50	2	792
4 Decommissioning New WTGs	50	2	3120

tblTripsAndVMT

WorkerTripLength	VendorTripLength	HaulingTripLength	WorkerVehicleClass	VendorVehicleClass	HaulingVehicleClass
14.6	6.2	60	LD_Mix	HDT_Mix	HHDT
14.6	6.2	60	LD_Mix	HDT_Mix	HHDT
14.6	6.2	140	LD_Mix	HDT_Mix	HHDT
14.6	6.2	60	LD_Mix	HDT_Mix	HHDT
14.6	6.2	60	LD_Mix	HDT_Mix	HHDT

tblOnRoadDust

PhaseName	WorkerPercentPave	VendorPercentPave
1 Roadway Improvements	90	90
2 Installing New WTGs	90	90
2a Delivering New WTGs Components	90	90
3 Restoration	90	90
4 Decommissioning New WTGs	90	90

tblOnRoadDust

HaulingPercentPave	RoadSiltLoading	MaterialSiltContent	MaterialMoistureContent
99	0.1	8.5	0.5
99	0.1	8.5	0.5
99	0.1	8.5	0.5
99	0.1	8.5	0.5
99	0.1	8.5	0.5

tblOnRoadDust

AverageVehicleWeight	MeanVehicleSpeed
2.4	40
2.4	40
2.4	40
2.4	40
2.4	40

tblGrading

PhaseName	MaterialImported	MaterialExported	GradingSizeMetric	ImportExportPhased
1 Roadway Improvements	0	2000	Ton of Debris	1
3 Restoration	0	2000	Ton of Debris	0

tblGrading

MeanVehicleSpeed	AcresOfGrading	MaterialMoistureContentBulldozing
7.1	107	7.9
7.1	107	7.9

tblGrading

MaterialMoistureContentTruckLoading	MaterialSiltContent
12	6.9
12	6.9

tblVehicleTrips

VehicleTripsLandUseSubType	VehicleTripsLandUseSizeMetric	WD_TR	ST_TR	SU_TR	HW_TL
Manufacturing	1000sqft	0.05	0.05	0.05	0

tblVehicleTrips

HS_TL	HO_TL	CC_TL	CW_TL	CNW_TL	PR_TP	DV_TP	PB_TP	HW_TTP	HS_TTP	HO_TTP
0	0	6.2	13.8	6.2	92	5	3	0	0	0

tblVehicleTrips

CC_TTP	CW_TTP	CNW_TTP
28	59	13

tblVehicleEF

Season	EmissionType	LDA	LDT1	LDT2	MDV	LHD1
A	CH4_IDLEX	0	0	0	0	0.005531
A	CH4_RUNEX	0.010923	0.013241	0.006147	0.013482	0.010424
A	CH4_STREX	0.012942	0.0168	0.006948	0.016765	0.018871
A	CO_IDLEX	0	0	0	0	0.14864
A	CO_RUNEX	0.974485	1.586668	0.837583	1.493936	0.905864
A	CO_STREX	2.184111	3.323452	1.503822	3.078781	2.399316
A	CO2_NBIO_IDLEX	0	0	0	0	9.226488
A	CO2_NBIO_RUNEX	247.902208	313.088892	352.011833	485.538765	599.928368
A	CO2_NBIO_STREX	56.016475	70.272794	78.776679	107.200081	29.904067
A	NOX_IDLEX	0	0	0	0	0.087599
A	NOX_RUNEX	0.109777	0.154364	0.082953	0.184855	1.868419
A	NOX_STREX	0.116464	0.208707	0.13187	0.318376	1.002779
A	PM10_IDLEX	0	0	0	0	0.000973
A	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644
A	PM10_PMTW	0.008	0.008	0.008	0.008	0.010207
A	PM10_RUNEX	0.001576	0.00244	0.001607	0.001712	0.012667
A	PM10_STREX	0.002282	0.00362	0.002392	0.002458	0.000833
A	PM25_IDLEX	0	0	0	0	0.000931
A	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276
A	PM25_PMTW	0.002	0.002	0.002	0.002	0.002552
A	PM25_RUNEX	0.001452	0.002247	0.001478	0.001578	0.0121
A	PM25_STREX	0.002099	0.003329	0.002199	0.002261	0.000766
A	ROG_DIURN	0.071563	0.308208	0.106533	0.17526	0.005916
A	ROG_HTSK	0.101952	0.38612	0.136702	0.234682	0.119282
A	ROG_IDLEX	0	0	0	0	0.017336
A	ROG_RESTL	0.05037	0.200045	0.081331	0.137629	0.002688
A	ROG_RUNEX	0.027197	0.033118	0.015284	0.033812	0.071703
A	ROG_RUNLS	0.039902	0.243294	0.08548	0.147388	0.357242
A	ROG_STREX	0.174537	0.226588	0.093708	0.226108	0.2545
A	SO2_IDLEX	0	0	0	0	0.000092
A	SO2_RUNEX	0.00249	0.003151	0.003527	0.004868	0.005881
A	SO2_STREX	0.000599	0.000761	0.000813	0.001126	0.000345
A	TOG_DIURN	0.071563	0.308208	0.106533	0.17526	0.005916
A	TOG_HTSK	0.101952	0.38612	0.136702	0.234682	0.119282
A	TOG_IDLEX	0	0	0	0	0.023975
A	TOG_RESTL	0.05037	0.200045	0.081331	0.137629	0.002688
A	TOG_RUNEX	0.039623	0.048178	0.022273	0.049156	0.087992
A	TOG_RUNLS	0.039902	0.243294	0.08548	0.147388	0.357242
A	TOG_STREX	0.191094	0.248075	0.102596	0.247553	0.278646
S	CH4_IDLEX	0	0	0	0	0.005531
S	CH4_RUNEX	0.012826	0.015805	0.00725	0.016054	0.010606
S	CH4_STREX	0.011884	0.015737	0.006409	0.015473	0.018413
S	CO_IDLEX	0	0	0	0	0.14864
S	CO_RUNEX	1.27368	2.032808	1.088433	1.937841	0.916072
S	CO_STREX	2.237189	3.413745	1.533498	3.146265	2.331234
S	CO2_NBIO_IDLEX	0	0	0	0	9.226488
S	CO2_NBIO_RUNEX	275.187055	346.032842	389.839539	536.214744	599.928368
S	CO2_NBIO_STREX	56.016475	70.272794	78.776679	107.200081	29.904067
S	NOX_IDLEX	0	0	0	0	0.087599
S	NOX_RUNEX	0.107407	0.151497	0.082635	0.182706	1.725016
S	NOX_STREX	0.123646	0.22095	0.13996	0.337907	0.983869

S	PM10_IDLEX	0	0	0	0	0.000973
S	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644
S	PM10_PMTW	0.008	0.008	0.008	0.008	0.010207
S	PM10_RUNEX	0.001576	0.00244	0.001607	0.001712	0.012667
S	PM10_STREX	0.002282	0.00362	0.002392	0.002458	0.000833
S	PM25_IDLEX	0	0	0	0	0.000931
S	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276
S	PM25_PMTW	0.002	0.002	0.002	0.002	0.002552
S	PM25_RUNEX	0.001452	0.002247	0.001478	0.001578	0.0121
S	PM25_STREX	0.002099	0.003329	0.002199	0.002261	0.000766
S	ROG_DIURN	0.147321	0.638567	0.219661	0.361555	0.01198
S	ROG_HTSK	0.133334	0.521485	0.177128	0.294557	0.150485
S	ROG_IDLEX	0	0	0	0	0.017336
S	ROG_RESTL	0.090988	0.355842	0.141222	0.234654	0.004663
S	ROG_RUNEX	0.031923	0.039573	0.018035	0.040288	0.072151
S	ROG_RUNLS	0.041385	0.255064	0.089084	0.153653	0.368113
S	ROG_STREX	0.160277	0.21225	0.086436	0.20869	0.248315
S	SO2_IDLEX	0	0	0	0	0.000092
S	SO2_RUNEX	0.002767	0.003487	0.003909	0.005381	0.005881
S	SO2_STREX	0.0006	0.000762	0.000813	0.001126	0.000343
S	TOG_DIURN	0.147321	0.638567	0.219661	0.361555	0.01198
S	TOG_HTSK	0.133334	0.521485	0.177128	0.294557	0.150485
S	TOG_IDLEX	0	0	0	0	0.023975
S	TOG_RESTL	0.090988	0.355842	0.141222	0.234654	0.004663
S	TOG_RUNEX	0.046512	0.05755	0.026278	0.058557	0.088646
S	TOG_RUNLS	0.041385	0.255064	0.089084	0.153653	0.368113
S	TOG_STREX	0.175481	0.232375	0.094633	0.228481	0.271874
W	CH4_IDLEX	0	0	0	0	0.005531
W	CH4_RUNEX	0.009697	0.011842	0.00549	0.012017	0.010132
W	CH4_STREX	0.015183	0.019686	0.00813	0.01961	0.01981
W	CO_IDLEX	0	0	0	0	0.14864
W	CO_RUNEX	0.807356	1.350964	0.701785	1.256322	0.889189
W	CO_STREX	2.557893	3.916976	1.76598	3.61526	2.5552
W	CO2_NBIO_IDLEX	0	0	0	0	9.226488
W	CO2_NBIO_RUNEX	229.62139	291.108184	326.771861	451.622463	599.928368
W	CO2_NBIO_STREX	56.016475	70.272794	78.776679	107.200081	29.904067
W	NOX_IDLEX	0	0	0	0	0.087599
W	NOX_RUNEX	0.110486	0.158072	0.084284	0.187941	1.896943
W	NOX_STREX	0.123426	0.221416	0.139764	0.337404	1.052038
W	PM10_IDLEX	0	0	0	0	0.000973
W	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644
W	PM10_PMTW	0.008	0.008	0.008	0.008	0.010207
W	PM10_RUNEX	0.001576	0.00244	0.001607	0.001712	0.012667
W	PM10_STREX	0.002282	0.00362	0.002392	0.002458	0.000833
W	PM25_IDLEX	0	0	0	0	0.000931
W	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276
W	PM25_PMTW	0.002	0.002	0.002	0.002	0.002552
W	PM25_RUNEX	0.001452	0.002247	0.001478	0.001578	0.0121
W	PM25_STREX	0.002099	0.003329	0.002199	0.002261	0.000766
W	ROG_DIURN	0.028913	0.127289	0.042416	0.069283	0.002606
W	ROG_HTSK	0.092308	0.347743	0.124296	0.215902	0.113118
W	ROG_IDLEX	0	0	0	0	0.017336

W	ROG_RESTL	0.020429	0.078771	0.033519	0.058207	0.001212
W	ROG_RUNEX	0.024157	0.029621	0.013651	0.030153	0.070979
W	ROG_RUNLS	0.043967	0.272319	0.095694	0.164408	0.376559
W	ROG_STREX	0.204759	0.265517	0.109647	0.264481	0.267162
W	SO2_IDLEX	0	0	0	0	0.000092
W	SO2_RUNEX	0.002305	0.002928	0.003273	0.004526	0.005881
W	SO2_STREX	0.000606	0.000772	0.000818	0.001136	0.000347
W	TOG_DIURN	0.028913	0.127289	0.042416	0.069283	0.002606
W	TOG_HTSK	0.092308	0.347743	0.124296	0.215902	0.113118
W	TOG_IDLEX	0	0	0	0	0.023975
W	TOG_RESTL	0.020429	0.078771	0.033519	0.058207	0.001212
W	TOG_RUNEX	0.03519	0.043092	0.019892	0.043832	0.086935
W	TOG_RUNLS	0.043967	0.272319	0.095694	0.164408	0.376559
W	TOG_STREX	0.224183	0.290695	0.120047	0.289565	0.292509

LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS
0.00421	0.01747	1.357959	0.013434	0	0	0.899395
0.004168	0.0061	0.011008	0.005394	1.120956	0.423417	0.015304
0.009456	0.065289	0.121577	0.02951	0.057919	0.1434	0.067356
0.131774	0.404357	3.663591	0.282171	0	0	7.430746
0.418961	0.432057	0.397083	0.362915	6.002973	18.620009	0.883537
1.337585	7.704264	1.586213	5.30395	9.942536	9.466432	6.24917
13.83395	140.295968	7746.618953	123.583965	0	0	1179.934665
606.281465	1054.939729	1412.703327	1087.576647	1830.164186	165.704378	1052.799164
27.225919	60.612932	4.838407	64.074622	134.866803	44.849577	47.668311
0.101396	0.570825	28.915454	0.554434	0	0	10.3988
1.187799	0.910399	2.02293	0.976627	3.133837	1.105405	4.077824
0.62864	10.862824	20.321843	3.619927	13.063988	0.300247	13.376185
0.001193	0.002566	0.01543	0.000119	0	0	0.010629
0.08918	0.13034	0.061421	0.13034	0.523418	0.01176	0.7448
0.010634	0.012	0.035755	0.012	0.012	0.004	0.010494
0.010469	0.007643	0.011237	0.005278	0.035144	0.001857	0.022264
0.000429	0.000906	0.000043	0.000866	0.001113	0.003399	0.000687
0.001142	0.002455	0.014763	0.000114	0	0	0.010169
0.03822	0.05586	0.026323	0.05586	0.224322	0.00504	0.3192
0.002658	0.003	0.008939	0.003	0.003	0.001	0.002623
0.010005	0.007306	0.010751	0.005037	0.033592	0.001735	0.021284
0.000394	0.000833	0.00004	0.000796	0.001023	0.003196	0.000632
0.002566	0.003215	0.000153	0.003499	0.009223	2.491704	0.006606
0.050283	0.077371	0.003849	0.021052	0.075798	0.985599	0.031096
0.015007	0.033569	0.962719	0.040968	0	0	0.903402
0.001251	0.001507	0.000081	0.001315	0.004518	1.436875	0.002616
0.045919	0.03521	0.057817	0.030723	0.259215	2.072528	0.108756
0.110349	0.039528	0.000311	0.039527	0.009478	0.392191	0.013343
0.12752	0.472258	0.056296	0.34581	0.781107	1.955121	0.349688
0.000135	0.001351	0.07374	0.001191	0	0	0.011506
0.005907	0.010138	0.013431	0.010556	0.010665	0.002022	0.010165
0.000297	0.000742	0.000075	0.000734	0.001528	0.000661	0.000585
0.002566	0.003215	0.000153	0.003499	0.009223	2.491704	0.006606
0.050283	0.077371	0.003849	0.021052	0.075798	0.985599	0.031096
0.020236	0.045221	1.097907	0.055403	0	0	1.301366
0.001251	0.001507	0.000081	0.001315	0.004518	1.436875	0.002616
0.054101	0.044088	0.074133	0.038534	1.410405	2.573754	0.133007
0.110349	0.039528	0.000311	0.039527	0.009478	0.392191	0.013343
0.139618	0.517063	0.061637	0.378618	0.855214	2.128215	0.382865
0.00421	0.016425	1.280067	0.013392	0	0	0.899029
0.004213	0.006177	0.011017	0.005461	1.121596	0.429416	0.015511
0.009236	0.063759	0.11877	0.028552	0.054664	0.137333	0.058363
0.131774	0.293997	2.663826	0.265937	0	0	7.301896
0.421596	0.437157	0.398572	0.367135	6.027408	20.589085	0.895528
1.300237	7.493647	1.543116	5.060847	9.017695	9.484852	4.801657
13.83395	148.597096	8206.62636	129.992786	0	0	1236.068118
606.281465	1054.939729	1412.703327	1087.576647	1830.164186	165.704378	1052.799164
27.225919	60.612932	4.838407	64.074622	134.866803	44.849577	47.668311
0.101396	0.589194	29.844927	0.572194	0	0	10.730955
1.104402	0.841121	1.884782	0.899167	2.899969	0.953053	3.774323
0.617873	10.838926	20.318664	3.602184	13.022587	0.290007	13.353109

0.001193	0.002163	0.013145	0.000101	0	0	0.00896
0.08918	0.13034	0.061421	0.13034	0.523418	0.01176	0.7448
0.010634	0.012	0.035755	0.012	0.012	0.004	0.010494
0.010469	0.007643	0.011237	0.005278	0.035144	0.001857	0.022264
0.000429	0.000906	0.000043	0.000866	0.001113	0.003399	0.000687
0.001142	0.00207	0.012576	0.000096	0	0	0.008573
0.03822	0.05586	0.026323	0.05586	0.224322	0.00504	0.3192
0.002658	0.003	0.008939	0.003	0.003	0.001	0.002623
0.010005	0.007306	0.010751	0.005037	0.033592	0.001735	0.021284
0.000394	0.000833	0.00004	0.000796	0.001023	0.003196	0.000632
0.005178	0.006524	0.000312	0.007079	0.018687	5.176869	0.013267
0.063367	0.100181	0.004699	0.026104	0.11035	1.647698	0.03634
0.015007	0.031583	0.907507	0.040182	0	0	0.900372
0.002178	0.002657	0.000137	0.002199	0.008829	3.017174	0.004419
0.04603	0.035402	0.05784	0.030889	0.2608	2.101613	0.109267
0.113976	0.041222	0.000324	0.040295	0.009887	0.409643	0.012816
0.12456	0.461192	0.054996	0.334588	0.737211	1.872439	0.302999
0.000135	0.001429	0.078119	0.001252	0	0	0.012042
0.005907	0.010138	0.013431	0.010556	0.010666	0.002054	0.010165
0.000296	0.000738	0.000074	0.00073	0.001512	0.000658	0.000561
0.005178	0.006524	0.000312	0.007079	0.018687	5.176869	0.013267
0.063367	0.100181	0.004699	0.026104	0.11035	1.647698	0.03634
0.020236	0.04254	1.034943	0.054508	0	0	1.297917
0.002178	0.002657	0.000137	0.002199	0.008829	3.017174	0.004419
0.054264	0.044368	0.074168	0.038776	1.412718	2.609935	0.133752
0.113976	0.041222	0.000324	0.040295	0.009887	0.409643	0.012816
0.136377	0.504947	0.060213	0.366332	0.807154	2.038189	0.331746
0.00421	0.018933	1.465523	0.013492	0	0	0.8999
0.004095	0.005956	0.010989	0.005266	1.119919	0.431281	0.014937
0.009893	0.068554	0.127741	0.03127	0.064001	0.163705	0.081341
0.131774	0.558492	5.04422	0.304589	0	0	7.608683
0.414691	0.422898	0.394381	0.355196	5.96476	18.692016	0.863227
1.420175	8.20627	1.690649	5.770104	11.708452	10.423514	8.61302
13.83395	128.817244	7111.370629	114.733688	0	0	1102.417039
606.281465	1054.939729	1412.703327	1087.576647	1830.164186	165.704378	1052.799164
27.225919	60.612932	4.838407	64.074622	134.866803	44.849577	47.668311
0.101396	0.545458	27.631896	0.529909	0	0	9.940109
1.204998	0.926286	2.04943	0.992514	3.192225	1.182287	4.140757
0.656833	10.923539	20.330035	3.665695	13.147297	0.32046	13.418742
0.001193	0.003122	0.018587	0.000145	0	0	0.012933
0.08918	0.13034	0.061421	0.13034	0.523418	0.01176	0.7448
0.010634	0.012	0.035755	0.012	0.012	0.004	0.010494
0.010469	0.007643	0.011237	0.005278	0.035144	0.001857	0.022264
0.000429	0.000906	0.000043	0.000866	0.001113	0.003399	0.000687
0.001142	0.002987	0.017783	0.000139	0	0	0.012374
0.03822	0.05586	0.026323	0.05586	0.224322	0.00504	0.3192
0.002658	0.003	0.008939	0.003	0.003	0.001	0.002623
0.010005	0.007306	0.010751	0.005037	0.033592	0.001735	0.021284
0.000394	0.000833	0.00004	0.000796	0.001023	0.003196	0.000632
0.001101	0.001393	0.000064	0.001623	0.00409	1.047923	0.00298
0.046869	0.070436	0.003615	0.019654	0.065547	0.793902	0.028963
0.015007	0.036336	1.038963	0.042054	0	0	0.907587

tblVehicleEF

0.000582	0.000641	0.000033	0.000595	0.002076	0.385691	0.001232
0.045737	0.034853	0.057772	0.030409	0.25665	2.118879	0.107846
0.116647	0.041905	0.000327	0.04132	0.01099	0.434636	0.016253
0.133416	0.495873	0.05915	0.36644	0.863126	2.232089	0.422292
0.000135	0.001243	0.067693	0.001106	0	0	0.010767
0.005907	0.010138	0.013431	0.010556	0.010665	0.002025	0.010164
0.000298	0.00075	0.000077	0.000742	0.001559	0.000685	0.000625
0.001101	0.001393	0.000064	0.001623	0.00409	1.047923	0.00298
0.046869	0.070436	0.003615	0.019654	0.065547	0.793902	0.028963
0.020236	0.04896	1.184859	0.056638	0	0	1.30613
0.000582	0.000641	0.000033	0.000595	0.002076	0.385691	0.001232
0.053836	0.043568	0.074067	0.038075	1.406662	2.629566	0.131679
0.116647	0.041905	0.000327	0.04132	0.01099	0.434636	0.016253
0.146074	0.542919	0.064762	0.401205	0.945015	2.429633	0.462357

MH
0
0.033527
0.025795
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0

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1.111727
0.092323
0
0.336889
0.134988
0.027099
0.406816

tblRoadDust

RoadPercentPave	RoadSiltLoading	MaterialSiltContent	MaterialMoistureContent
90	0.1	4.3	0.5

tblRoadDust

MobileAverageVehicleWeight	MeanVehicleSpeed	CARB_PM_VMT
2.4	40	0

tblConsumerProducts

ROG_EF	ROG_EF_Degreaser	ROG_EF_PesticidesFertilizers
0	3.542E-07	5.152E-08

tblAreaCoating

Area_EF_Residential_Interior	Area_Residential_Interior	Area_EF_Residential_Exterior
100	0	100

tblAreaCoating

Area_Residential_Exterior	Area_EF_Nonresidential_Interior	Area_Nonresidential_Interior
0	150	1950000

tblAreaCoating

Area_EF_Nonresidential_Exterior	Area_Nonresidential_Exterior	ReapplicationRatePercent
150	650000	0

tblAreaCoating

Area_EF_Parking	Area_Parking
150	0

tblLandscapeEquipment

NumberSnowDays	NumberSummerDays
0	180

tblWater

WaterLandUseSubType	WaterLandUseSizeMetric	IndoorWaterUseRate	OutdoorWaterUseRate
Manufacturing	1000sqft	0	0

tblWater

ElectricityIntensityFactorToSupply	ElectricityIntensityFactorToTreat
9727	111

tblWater

ElectricityIntensityFactorToDistribute	ElectricityIntensityFactorForWastewaterTreatment
1272	1911

tblWater

SepticTankPercent	AerobicPercent	AnaerobicandFacultativeLagoonsPercent
10.33	87.46	2.21

AnaDigestCombDigestGasPercent	AnaDigestCogenCombDigestGasPercent
100	0

tblSolidWaste

SolidWasteLandUseSubType	SolidWasteLandUseSizeMetric	SolidWasteGenerationRate
Manufacturing	1000sqft	0

tblSolidWaste

LandfillNoGasCapture	LandfillCaptureGasFlare	LandfillCaptureGasEnergyRecovery
6	94	0

tblConstEquipMitigation

ConstMitigationEquipmentType	FuelType	Tier	NumberOfEquipmentMitigated
Air Compressors	Diesel	Tier 3	2
Bore/Drill Rigs	Diesel	Tier 3	1
Concrete/Industrial Saws	Diesel	Tier 3	1
Cranes	Diesel	Tier 3	3
Excavators	Diesel	Tier 3	2
Forklifts	Diesel	Tier 3	3
Generator Sets	Diesel	Tier 3	1
Graders	Diesel	Tier 3	2
Other Construction Equipment	Diesel	Tier 3	2
Other Material Handling Equipment	Diesel	Tier 3	2
Rollers	Diesel	Tier 3	2
Rubber Tired Dozers	Diesel	Tier 3	2
Scrapers	Diesel	Tier 3	1
Skid Steer Loaders	Diesel	Tier 3	1
Tractors/Loaders/Backhoes	Diesel	Tier 3	4
Welders	Diesel	Tier 3	1

tblConstEquipMitigation

TotalNumberOfEquipmentMitigated	DPF	OxidationCatalyst
2	No Change	0
1	No Change	0
1	No Change	0
3	No Change	0
2	No Change	0
3	No Change	0
1	No Change	0
2	No Change	0
2	No Change	0
2	No Change	0
2	No Change	0
2	No Change	0
1	No Change	0
1	No Change	0
4	No Change	0
1	No Change	0

tblConstDustMitigation

SoilStabilizerCheck	SoilStabilizerPM10PercentReduction	SoilStabilizerPM25PercentReduction
1	84	84

tblConstDustMitigation

ReplaceGroundCoverCheck	ReplaceGroundCoverPM10PercentReduction
0	0

tblConstDustMitigation

ReplaceGroundCoverPM25PercentReduction	WaterExposedAreaCheck
0	1

tblConstDustMitigation

WaterExposedAreaFrequency	WaterExposedAreaPM10PercentReduction
2	55

tblConstDustMitigation

WaterExposedAreaPM25PercentReduction	WaterUnpavedRoadMoistureContentCheck
55	0

tblConstDustMitigation

WaterUnpavedRoadVehicleSpeedCheck	WaterUnpavedRoadMoistureContent
1	0.5

tblConstDustMitigation

WaterUnpavedRoadVehicleSpeed	CleanPavedRoadPercentReduction
40	0

tblAreaMitigation

LandscapeLawnmowerCheck	LandscapeLawnmowerPercentElectric	LandscapeLeafblowerCheck
0		0

tblAreaMitigation

LandscapeLeafblowerPercentElectric	LandscapeChainsawCheck
	0

tblAreaMitigation

LandscapeChainsawPercentElectric UseLowVOCPaintResidentialInteriorCheck

0

tblAreaMitigation

UseLowVOCPaintResidentialInteriorValue	UseLowVOCPaintResidentialExteriorCheck
100	0

UseLowVOCPaintResidentialExteriorValue	UseLowVOCPaintNonresidentialInteriorCheck
100	0

tblAreaMitigation

UseLowVOCPaintNonresidentialInteriorValue	UseLowVOCPaintNonresidentialExteriorCheck
150	0

tblAreaMitigation

UseLowVOCPaintNonresidentialExteriorValue	HearthOnlyNaturalGasHearthCheck	NoHearthCheck
150	0	0

tblAreaMitigation

UseLowVOCCleaningSuppliesCheck	UseLowVOCPaintParkingCheck	UseLowVOCPaintParkingValue
0	0	150

tblApplianceMitigation

ApplianceType	ApplianceLandUseSubType	PercentImprovement
ClothWasher		30
DishWasher		15
Fan		50
Refrigerator		15

tblWaterMitigation

ApplyWaterConservationStrategyCheck	ApplyWaterConservationStrategyPercentReductionIndoor
0	

tblWaterMitigation

ApplyWaterConservationStrategyPercentReductionOutdoor	UseReclaimedWaterCheck
	0

tblWaterMitigation

PercentOutdoorReclaimedWaterUse	PercentIndoorReclaimedWaterUse	UseGreyWaterCheck
		0

tblWaterMitigation

PercentOutdoorGreyWaterUse	PercentIndoorGreyWaterUse	InstallLowFlowBathroomFaucetCheck
		0

tblWaterMitigation

PercentReductionInFlowBathroomFaucet	InstallLowFlowKitchenFaucetCheck
32	0

tblWaterMitigation

PercentReductionInFlowKitchenFaucet	InstallLowFlowToiletCheck	PercentReductionInFlowToilet
18	0	20

tblWaterMitigation

InstallLowFlowShowerCheck	PercentReductionInFlowShower	TurfReductionCheck
0	20	0

tblWaterMitigation

TurfReductionTurfArea	TurfReductionPercentReduction	UseWaterEfficientIrrigationSystemCheck
		0

tblWaterMitigation

UseWaterEfficientIrrigationSystemPercentReduction	WaterEfficientLandscapeCheck	MAWA	ETWU
6.1	0		

tblFleetMix

FleetMixLandUseSubType	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD
Manufacturing	0.490441	0.036099	0.183975	0.121725	0.015214	0.005252	0.022424

tblFleetMix

HHD	OBUS	UBUS	MCY	SBUS	MH
0.11223	0.002972	0.001873	0.006187	0.000783	0.000825

tblRemarks

SubModuleID	PhaseName	Remarks
1		Existing wind project repower. Decommissioning and removing the legacy towers is not included in this CEQA emissions estimate.
3		Total site estimated disturbance of up to 107 acres. Equiv of 1.3 million sq ft.
4		Phasing approximate per POD dated October 2019, excluding removing legacy towers
5	1 Roadway Improvements	Roadway Improvements - Estd Offroad Equipment ct 5
5	2 Installing New WTGs	Install New WTGs - Estd Offroad Equipment ct 16
5	2a Delivering New WTGs Components	Ph 2a for on-road only
5	3 Restoration	Restoration Revegetation - Estd Offroad Equipment ct 3
5	4 Decommissioning New WTGs	Future year decommissioning new WTGs - Estd Offroad Equipment ct 6
6		approx up to 400 Light Duty vehicles daily and overall 10,580 Heavy Duty haul trips
7		final fraction of average trip is unpaved
9		Total disturbance up to 107 ac. Temp site disturbance approx 82 acres
12		Operational mobile sources under 100 trips daily
14		final fraction of worker trip is unpaved
17		no consumer products in operational phase
18		no architectural coatings needed in operation phase
20		no energy use applicable in operational phase
21		no water use applicable in operational phase
22		no solid waste applicable in operational phase
25		Mitigation includes offroad Tier 3 fleet or higher, stabilizer is 84% effective per Table XI-D, watering 2x daily is 55% effective PM10 control per Rule 403, unpaved travel speed limit 15 mph

Appendix C

Biological Resources Reports

- Biological Resources Technical Report
- Public Roadway Biological Survey Memo (January 2021)

Biological Resources Technical Report
Alta Mesa Wind Repower Project

Prepared for:

Brookfield
Renewable Partners

PMB 422
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Tehachapi, CA 93561

Prepared by:

Aspen
environmental group

5020 Chesebro Road, Suite 200
Agoura Hills, CA 91301

April 2020

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Attachments

Biological Resources Technical Report: Alta Mesa Wind Repower Project

Aspen Environmental Group
March 2020

1.0 Introduction

This report presents the methods and results of biological resources field surveys, including focused surveys for desert tortoise and special-status plants that were conducted in 2019 at the proposed Alta Mesa Wind Repower Project site (AM Project), located on private land in unincorporated Riverside County, California (Figure 1). This report provides baseline information on biological resources to support the California Environmental Quality Act (CEQA) review process, Coachella Valley Multispecies Habitat Conservation Plan (CVMSHCP) consistency review, and permitting for the proposed project.

1.1 Project Description

Brookfield Renewable Partners proposes to repower an existing wind energy project located in Riverside County, 11 miles northwest of the City of Palm Springs, on land zoned as Wind Energy (W-E). W-E zoning allows the development of wind energy subject to the approval of a Commercial WECS application. The existing project consists of 159 turbines generating 27 megawatts (MW) and has a disturbance area of about 40 acres including access roads, pad sites for wind turbine generators (WTGs), and operations and maintenance (O&M) facilities. The original project was approved in 1986 and was installed in three phases between 1987 and 1997. The proposed AM Project would repower the site for up to 39 MW by replacing and upgrading wind energy generation equipment and facilities. The AM Project would remove the legacy turbines and install up to 14 new wind turbine generators (Figure 1). The number of turbines may be reduced during the design and review process, but access routes would be as shown on Figure 1. Portions of the access road are located on the adjacent Mesa Wind Project on land administered by the Bureau of Land Management (BLM) and are under environmental review for that project.

1.2 Project Location

The project site is located in the San Gorgonio Pass on private lands (APNs 516020001, 516020002, and 516020003). It is west of the Whitewater River and east of Cottonwood Creek, shown on the White Water USGS 7.5-minute topographic quad. Elevation of the project area ranges from approximately 2,160 feet at the southeastern corner of the site to 2,821 in the northwestern portion of the site.

Most surrounding lands are natural open space, with the exception of adjacent parcels to the north and west that are also in use for wind energy production (the Mesa Wind Project). Nearby communities include the community of Whitewater accessed from Haugen-Lehmann Way, southwest of the site; the community of Bonnie Bell to the east; and the community of Snow Creek south of Interstate 10.

The AM Project site is within the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) boundaries (CVAG 2007). The CVMSHCP is addressed in Section 3.6 of this report. It provides state and federal Endangered Species Act coverage for listed species as well as mitigation coverage for multiple other special-status plants and animals.

2.0 Methods

2.1 Literature Review

Prior to field surveys, Aspen biologists reviewed data sources and prior reports to identify special-status biological resources known from the vicinity. The literature and databases listed below were reviewed.

- CNDDB (CDFW 2019a) for the following 7.5-minute USGS topographic quads: Cabazon, Catclaw Flat, Desert Hot Springs, Lake Fulmor, Morongo Valley, Palm Springs, San Gorgonio Mountain, San Jacinto Peak, and White Water;
- CNPS Electronic Inventory of Rare and Endangered Vascular Plants of California (CNPS 2019), for the same topographic quads;
- Coachella Valley Multiple Species Habitat Conservation Plan (CVAG 2007); and
- Biological Resources Assessment, Focused Burrowing Owl Survey, Desert Tortoise Protocol Survey, Jurisdictional Delineation, and CVMSHCP Consistency Analysis for the Alta Mesa 640 Windfarm, Whitewater, Riverside County, California (Jericho Systems, Inc. 2018).

2.2 Field Surveys

2.2.1 Focused Desert Tortoise and Botanical Surveys

Focused concurrent field surveys during 2019 provided 100 percent visual coverage of all safely accessible areas within the survey area (Figure 1), conducted by walking along parallel transects at 10-meter intervals. The survey dates, field team, and weather conditions for each date are listed in Table 1. During the field surveys, all plant and wildlife species noted were recorded in field notes and sensitive species locations were recorded using hand-held GPS units.

Table 1. 2019 Focused Survey Dates and Team.

				Weather Conditions[1]					
		Time		Temp (°F)		Winds (mph)		Cloud Cover	
Date	Biologist[2]	Start	End	Start	End	Start	End	Start	End
24-May	AD, BL, GS, JA, SK	630	1400	57	77	2-4	4-7	Clear	20%
30-May	AD, BL, GS, SK	630	1400	68	89	4-7	8-12	Clear	Clear
31-May	AD, BL, GS, SK	630	1230	73	94	0-2	4-7	Clear	5%
18-July	JA, SK	630	1230	-	-	-	-	-	-

1. Temperature and wind speed measured with Kestrel 3000.
2. AD=Adam DeLuna, BL=Brian Leatherman, GS=Greg Stratton, JA= Jacob Aragon, SK=Shaun Kehrmeyer

The field surveys conformed to full coverage desert tortoise protocol surveys (USFWS 2010). All tortoise sign (e.g., live tortoises, burrows/pallets, tracks, scat, or other indication of current or previous tortoise occurrence) observed was recorded. The condition of burrows was categorized according to the following class designations (USFWS 2009b):

- Class 1. Currently active, with desert tortoise or recent desert tortoise sign;
- Class 2. Good condition (no evidence of recent use), definitely desert tortoise;
- Class 3. Deteriorated condition (including collapsed burrows), definitely desert tortoise;

- Class 4. Good condition - possibly desert tortoise; and
- Class 5. Deteriorated condition (including collapsed burrows), possibly desert tortoise.

In addition to the parallel transects, each concrete foundation on the site was inspected by Jacob Aragon and Shaun Kehrmeyer for potential desert tortoise burrows (see Figure 2 and Attachment 6). This is because Lovich and Daniels (2000) have reported that desert tortoises excavate or occupy burrows beneath concrete foundations at the adjacent Mesa Wind site. Most of the legacy turbines, as well as electrical boxes or other infrastructure, are supported by concrete slab foundations allowing for tortoise burrow construction beneath them. Some of the legacy turbines are built on deep concrete pier foundations where there is no accessible soil for burrow excavation.

The botanical surveys were conducted in conformance with California Department of Fish and Wildlife guidelines (CDFW 2018a). The botanical surveys were (a) conducted during flowering seasons for the special status plants known from the area, (b) floristic in nature, (c) consistent with conservation ethics, (d) systematically covered all habitat types on the sites, and (e) well documented, by this report and by voucher specimens to be deposited at Rancho Santa Ana Botanic Garden. Plants of uncertain identity were collected and identified later using keys, descriptions, and illustrations in Baldwin et al. (2012), the Jepson eFlora database of California plants (Jepson Flora Project 2019), and other regional references. All plant species observed during the surveys are listed in Attachment 4.

Rainfall: Average annual precipitation recorded at the Cabazon weather station (Station No. 041250), located approximately 5.5 miles west of the site, is 15.72 inches (39.9 cm; WRCC 2013). Rainfall during 2018-2019 rainy season was above average at 18.53 inches (47.07 cm; WRCC 2019). Due to the above-average rainfall during the 2018-19 season and widely-reported exceptional flowering season (“superbloom”), the 2019 survey results should have been conclusive, and it is likely that special-status plants would have been found during the survey, if present.

2.2.2 Vegetation

Vegetation maps were prepared by drawing tentative vegetation-type boundaries onto high-resolution aerial images during the 2019 site visits, then digitizing these boundaries into GIS, and confirming the mapping on a subsequent 2019 site visit by Justin Wood (see Figure 3).

Vegetation in the survey area was difficult to distinguish on aerial images due to homogeneous vegetation structure throughout much of the site. The smallest mapping unit was approximately 0.25 acre; GIS data for most mapped vegetation boundaries is accurate to within 3 feet. Any vegetation map is subject to imprecision for several reasons:

- Vegetation types tend to intergrade on the landscape so that there are no true boundaries in the vegetation itself. In these cases, a mapped boundary represents best professional judgment.
- Vegetation types as they are named and described tend to intergrade; that is, a given stand of real-world vegetation may not fit into any named type in the classification scheme used. Thus, a mapped and labeled polygon is given the best name available in the classification, but this name does not imply that the vegetation unambiguously matches its mapped name.
- Vegetation tends to be patchy. Small patches of one named type are often included within mapped polygons of another type. The size of these patches varies, depending on the minimum mapping units and scale of available aerial imagery.
- Photo interpretation of some types is difficult, such as distinguishing brittlebush scrub from California sagebrush-California buckwheat scrub.

Several non-native and invasive plants species were common throughout the site, particularly several species in the mustard family (e.g., Sahara mustard, shortpod mustard) and grass family (e.g., slender wild-oat, red brome, cheatgrass, and Mediterranean schismus). They tended to be most common at the upstream side of culverts or other sites that may briefly impound storm flows. All non-native species are indicated by an asterisk in Attachment 4 (Species List).

3.0 Results

Based upon review of the literature, databases, and field surveys identified above, Aspen biologist Justin Wood compiled a list of special-status species that are present or may be found in the vicinity of the AM site. Plant and wildlife species classified as one or more of the following are considered special-status species in this report:

- Listed, proposed for listing, or candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA)
- Listed as threatened or endangered, or candidates for listing under the California Endangered Species Act (CESA)
- Plants listed as rare under the California Native Plant Protection Act
- Meet the definition of rare or endangered under CEQA §15380(b) and (d)
- Considered special-status species in local or regional plans, policies, or regulations

Three of the 7.5-minute USGS topographic quads reviewed (Lake Fulmor, San Gorgonio Mountain, and San Jacinto Peak) represent much higher elevations and very different habitats than those present on the project site, and the CNDDB contains numerous records of special-status species from those quads that have no potential for occurrence in the survey area. Therefore, these three quads were excluded from this report. Many of the special-status species identified in the remaining six quads are found only in specialized native habitats (e.g., wetlands, riparian, or high elevation mountains) that are not present in the project vicinity. These plants and animals are listed in Table 2, but are not addressed further in this report. Table 3 lists all special-status plants and animals known from comparable habitats within the region and summarizes their habitat, distribution, conservation status, and probability of occurrence on the site.

Table 2. Special Status Species Not Addressed.[1]

Latin Name	Common Name	Reason for Exclusion
PLANTS		
Allium marvinii	Yucaipa onion	No suitable clay soils present.
Almutaster pauciflorus	Alkali marsh aster	No suitable alkali meadow or seep habitat.
Astragalus pachypus var. *jaegeri*	Jaeger's milk-vetch	East of geographic range.
Atriplex parishii	Parish's brittlescale	No suitable alkali playa or chenopod scrub habitat.
Boechera lincolnensis *(Arabis pulchra* var. *munciensis)*	Lincoln rockcress	No suitable carbonate soils; below elevational range.
Boechera parishii	Parish's rockcress	Below elevational range.
Calochortus palmeri var. palmeri	Palmer's mariposa-lily	No suitable meadow habitat.
Caulanthus simulans	Payson's jewel-flower	Well outside of known geographic range.
Chamaesyce arizonica (Euphorbia arizonica)	Arizona spurge	Outside of known range; no suitable sand flat habitat present.

Table 2. Special Status Species Not Addressed.[1]

Latin Name	**Common Name**	**Reason for Exclusion**
Deinandra mohavensis	Mojave tarplant	Well outside of known range; no suitable chaparral habitat present.
Dodecahema leptoceras	Slender-horned spineflower	No suitable mature alluvial bench habitat.
Eriastrum harwoodii	Harwood's eriastrum	No suitable dune or stabilized windblown sand habitat.
Euphorbia arizonica	Arizona spurge	West of geographic range.
Heuchera hirsutissima	Shaggy-haired alumroot	Below elevational range.
Heuchera parishii	Parish's alumroot	Below elevational range.
Horkelia cuneata var. puberula	Mesa horkelia	Well outside known geographic range.
Imperata brevifolia	California satintail	No suitable meadow or riparian habitat.
Ivesia argyrocoma var. argyrocoma	Silver-haired ivesia	Below elevational range.
Lilium parryi	Lemon lily	Below elevational range.
Linanthus jaegeri	San Jacinto linanthus	Below elevational range.
Linanthus orcutti	Orcutt's linanthus	East of geographic range.
Monardella robisonii	Robison's monardella	Well outside known geographic range.
Nemacaulis denudata var. gracilis	Slender cottonheads	No suitable aeolian sand habitat present.
Petalonyx linearis	Narrow-leaf sandpaper-plant	Well to west of extant geographic range.
Silene krantzii	Krantz's catchfly	Well below elevation range.
Stemodia durantifolia	Purple stemodia	No suitable wetland habitat present.
Streptanthus campestris	Southern jewel-flower	Well outside known geographic range.
Symphyotrichum defoliatum	San Bernardino aster	No suitable meadow or riparian habitat.
Thelypteris puberula var. sonorensis	Sonoran maiden fern	No suitable wetland habitat present.
Xylorhiza cognate	Mecca-aster	Well outside known geographic range.
INVERTEBRATES		
Bombus caliginosus	Obscure bumble bee	Outside of geographic range (Santa Barbara Co. and north). Historic record from Strawberry Valley is doubtful.
Calileptoneta oasa	Andreas Canyon leptonetid spider	Outside known geographic range (known from a single location near Palm Springs).
Dinacoma caseyi	Casey's June beetle	Outside known geographic range; no suitable alluvial silt deposits in the survey area.
Eremarionta morongoana	Morongo (=Colorado) desertsnail	No suitable wash habitat.
Macrobaenetes valgum	Coachella giant sand treader cricket	No suitable aeolian sand habitat present.
AMPHIBIANS		
Anaxyrus californicus (Bufo californicus, Bufo microscaphus californicus)[2]	Arroyo toad	No suitable wash habitat with seasonal intermittent stream flows present.
Ensatina eschscholtzii klauberi	Large-blotched salamander	No suitable seep or mesic forest understory habitat.
Rana draytonii[3]	California red-legged frog	No suitable aquatic habitat present.
Rana muscosa[4]	Sierra Madre yellow-legged frog	No suitable aquatic habitat present.
REPTILES		
Aspidoscelis tigris stejnegeri	Coastal whiptail	East of the geographic range (the common desert subspecies occurs on site).
Phrynosoma mcallii	Flat-tailed horned lizard	No suitable aeolian sand habitat present.
Thamnophis hammondii	Two-striped garter snake	No suitable aquatic habitat present.

Table 2. Special Status Species Not Addressed.[1]

Latin Name	**Common Name**	**Reason for Exclusion**
Uma inornata	Coachella Valley fringe-toed lizard	No suitable aeolian sand habitat present.
BIRDS		
Icteria virens	Yellow-breasted chat	No suitable riparian vegetation present.
Myiarchus tyrannulus	Brown-crested flycatcher	No suitable desert woodland or riparian vegetation present.
Piranga rubra	Summer tanager	No suitable riparian vegetation present.
Progne subis	Purple martin	No suitable woodland or forest habitat present.
Pyrocephalus rubinus	Vermilion flycatcher	No suitable riparian vegetation present.
Toxostoma crissale	Crissal thrasher	Outside known geographic range; minimal habitat present.
MAMMALS		
Chaetodipus caliornicus femoralis	Dulzura pocket mouse	Well outside of geographic range.
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	East of geographic range (desert subspecies is addressed in Table 3).
Dipodomys merriami parvus	San Bernardino kangaroo rat	Outside geographic range (San Bernardino and San Jacinto Valleys); no suitable alluvial wash habitat.
Ovis canadensis nelsoni (distinct population segment)	Peninsular bighorn sheep	Geographically restricted to the Peninsular Ranges, south of Interstate 10.
Perognathus longimembris bangsi	Palm Springs pocket mouse	West of geographic range.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	No suitable wash habitat.
Xerospermophilus tereticaudus chlorus	Palm Springs round-tailed ground squirrel	No suitable sand flat or mesquite habitats; restricted to the Coachella Valley.

1. Special status species reported from the region, but not addressed in this report due to habitat or geographic range.
2. Arroyo toad has been reported from the Whitewater River; that record has since been revised due to mis-identification (Ervin et al. 2013).
3. California red-legged frog occurs upstream at the former Whitewater Trout Farm about 3.5 miles north of the Project site.
4. There are no extant or historic reports of mountain yellow-legged from the Whitewater River watershed. Almost all perennial streams in the San Bernardino, San Gabriel, and San Jacinto Mountains are identified as suitable habitat as potential sites for re-introduction.

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
PLANTS				
Abronia villosa var. *aurita* Chaparral sand verbena	Annual or perennial herb; sand, about 250-5300 ft. elev.; San Jacinto Mtns, Inland Empire, adj. Colorado Des, Orange & San Diego cos; mostly alluvial fans and benches in w Riverside Co; dunes in deserts.	Feb–Jul	Fed ESA: none CA: S2, 1B.1 MSHCP: none	Minimal; no suitable habitat on site; not seen during surveys.
Acmispon haydonii (Lotus haydonii) Pygmy lotus	Perennial herb; rocky, pinyon and juniper woodland, Sonoran Desert scrub; 1700-3940 ft. elev.; SE Peninsular ranges, SW Sonoran Desert, Baja California	Jan–Jun	Fed ESA: none CA: S3, 1B.3 MSHCP: none	Low; potentially suitable habitat; at margin of known range; not seen during surveys.

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Ambrosia monogyra (Hymenoclea monogyra) Singlewhorl burrobush	Shrub or small tree; desert and inland cismontane flats, washes, alluvial fans; below about 1700 ft. elev.; San Bernardino Valley; San Diego Co., east to Texas and mainland Mexico	Aug–Nov	Fed ESA: none CA: S2, 2B.2 MSHCP: none	Minimal; no suitable habitat on site; not seen during surveys.
Astragalus lentiginosus var. *coachellae* Coachella Valley milk-vetch	Annual or perennial herb; open sand, gen. dunes but also wash margins; below about 2200 ft. elev.; endemic to Coachella Valley. 4.3 ac of CVMSHCP modeled (but unsuitable) habitat on Project site	Feb. - May	Fed: END CA: S1, 1B.2 MSHCP: covered	Low; not found during protocol field survey 2019; no suitable habitat present onsite.
Astragalus tricarinatus Triple-ribbed milk-vetch	Perennial herb; exposed rocky slopes, canyon walls, alluvial fans; Whitewater Canyon, Mission Creek, and Morongo Canyon areas; ±1500 to 5000 ft. elev.	Feb–May	Fed ESA: END CA: S2, 1B.2 MSHCP: covered	Low; potentially suitable habitat present; not observed; known from within 1.0 mile.
Ayenia compacta California ayenia	Perennial herb; desert shrubland, gen. rocky sites, washes and mountain slopes below about 3600 ft. elev.; W low desert margins, Chuckwalla Valley, and E Mojave.	Mar–Apr	Fed ESA: none CA: S3, 2B.3 MSHCP: none	Low; suitable habitat; not observed; at western margin of the known range.
Calochortus plummerae Plummer's mariposa lily	Perennial herb (bulb.); chaparral, coastal scrub, woodland, and grassland; 300-5600 ft. elev.; LA, Orange, Riverside, San Bernardino, and Ventura Co., California endemic	May-Jul	Fed ESA: none CA: S4, 4.2 MSHCP: none	Low; potentially suitable habitat present but; not observed; known from within about one mile.
Chorizanthe parryi var. *parryi* Parry's spineflower	Annual; shrublands; open sandy places on alluvial slopes below about 5600 ft. elev.; Inland Empire and also coastal LA Co., Banning Pass, Cajon Pass	Apr–Jun	Fed ESA: none CA: S2, 1B.1 MSHCP: none	Low; suitable habitat present; not observed; known from within one mile of the site.
Chorizanthe xanti var. *leucotheca* White-bracted spineflower	Annual; sandy soil, desert shrubland, pinyon-juniper woodland, about 1000-4000 ft. elev.; Mountains and foothills, Cajon Pass and Banning Pass areas; also reported from Liebre Mtns.	Apr-Jun	Fed ESA: none CA: S3, 1B.2 MSHCP: none	Low; minimal suitable habitat on site; not seen during surveys. known from within one mile of the site.
Euphorbia misera Cliff spurge	Low shrub; coastal bluffs (Orange and San Diego cos) and rocky desert slopes (Whitewater area, Riv. Co.), below about 1700 ft. elev.	Jan–Aug	Fed ESA: none CA: S2, 2B.2 MSHCP: none	Minimal; marginal habitat; not observed; known from a single location east of Whitewater Canyon.
Linanthus maculatus subsp. *maculatus* (*Gilia maculata*) Little San Bernardino Mountains linanthus	Annual; sandy washes or dunes in desert shrubland habitats; Whitewater Cyn. through Joshua Tree Natl. Park; about 600–6800 ft. elev.	Mar–May	Fed ESA: none CA: S2, 1B.2 MSHCP: covered	Minimal; no suitable habitat on site; not seen during surveys; margin of the range.
Mentzelia tricuspis Spiny-hair blazing star	Annual; sandy or gravelly soil (exposed consolidated alluvial deposits), slopes and washes, Mojave desert scrub; 500-4200 ft. elev.; desert mts, east Sonoran Desert, to Utah, Arizona	Mar – May	Fed ESA: none CA: S2, 2B.1 MSHCP: none	Low; marginal habitat; not observed; recent specimens from within about 0.2 miles of the survey area.

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Penstemon pseudospectabilis subsp. *pseudospectabilis* Desert beardtongue	Perennial herb; sandy washes and rocky slopes in canyons; about 300-6400 ft. elev.; scattered locations, Mojave and Colo. Deserts in California and Arizona	Jan–May	Fed ESA: none CA: S3, 2B.2 MSHCP: none	Low; suitable habitat; not detected; recent record from 4 miles south in Snow Creek.
Saltugilia latimeri (*Gilia australis*) Latimer's woodland gilia	Annual; chaparral and desert shrublands, arid mountains and foothills; about 1300-6200 ft. elev.; desert margins, Riv. Co to Inyo Co	Mar–June	Fed ESA: none CA: S3, 1B.2 MSHCP: none	Low; suitable habitat present; not detected during surveys.
Selaginella eremophila Desert spike-moss	Perennial herb; mountainous or hillside rock outcrops and crevices, about 600–3000 ft. elev.; lower desert-facing slopes of San Jacinto Mtns and adj. desert, to Texas and Baja	n/a	Fed ESA: none CA: S2S3, 2B.2 MSHCP: none	Low; suitable habitat; not observed; margin of geographic range.
INVERTEBRATES				
Bombus crotchii Crotch bumble bee	Colonial insect; open grassland and scrub; underground colonies, often in old rodent burrows. Many food plants including *Chaenactis, Lupinus, Phacelia, Salvia*, and *Eriogonum*. Much of southern and central CA, SW Nevada and Baja.	Feb-Oct	Fed ESA: none CA: Candidate, S1S2 MSHCP: none	Moderate; suitable habitat and food plants present; not observed; historical records from within 5 miles.
Parnopes borregoensis Borrego parnopes cuckoo wasp	Chrysidid wasp; endemic to California; Sonoran and Mojave Deserts; desert scrub, creosote bush scrub, yucca and cholla cactus, saltbush, and desert dune communities	Unknown	Fed ESA: none CA: S1S2 MSHCP: none	Low; suitable habitat; not observed; known from very few locations including one 15 miles to the northeast.
Stenopelmatus cahuilaensis Coachella Valley Jerusalem cricket	Open sand, gen. dunes and sandy/gravelly soils, endemic to Coachella Valley. 4.3 ac of CVMSHCP modeled (but unsuitable) habitat on Project site; site is outside mapped current distribution polygon (CVCC 2014)	Primarily winter (dependent on humidity and soil moisture)	Fed ESA: none CA: S1S2 MSHCP: covered	Low. Modeled habitat present on property is unsuitable; disjunct from similar aeolian sand and outside the current distribution.
REPTILES				
Anniella pulchra pulchra Silvery legless lizard	Mtns and valleys, Bay Area to N Baja (excluding desert); shrublands and woodlands, loose soils and leaf litter, below about 6500 ft. elev.	Spring–Fall	Fed ESA: none CA: S3S4, SC MSHCP: none	Low; suitable habitat; not observed; known from just west of the survey area.
Arizona elegans occidentalis *California glossy snake*	Patchily distributed from the east. San Francisco Bay, so. San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja Calif. Loose sandy soils in coastal sage scrub and grasslands.	Spring-Summer	Fed ESA: none CA: S2, SC MSHCP: none	Low; suitable habitat; not observed; known from west of the survey area.
Aspidoscelis hyperythra (Cnemidophorus hyperythra) Orange-throated whiptail	Open coastal sage scrub, chaparral; SW California to S Baja, most populations in Riverside and San Diego Cos.; sea level to about 3000 ft. elev.	Spring–Summer	Fed ESA: none CA: S2S3 MSHCP: none	Low; suitable habitat; not observed; one observation from Whitewater canyon

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Crotalus ruber Red diamond rattlesnake	Chaparral, woodland, desert, rocky areas and dense vegetation; coastal San Diego Co. to E. slopes of the Peninsular range and north thru W. Riverside Co. into S. San Bernardino Co.; sea level to about 3000 ft. elev.	Mid-Spring–Mid-Fall	Fed ESA: none CA: S3, SC MSHCP: none	Present; two adults observed during the survey.
Gopherus agassizii *(Xerobates agassizi)* *Desert tortoise*	Desert shrublands where soil suitable for burrows; Mojave and Sonoran des. (E Calif., S Nevada, W Ariz., and Sonora, Mexico)	Spring–Summer	Fed ESA: THR CA: THR, S2S3 MSHCP: covered	High; no live tortoises found but old sign was present; known from within 0.1 miles.
Phrynosoma blainvillii *(Phrynosoma coronatum blainvillii)* Coast horned lizard	Forest, shrubland or grassland; sandy soils; W Calif. from LA Co S through N Baja Calif., below about 6000 ft. elev.	Spring–Summer	Fed ESA: none CA: S3S4, SC MSHCP: none	High; suitable habitat throughout; not observed; at margin of range.
BIRDS				
Accipiter striatus Sharp-shinned hawk	Nests in forest and woodland, hunts in woods and open areas; breeds in Sierra Nevada and N, winters through US & Cent. Amer.	Winter	Fed ESA: none CA: S4 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Accipiter cooperii Cooper's hawk	Nests in forest and woodland, hunts in woods and open areas; breeds through most of US, winters south through Mexico	Year-around	Fed ESA: none CA: S4 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Aimophila ruficeps canescens Southern California rufous-crowned sparrow	Coastal sage scrub, open chaparral; S Calif. and NW Baja Calif.; not migratory	Year - around	Fed ESA: none CA: S3 MSHCP: none	Nesting: moderate Winter/Migration: high
Aquila chrysaetos Golden eagle	Nests in remote trees and cliffs; forages over shrublands and grasslands; breeds throughout W N America, winters to E coast	Year-around	Fed: Eagle Protection Act CA: S3, FP MSHCP: none	Nesting: minimal Year-around foraging or flyover: high
Asio otus Long-eared owl	Breed in riparian woodlands; forage (nocturnally) over open land; sea level to about 6000 ft. elev.; through N America and Eurasia	Year-around	Fed ESA: none CA: S3?, SC (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Athene cunicularia (*Speotyto cunicularia*) Burrowing owl	Nests mainly in rodent burrows, usually in open grassland or shrubland; forages in open habitat; increasingly uncommon in S Calif.; through W US and Mexico	Year-around	Fed ESA: none CA: S3, SC (burrow sites) MSHCP: covered	Present; suitable habitat present; single adult observed.
Buteo regalis Ferruginous hawk	Forages over grassland and shrubland; winters in W and SW N Amer. (breeds in Great Basin and N plains)	Winter	Fed ESA: none CA: S3S4 (winter) MSHCP: none	Nesting: minimal Winter/Migration: high
Buteo swainsonii Swainson's hawk	Breeds in open habitats (e.g., grassland), Central Valley and W Mojave Desert (Calif.) and east to cent. US, S. Canada, New Mexico; winters in S America	Spring–Summer	Fed ESA: none CA: THR, S3 MSHCP: none	Nesting: minimal Migration: high

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Calypte costae Costa's hummingbird	Breeds throughout central and southern CA, east through S AZ and south through Baja CA and Sonora, Mexico. Desert and chaparral shrublands.	Year-round	Fed ESA: none CA: S4 MSHCP: none	Present: adults observed during field surveys.
Chaetura vauxi Vaux's swift	Breeds central Calif. and northward, in coastal and montane forests; winters in Central and S America	Spring and fall migration. seasons	Fed ESA: none CA: SC S3 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Circus hudsonius Northern harrier	Breeds colonially in marshlands, San Diego and northward; winters to south through Central Amer.; forages over open terrain; N America and Eurasia	Winter; rare in summer	Fed ESA: none CA: SC, S3 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Coccyzus americanus Western yellow-billed cuckoo	Large patches of riparian forest and woodland, usually near surface water; historically common in floodplain habitats. Reported in nearby Whitewater River corridor during summer but apparently not breeding.	Spring–Fall	Fed ESA: THR CA: END, S1 MSHCP: none	Nesting: Minimal; no suitable habitat on or adjacent to the site; Migration: Potential flyover or stopover
Cypseloides niger Black swift	Breeds on cliffs, often at waterfalls	Spring–fall	Fed ESA: none CA: S2, SC (nesting) MSHCP: none	Nesting: minimal Winter/Migration: low
Setophaga petechia (Dendroica petechia) Yellow warbler	Breeds in willow and cottonwood riparian habitat, near sea level to 9000 ft. elev.; much of N Amer.; sensitive in S Calif. due to habitat loss & cowbird parasitism; winters Mexico to S Amer.	Spring–summer	Fed ESA: none CA: SC S3S4 (nesting) MSHCP: covered	Nesting: minimal Winter/Migration: high
Empidonax traillii Willow flycatcher (incl. subspecies *extimus,* southwestern willow flycatcher)	Breeds in dense riparian forests & shrublands; scattered locations in Arizona, California, and North Baja; near sea level to about 8000 ft. elevation; winters in Central America. Reported in nearby Whitewater River corridor during migratory and marginal breeding season (breeding status unknown).	Spring–Fall	Fed ESA: END (ssp *extimus* only) CA: END, S1S2 MSHCP: covered	Nesting: Minimal; no suitable habitat on or adjacent to the site; Migration: Potential flyover or stopover
Eremophila alpestris actia California horned lark	Open, flat lands incl. sparse sagebrush or grassland, meadows, alkali flats; wide elev. range; breeds in western Calif (San Diego Co through Humboldt Co) and Baja Calif; winters in same range	Summer	Fed ESA: none CA: S4 MSHCP: none	Present: several individuals observed during the survey
Falco columbarius Merlin	Uncommon wintering species in S Calif. desert and valleys (breeds in northern N America and Eurasia)	Winter	Fed ESA: none CA: S3S4 (winter) MSHCP: none	Nesting: minimal Winter/Migration: high
Falco mexicanus Prairie falcon	Nests on high cliffs, forages primarily over open lands; throughout arid western US and Mexico	Year-around	Fed ESA: none CA: S4 (nesting) MSHCP: none	Nesting: minimal Year-around foraging and flyover: high

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Falco peregrinus American peregrine falcon	Nests on high cliffs, generally near water bodies; feed on birds (esp. shorebirds & waterfowl); widespread but rare worldwide	Spring–Summer	Fed ESA: delisted Calif: FP, S3S4 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: high
Haliaeetus leucocephalus Bald eagle	Breed in large trees, usually near major rivers or lakes; winters more widely; scattered distribution in N America; esp. coastal regions	Winter	Fed: Eagle Protection Act CA: END, S3, FP (nesting and wintering) MSHCP: none	Nesting: minimal Winter/Migration: high
Lanius ludovicianus Loggerhead shrike	Woodlands, shrublands, open areas with scattered perch sites; not dense forest; widespread in N America; valley floors to about 7000 ft. elev.	Year-around	Fed ESA: none CA: S4, SC (nesting) MSHCP: none	Present. Suitable habitat throughout area, observed during field surveys.
Pandion haliaetus Osprey	Nests in northern N America and Mexican coastlines near large water bodies, preys primarily on fish; winters in central Calif to S America;	Spring–Fall	Fed ESA: none CA: S4 MSHCP: none	Nesting: minimal Winter/Migration: high
Plegadis chihi White-faced ibis	Freshwater and brackish marsh; breeding range scattered in W N America incl. central & S Calif wetlands; winters in Mexico & to S	Year-around	Fed ESA: none CA: S3S4 (rookery sites) MSHCP: none	Nesting: minimal Winter/Migration: high
Polioptila californica californica Coastal California gnatcatcher	Primarily coastal sage scrub below about 2,000 feet elev.; southwestern California, Ventura County to northern Baja California; inland to San Gorgonio Pass area (e.g., Banning)	Year-around	Fed ESA: THR CA: SC, S2 MSHCP: none	Moderate. Margin of range (reported by BLM staff at adjacent Pacific Crest Trail)
Polioptila melanura Black-tailed gnatcatcher	Desert shrublands, gen. nests in shrub thickets along washes; occas. in open scrub (esp. in winter); Calif. deserts, to W Texas, Baja, and central Mexico	Year-around	Fed ESA: none CA: S3S4 MSHCP: none	Nesting: moderate Winter/Migration: high
Spinus lawrencei Lawrence's goldfinch	CA coastal ranges, western Sierra Nevada, desert margins through northern Baja CA; winters in AZ and Sonora. Shrublands and woodlands usually near water.	Year-around	Fed ESA: none CA: S3S4 (nesting) MSHCP: none	Nesting: minimal Winter/Migration: moderate
Toxostoma lecontei LeConte's thrasher	Calif. deserts, SW Central Val. & Owens Val., east to Utah, Arizona; open shrubland, often sandy or alkaline flats	Year-around	Fed ESA: none CA: S3, SC MSHCP: covered	Low; suitable habitat present; not detected during recent surveys; known from the within about 2.5 miles.
Vireo bellii pusillus Least Bell's vireo	Summer resident of southern California in low riparian habitats in vicinity of water or dry river bottoms; found below 2000 ft; nests placed along margins of bushes or on twigs projecting into pathways, usually willow, mesquite, and mulefat.	Spring–Fall	Fed ESA: END CA: END S2 MSHCP: covered	Nesting: minimal. Modeled habitat in nearby Whitewater River corridor, but no potential habitat on site. Winter/Migration: low (expected only as a flyover)

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
MAMMALS				
Antrozous pallidus Pallid bat	Rock outcrops of shrublands, mostly below about 6000 ft. elev.; Calif, SW N Amer through interior Oregon and Washington; hibernates in winter	Warm season	Fed ESA: none CA: S3, SC MSHCP: none	Roosting: minimal Foraging: high (not detected)
Chaetodipus fallax pallidus (Perognathus f. pallidus) Pallid San Diego pocket mouse	Open shrublands and sandy areas; deserts and desert-facing foothills, LA Co. south to N Baja Calif.	Spring–Fall (Winter dormant)	Fed ESA: none CA: S3S4, SC MSHCP: none	Low; suitable habitat present; known from the vicinity of the survey area.
Corynorhinus (Plecotus) townsendii Townsend's big-eared bat (incl. "pale," "western," and other subspecies)	Many habitats throughout Calif and W N Amer, scattered populations in E; day roosts in caves, tunnels, mines; feed primarily on moths	Year-around	Fed ESA: none CA: S2, SC MSHCP: none	Roosting: minimal Foraging: high (not detected)
Euderma maculatum Spotted bat	Desert (cool seasons) to pine forest (summer), much of SW N Amer. but very rare; roosts in deep crevices in cliffs, feeds on moths captured over open water	Not known	Fed: none Calif: S3, SC MSHCP: none	Low potential for roosting or foraging on site; potential flyover
Eumops perotis californicus Western mastiff bat	Lowlands (with rare exceptions); cent. and S Calif., S Ariz., NM, SW Tex., N Mexico; roost in deep rock crevices, forage over wide area; recorded in 2016 at nearby wind site	Year-around	Fed: none Calif: S3S4, SC MSHCP: none	Low potential for roosting on site; high potential for foraging in area
Lasiurus blossevillii Western red bat	Shasta Co. to the Mexican border, W of the Sierra Nevada. Winters in lowlands and coastal regions south of SF Bay. Roosts in forests and woodlands. Feeds over grasslands, shrublands, open woodlands and forests, and croplands.	Spring/Fall migration	Fed ESA: none CA: S3, SC MSHCP: none	Roosting: minimal Foraging: high (not detected)
Lasiurus xanthinus (Nycteris ega xanthina) Western (Southern) yellow bat	Mexico and Cent. Amer., to S AZ; Riv., Imperial and San Diego Cos.; riparian and wash habitats; roosts in trees; evidently migrates from Calif. during winter	Spring–Summer?	Fed ESA: none CA: S3, SC MSHCP: covered	Roosting: minimal Foraging: low (not detected)
Macrotus californicus (M. waterhousii) California leaf-nosed bat	Arid lowlands, S Calif., S and W Ariz., Baja Calif. and Sonora, Mexico; roost in mine-shafts, forage over open shrublands	Year-around	Fed: none Calif: S3 MSHCP: none	Low potential for roosting on site; high potential for foraging in area
Myotis evotis Long-eared myotis	Much of the western US, southern Canada and N Baja Calif.; generally forested lands, also shrublands; roosts in broken rock outcrops, crevices, structures, crevices, mines and tunnels; feeds on large insects.	Year-around?	Fed: none Calif: S3 MSHCP: none	Low potential for roosting on site; moderate to high potential for foraging in area
Myotis thysanodes Fringed myotis	Widespread in CA, but generally not in Central Valley and deserts. Wide variety of habitats; sea level to higher mountains. Optimal habitats are pinyon-juniper, valley foothill hardwood and hardwood-conifer, about 1300-2200 m (4000-7000 ft).	Year-around?	Fed ESA: none CA: S3 MSHCP: none	Roosting: minimal Foraging: high (not detected)

Table 3. Special-status Species of the Cabazon/Whitewater Area.

Species Name	Habitat Requirements	Flowering or Activity Season	Conservation Status	Potential to Occur
Myotis velifer Cave myotis	S Calif through Arizona to TX and Mexico; generally roosts in caves; feeds over water or riparian vegetation	Spring - Summer	Fed: none Calif: S1, SC MSHCP: none	Minimal potential for roosting on site; moderate potential for flyover to access foraging habitat
Myotis yumanensis Yuma myotis	Widespread in CA, uncommon in deserts, many habitats, sea level to 3300 m (11,000 ft), but uncommon above 2560 m (8000 ft); feeds over open water.	Year-around	Fed ESA: none CA: S4 MSHCP: none	Roosting: minimal Foraging: high (not detected)
Neotoma lepida intermedia San Diego desert woodrat	Coastal scrub with a moderate to dense canopies preferred. Particularly abundant in rock outcrops, rocky cliffs, and slopes. So. California from San Diego to San Luis Obispo Cos.	Year-around	Fed ESA: none CA: S3S4, SC MSHCP: none	High: numerous middens observed during the surveys, unable to confirm occupancy (see text).
Nyctinomops femorosaccus (Tadarida femorosaccus) Pocketed free-tailed bat	Deserts and arid lowlands, SW US, Baja Calif., mainland Mexico; Roost mainly in crevices of high cliffs; forage over water and open shrubland	Year-around	Fed ESA: none CA: S3, SC MSHCP: none	Roosting: minimal Foraging: high (not detected)
Nyctinomops macrotis (Tadarida molossa) Big free-tailed bat	Roosts in crevices of rocky cliffs, scattered localities in W N. Amer. through Cent. Amer.; ranges widely from roost sites; often forages over water	Year-around (?)	Fed ESA: none CA: S3, SC MSHCP: none	Roosting: minimal Foraging: moderate (not detected)
Ovis canadensis nelsoni Nelson's bighorn sheep	Open shrublands and conifer forest, remote mountains; scattered populations in desert mountains and surrounding ranges, incl. Transverse and Peninsular ranges	Year-around	Fed ESA: none CA: S3, FP (selected populations) MSHCP: none	High; not observed during recent surveys but known from within about 0.25 miles.
Vulpes macrotis arsipus Desert kit fox	Arid areas with grasslands, agricultural lands, or scattered shrubby vegetation. Requires open, level areas with loose-textured, sandy loamy soils for digging dens. SW US and northern Mexico.	Year-around	Fed ESA: none CA: FP Furbearer MSHCP: none	Moderate; potentially suitable habitat throughout.
Taxidea taxus American badger	Mountains, deserts, interior valleys where burrowing animals are avail as prey and soil permits digging; throughout cent and W N Amer	Year-around	Fed ESA: none CA: S3, SC MSHCP: none	Present; suitable habitat present; sign observed in 2019 (2 burrows found during survey).

General references (botany): Baldwin et al. 2012; CDFW 2019a, b, CNPS 2019; CCH 2019
General references (wildlife): American Ornithologists Union 1998 (including supplements through 2011); Barbour and Davis 1969; CDFW 2019a; Feldhammer et al. 2003; Gannon 2003; Garrett and Dunn 1981; Grinnell and Miller 1944; Hall 1981; Hatfield et al. 2015; Jennings and Hayes 1994; Pierson and Rainey 1998; Sibley 2000; Stebbins 2003; Wilson and Ruff 1999.

Conservation Status

Federal designations: (federal ESA, USFWS).

END: Federally listed, endangered.
THR: Federally listed, threatened.
Candidate: Sufficient data are available to support federal listing, but not yet listed.
Proposed: Formally proposed for federal status shown.

Federal designations: (federal Bald and Golden Eagle Protection Act, US Fish and Wildlife Service).
Eagle Protection Act: Bald and Golden Eagle Protection Act.

State designations: (CESA, CDFW)

END: State listed, endangered.
THR: State listed, threatened.
RARE: State listed as rare (applied only to certain plants).
Candidate: Sufficient data are available to support state listing, but not yet listed
SC: California species of special concern. Considered vulnerable to extinction due to declining numbers, limited geographic ranges, or ongoing threats.
FP: Fully protected. May not be taken or possessed without permit from CDFW.

CDFW Natural Diversity Data Base Designations: Applied to special-status plants and sensitive plant communities; where correct category is uncertain, CDFW uses two categories or question marks.

S1: Fewer than 6 occurrences or fewer than 1000 individuals or less than 2000 acres.
S1.1: Very threatened
S1.2: Threatened
S1.3: No current threats known
S2: 6-20 occurrences or 1000-3000 individuals or 2000-10,000 acres (decimal suffixes same as above).
S3: 21-100 occurrences or 3000-10,000 individuals or 10,000-50,000 acres (decimal suffixes same as above).
S4: Apparently secure in California; this rank is clearly lower than S3, but factors exist to cause some concern, i.e., there is some threat or somewhat narrow habitat. No threat rank.
S5: Demonstrably secure or ineradicable in California. No threat rank.
SH: All California occurrences historical (i.e., no records in > 20 years).
SX: Presumed extirpated in California.

California Native Plant Society (CNPS) Rare Plant Rank designations. Note: According to CNPS (http://www.cnps.org/cnps/rareplants/ranking.php), plants ranked as CRPR 1A, 1B, and 2 meet definitions as threatened or endangered and are eligible for state listing. That interpretation of the state Endangered Species Act is not in general use.

1A: Plants presumed extinct in California.
1B: Plants rare and endangered in California and throughout their range.
2: Plants rare, threatened or endangered in California but more common elsewhere in their range.
3: Plants about which we need more information; a review list.
4: Plants of limited distribution; a watch list.

California Rare Plant Rank Threat designations:

.1 Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Fairly endangered in California (20-80% occurrences threatened)
.3 Not very endangered in California (<20% of occurrences threatened, or no current threats known)

Definitions of occurrence probability: Estimated occurrence probabilities based literature sources cited earlier and field surveys and habitat analyses reported here.

Present: Observed on the site by qualified biologists.
High: Habitat is a type often utilized by the species and the site is within the known range of the species.
Moderate: Site is within the known range of the species and habitat on the site is a type occasionally used.
Low: Site is within the species' known range, but habitat is rarely used, or the species was not found during focused surveys covering less than 100% of potential habitat or completed in marginal seasons.
Minimal: No suitable habitat on the site; or well outside the species' known elevational or geographic ranges; or a focused survey covering 100% of all suitable habitat, completed during the appropriate season and during a year of appropriate rainfall, did not detect the species.

3.1 Special-status Plants

3.1.1 Listed Threatened or Endangered Plants

This section describes plant species reported from the region that are listed as threatened or endangered under the federal ESA or CESA. One federally listed endangered plant, triple-ribbed milk-vetch, has been reported in Whitewater Canyon, just east of the survey area. Other listed threatened or endangered plant species of the low desert region (e.g., Coachella Valley milk-vetch) grow on wind-blown sands to the east, well outside the survey area and are not addressed in this report. No listed threatened or endangered plant species, species proposed for listing, or candidates for listing have been documented from the survey area.

Coachella Valley milk-vetch: Coachella Valley milk-vetch is an annual or short-lived perennial endemic to the Coachella Valley. It is federally listed as endangered, a BLM sensitive species, and ranked as CRPR 1B.

It is primarily found on loose aeolian (wind transported) or, less-often, in alluvial (water transported) sands, on dunes or flats and along disturbed margins of sandy washes. There is no designated critical habitat for Coachella Valley milk-vetch on the Project site (USFWS 2011a). A patch of CVMSHCP-modeled habitat for Coachella Valley milk-vetch is within the ROW (see Figure 4). The site was examined in the field; no Coachella Valley milk-vetch and no windblown or fluvial sand deposits are present in this area or elsewhere on the site. Vegetation in that location is predominantly brittlebush and creosote bush (Figure 3). The area is not suitable habitat for Coachella Valley milk-vetch or other species requiring windblown sand (including Coachella Valley Jerusalem cricket). Based on the results of these field surveys, Coachella Valley milk-vetch is not expected to occur on the site.

Triple-ribbed milk-vetch: Triple-ribbed milk-vetch is found in arroyos, canyons, and hillsides between about 1,400 and 4,000 feet elevation. It grows in Whitewater Canyon just east of the AM Project site and in nearby canyons, hills, and mountains to the east (Baldwin et al. 2012) including Morongo Canyon and Mission Canyon and one disjunct site some 40 miles south at Agua Alta Canyon (White 2004). It is very rare, and several known locations consist of only a single plant. Prior to 2004, almost all known occurrences consisted of a few scattered plants in alluvial washes or on adjacent slopes. More recently, occurrences consisting of much larger numbers of plants have been documented, all on unusual upland gravelly substrates. One of these is in the Whitewater River watershed at about 3900 ft. elevation (White 2004), one is near Catclaw Flat (Amsberry and Meinke 2007), and there are one or more similar sites in Joshua Tree National Park (LaDoux, pers. comm.). There also is a record of a few small plants near the Super Creek decorative rock quarry, about a mile east of the Project site, growing on parent material that was visually unlike other upland or alluvial occurrences (personal observation). Based on knowledge of its upland occurrences, it now appears that the alluvial wash occurrences originated from seed dispersed downstream from the much larger upland populations higher in the watersheds. Triple-ribbed milk-vetch is covered under the Coachella Valley Multiple Species Habitat Conservation Plan. There is no CVMSHCP-modeled habitat on the site and Aspen did not locate triple-ribbed milk-vetch during our surveys. Habitat suitability is difficult to evaluate (due to occurrences on upland and alluvial sites, with little more characterization of substrate). Potentially suitable habitat is present but and there is a low potential that it may grow in the study area due to negative results of field surveys.

3.1.2 Other Special-Status Plants

In addition to the statutes and policies described above, several public agencies and private entities maintain lists of plants of conservation concern. The CDFW compiles these species including CDFW and CNPS rankings as California Rare Plant Rank (CRPR) 1, 2, 3, or 4 in its compendium of "Special Plants" (CDFW 2019b). These plants are treated here as "special-status species." One of these, spiny-hair blazing star has a moderate potential to be present. No additional special-status plants have been documented from the AM site or are expected to occur there (Tables 2 and 3).

Spiny-hair blazing star: Spiny-hair blazing star is an erect annual that has a CRPR of 2B.1 (i.e., rare in California but more common elsewhere in its range). It blooms from March through May and is found in Mojavean desert scrub on sandy, gravelly slopes and washes. It was documented in 2013 at three locations along a service road just west of Whitewater, within about 0.2 miles of the survey area. This species was not found during the field surveys, but there is low potential that a small individual may have been overlooked or that a seed could enter the survey area and germinate in the future. The best habitat for this species is along the steep eroded slopes at the southern edge of the survey area.

3.2 Special-status Wildlife

3.2.1 Listed Threatened or Endangered Wildlife

This section includes species listed as threatened or endangered under CESA or ESA or species that are candidates or proposed for listing. Two listed threatened or endangered species, the desert tortoise and Swainson's hawk, are known from the immediate vicinity of the survey area. Other listed species of the region are either limited to riparian and aquatic habitats (e.g., southwestern willow flycatcher, least Bell's vireo and western yellow-billed cuckoo) or aeolian sands (e.g., Coachella Valley fringe-toed lizard). Crotch bumblebee is a candidate for state listing and is addressed below. Note that recent studies indicate that the federally listed southwestern willow flycatchers generally do not migrate over the southern California desert (BLM 2017 and citations therein). However, other willow flycatcher subspecies (state listed but not federally listed) may pass through the area during migration. Identification of subspecies is difficult and may necessitate hearing the calls. Identification of willow flycatcher subspecies seen during migration, including birds found dead, is usually not possible.

Desert Tortoise. The desert tortoise is listed as threatened under CESA, and the Mojave population (i.e., west of the Colorado River) is listed as threatened under the federal ESA. East of the Colorado River, the desert tortoise's range extends into the Arizona deserts, and south through Sonora (Mexico). All wild desert tortoises in California are part of the state and federally listed Mojave population.

The USFWS reviewed desert tortoise biology and population status in the Revised Recovery Plan (USFWS 2011). The following summary is based on that review and literature cited therein. Desert tortoises spend much of their lives in burrows. They enter hibernation during autumn. In late winter or early spring, they emerge from over-wintering burrows and typically remain active or partially active through the fall. Activity decreases in summer, but tortoises often emerge during summer to drink and to take advantage of seasonal food availability during the few weeks following late summer rains. They may become dormant during extended periods of summer heat and dryness. A single tortoise may have a dozen or more burrows within its home range, and different tortoises may use these burrows at different times. Even during their active seasons, they are inactive during much of the day or night, within burrows or at "palettes" (partially sheltered flattened areas, often beneath shrubs or large rocks) or other shaded sites.

The size of desert tortoise home ranges varies with respect to location and resource availability, and may fluctuate over time. Male tortoises' home ranges can be as large as 200 acres, while females' long-term home ranges may be less than half that size. Over its lifetime, a desert tortoise may use more than 1.5 square miles of habitat and may make periodic forays of several miles at a time.

Tortoises are long-lived and grow slowly. They require 13 to 20 years to reach sexual maturity. Their reproductive rates are low, though their reproductive lifespan is long. Mating may occur both during spring and fall. The number of clutches (sets of eggs laid at a single time) and number of eggs that a female desert tortoise produces is dependent on habitat quality, seasonal food and water availability, and the animal's physiological condition. Egg-laying takes place primarily between April and July; the female typically lays 2-14 (average 5-6) eggs, which are buried near the mouth of a burrow or beneath a shrub. The eggs typically hatch 90 to 120 days later, between August and October. Clutch success rates are unknown and nest predation rates are variable, but predation appears to be an important cause of clutch failure.

Desert tortoises at the Mesa Wind site, located to the north of the AM site have been studied extensively. Researchers conducted focused desert tortoise surveys of the Mesa Wind Project in 1997, 1998, 1999, 2000, 2009, and 2010. The number of tortoises encountered increased with each survey (31, 42, 49, 59, 63, and 69 tortoises, respectively) (Lovich et al. 2011). Desert tortoises at the Mesa Wind site constructed burrows under shrubs (41% of burrows were located under shrubs), but also constructed burrows under anthropogenic features in the landscape (e.g., roads, concrete foundations associated with wind energy turbines and transformers) (Lovich and Daniels 2000). A disproportionate number of desert tortoise burrows were located near roads and concrete foundations as opposed to available undisturbed habitat in the vicinity. These results suggest that wind energy development may be compatible with desert tortoise conservation (Lovich and Daniels 2000).

Focused surveys at the AM site for desert tortoise detected two old burrows and one old piece of scat within the biological survey area, listed in Table 4. No live tortoises were observed during the survey; however, they are known from within about 0.1 miles of the site and have a high potential to be present within the site.

Table 4. Desert Tortoise Observations.

Date	Sign	UTM	Notes
May 30, 2019	potential burrow	11 S 531499 3754971	Class 4 burrow: more than four feet deep.
May 30, 2019	scat	11 S 531512 3756000	Old scat, more than one year old.
July 18, 2019	potential burrow	11 S 531577 3755247	Class 4 burrow: under concrete foundation

A total of 199 concrete foundations were inspected for potential tortoise burrows. One of these had a suitable desert tortoise burrow (shallow Class 4) beneath it. Based on visual inspection the burrow was not occupied by desert tortoise at the time of the survey. The burrow was revisited on March 26, 2020; by that date it had partially collapsed and appeared to be inactive. Visual inspection indicated that, no desert tortoise was present. Attachment 6 includes a list and map of the foundations.

The AM site is not within USFWS designated critical habitat for the desert tortoise (USFWS 1994). Desert tortoise is covered under the CVMSHCP.

Swainson's Hawk. Swainson's hawk is listed as threatened under the CESA. In California, it nests in the San Joaquin Valley, western Antelope Valley, and Owens Valley. It migrates to South America every fall and returns to California every spring. The survey area is well outside of the breeding range but Swainson's hawk may migrate over the site biannually. Swainson's hawks are regularly observed migrating through the San Gorgonio pass and there are several records within about two miles of the survey area (ebird.org, 2019). Swainson's hawks have a high potential to migrate over the survey area and could use the site briefly during migratory stopovers, but otherwise would not be expected. Swainson's hawk is not covered under the CVMSHCP.

Coastal California gnatcatcher. The coastal California gnatcatcher is listed as threatened under the ESA. Its geographic range is primarily coastal southern California from Ventura County, inland to the Santa Clarita area, Banning area, and southward through northwestern Baja California. Its habitat is coastal sage scrub largely composed of California sagebrush, California buckwheat, and other low-growing, drought-deciduous shrubs. The coastal California gnatcatcher, as well as several shrubs that are characteristic of its habitat, reach their inland range margins in the San Gorgonio Pass. In this area, the ranges of Coastal California gnatcatcher and the more common black-tailed gnatcatcher, may overlap. The black-tailed gnatcatcher occurs on the Alta Mesa site and throughout the general area. Coastal California gnatcatcher has been reported by BLM staff along the Pacific Crest Trail, north of the Project site. There is a low possibility that coastal California gnatcatcher may occur on the Project site and, if so, most likely outside the breeding season during the dispersal phase of its life cycle. Coastal California gnatcatcher is not covered under the CVMSHCP.

Crotch Bumble Bee. Crotch bumble bee is a candidate species for State listing (CDFW, 2019c). It is a widespread secretive species that is known from more than two hundred locations over a broad geographic range (CDFW, 2019a). More than 100 recent observations have been made throughout much of California (iNaturalist.org, 2019). It is typically found in openings in grassland and scrub habitats where it burrows into the ground and lives in colonies. It feeds on native plants including milkweed, pincushion, lupine, phacelia, sage, snapdragon, clarkia, bush poppy, and buckwheat (Hatfield et al., 2015). Many of these food plants are present on or in the vicinity of the survey area and suitable burrowing and foraging habitat is also present. Crotch bumblebee has a moderate potential to be present on the site. Crotch bumblebee is not covered under the CVMSHCP.

3.2.2 Species Protected Under the Federal Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d; BGEPA) prohibits take of bald eagles and golden eagles. The BGEPA defines *take* to include “pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, and disturbing.” The USFWS (2007) further defines *disturb* as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

Golden Eagle. Golden eagles are year-round residents throughout most of their range in the western United States. In the southwest, they are more common during winter when eagles that nest in Canada migrate south into the region. They breed from late January through August, mainly during late winter and early spring in the California deserts (Pagel et al. 2010). In the desert, they generally nest in steep, rugged terrain, often on sites with overhanging ledges, cliffs or large trees as cover. Golden eagles are wide-ranging predators, especially outside of the nesting season, when they do not need to return to tend eggs or young at their nests.

Golden eagle foraging habitat consists of open terrain such as grasslands, deserts, savanna, and early successional forest and shrubland habitats throughout the regional foothills, mountains, and deserts. They prey primarily on rabbits and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002).

The mountains and canyons surrounding the survey area provide suitable golden eagle nesting habitat. The AM site does not have suitable nesting habitat, but the entire site is suitable foraging habitat. There are several documented golden eagle nest locations within a 10-mile radius of the site including locations to the north in the San Bernardino Mountains and to the south, in the San Jacinto Mountains. The nearest recorded nest sites are about 2.5 miles west of the AM site. Golden eagles are regularly observed migrating through the San Gorgonio pass and there are numerous observations within about one mile of the survey area (ebird.org, 2019). Golden eagles have a high potential to occur over the survey area during winter, migration, or nesting seasons.

Bald Eagle. Bald eagles are occasional migrants in southern California during the winter when birds from areas further to the north migrate south. There are a few year-round resident birds, regularly seen near Lake Hemet in Riverside County, and more recently Big Bear Lake in San Bernardino County and Irvine Lake in Orange County. Bald eagles have been observed migrating through the San Gorgonio pass and were observed twice in January of 2019 at the nearby Interstate 10 Whitewater rest area (ebird.org, 2019). Bald eagles have a high potential to migrate over the survey area.

3.2.3 Wildlife Species Fully Protected Under the California Fish and Game Code

Under the state Fish and Game Code, selected fish and wildlife species are designated as fully protected, prohibiting take except under permit for scientific purposes. Most of the designated fully protected species occur well outside the vicinity of the AM site, but several may be found in the vicinity. These are: golden eagle and bald eagle (discussed above, Species Protected under the Bald and Golden Eagle Protection Act), American peregrine falcon, Nelson's bighorn sheep, and desert kit fox.

American Peregrine Falcon. Peregrine falcons were formerly listed under CESA and ESA but have been delisted under both acts. They are fully protected under the state Fish and Game Code. They are found irregularly in the region, generally during migratory and winter seasons. They feed primarily on birds captured during flight. Waterfowl and shorebirds make up a large proportion of their prey, and nest sites are often within foraging range of large water bodies. Peregrine falcons are regularly observed migrating through the San Gorgonio pass and there are numerous observations within about one mile of the survey area (ebird.org, 2019). Peregrine falcons have a high potential to migrate over the AM site. There are no nest sites known in the vicinity.

Nelson's Bighorn Sheep. Nelson's bighorn sheep (or desert bighorn sheep) are known from the Transverse Ranges, California Desert Ranges, Nevada, northern Arizona, and Utah. Its populations in the Peninsular Ranges (the Santa Rosa and San Jacinto Mountains, and southward into Baja California), south of the AM site, are federally listed as a threatened distinct vertebrate population segment. The populations in the San Bernardino Mountains have no CESA or ESA listing status. Nelson's bighorn sheep is fully protected under the state Fish and Game Code. Nelson's bighorn sheep have been observed at the Mesa Wind site immediately north of the AM site and have a high potential to forage on the site.

Desert kit fox. Desert kit fox is protected by the California Code of Regulations (Title 14, CCR: §460) and Fish and Game Commission Section 4000 as a fur-bearing mammal. Title 14 of the California Code of Regulations, Section 460, stipulates that desert kit fox may not be taken at any time. Desert kit fox is a fossorial mammal that occurs in arid open areas, shrub grassland, and desert ecosystems within the Mojave Desert. Desert kit fox typically occurs in association with its prey base, which includes small rodents, primarily kangaroo rats, rabbits, lizards, insects, and in some cases, immature desert tortoises (Zeiner et al. 1990). Burrow complexes that have multiple entrances provide shelter, escape, cover, and reproduction, but desert kit fox may utilize single burrows for temporary shelter. No desert kit fox burrows were found during the survey, but they have a moderate potential to be present within the survey area.

3.2.4 Other Special-Status Wildlife Species

In addition to the listed species described above, several public agencies and private entities maintain lists of wildlife species of conservation concern. The CDFW compiles these in its compendium of "Special Animals" (2018b). These species are treated here as special-status species.

Coast horned lizard. Coast horned lizard is found throughout much of coastal southern California, inland as far as the southern Mojave Desert and to about 6000 feet elevation in the mountains. Coast horned lizards occur in sandy soils in shrubland, grassland, and woodland habitats. They have been extirpated from much of their historic range by land use changes, but they remain fairly common in natural open space areas where their primary prey (native ants) are found. They have been documented from Whitewater Canyon to the east and from the vicinity of Cabazon to the southwest. Desert horned lizard (no special-status) was observed on the site, but coast horned lizard was not. There is suitable habitat throughout the AM site, and coast horned lizards have a high potential to be present.

Red diamond rattlesnake. Red diamond rattlesnakes live between sea level and about 5000 feet elevation throughout most of Orange County and western Riverside County, south through San Diego and Baja California and inland to the Colorado Desert margins. Their habitats include coastal sage scrub, chaparral, and woodlands through most of their geographic range, and desert scrub at the eastern margins of their range. They are generally found around boulders and rock outcrops (Klauber 1972; Zeiner et al. 1988; Stebbins 2003). There are numerous records of red diamond rattlesnakes from Whitewater Canyon just east of the survey area. Two adult red diamond rattlesnakes were observed during the field surveys (see Figure 5).

Burrowing owl. The burrowing owl is a CDFW Species of Special Concern. As a native bird, it is also protected by the federal Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code (below). It is a small, terrestrial owl of open country. During breeding season, it ranges throughout most of the western US. It occurs year-round in southern California, but may be more numerous during fall and winter, when migratory individuals from farther north join the regional resident population. Burrowing owls favor flat, open annual or perennial grassland or gentle slopes and sparse shrub or tree cover. They use the burrows of ground squirrels and other rodents for shelter and nesting. Availability of suitable burrows is an important habitat component. Where ground squirrel burrows are not available, the owls may use alternate burrow sites or man-made features (such as drain pipes, debris piles, or concrete slabs). In the California deserts, burrowing owls generally occur in low numbers in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Wilkerson and Siegel 2011). Burrowing owl nesting season, as recognized by CDFW is February 1 through August 31 (CDFW 2012). Burrowing owls are covered under the Coachella Valley Multiple Species Habitat Conservation Plan. The site provides suitable habitat for burrowing owls and a single adult burrowing owl was observed during the field surveys (see Figure 5).

San Diego desert woodrat. The San Diego desert woodrat is a CDFW Species of Special Concern. It is known from coastal and desert scrub and rocky outcrops throughout much of southern California. It frequently builds nests or middens (piles of sticks and debris arranged to form a shelter) in rock outcrops or may occupy larger middens (usually built by a different woodrat species) around the bases of shrubs. In some portions of its range it builds middens primarily at the bases of cactus (*Opuntia* spp.) and yucca (*Yucca* spp.) plants (Feldhamer et al., 2003). It is known from the region and has been trapped near the community of Whitewater (CDFW, 2019a). Habitat throughout the survey area is suitable for San Diego desert woodrat and numerous middens were observed under concrete foundation and among rock outcrops. No live woodrats were observed, and we were unable to confirm whether the woodrats occupying the middens are the common desert subspecies or the special-status coastal subspecies. There is a high potential for San Diego desert woodrat to be present.

Bats. There are ten special-status bats that could occur in the AM vicinity and six of these are ranked as CDFW Species of Special Concern (Table 3). However, none of these is expected to roost on the site and therefore the likelihood of sensitive bat species roosting on-site is low. The special-status bats of the local area roost in rock crevices, tunnels, or caves and one species (western yellow bat) roosts in the foliage of riparian trees. None of these features is present on the site. Roost sites may be used seasonally (e.g., inactive cool seasons) or daily (day roosts, used during inactive daylight hours). Maternity roosts are particularly important overall for bat life histories. Knowledge of bat distributions and occurrences is sparse. Bat life histories vary widely. Some species hibernate during winter or migrate south. During the breeding season, bats generally roost during the day, either alone or in communal roost sites, depending on species. All special-status regional bats are insectivorous, catching their prey either on the wing or on the ground. Some species feed mainly over open water where insect production is especially high, but others forage over open shrublands such as those found on the AM site. Several special-status bats are likely to forage over the site or fly over the site en route to foraging habitat elsewhere (Table 3). The USGS Mineral Resources Data System (MRDS 2019) reports several mines in the project vicinity including unnamed gravel pits, the Super Creek Quarry, and the Painted Hills Quarry. All of these are open pits or quarries, rather than subterranean mines. MRDS also reports gold claims or prospects in the vicinity but does not indicate active or abandoned mines at the claim sites. There is a vertical excavation about 4 feet wide and 10-15 feet deep off-site to the north and a horizontal excavation off-site about 1 mile northeast. We are not aware of any caves or subterranean mines on the site or in the vicinity.

Raptors. In addition to the raptors discussed above, several other special-status birds of prey are found seasonally in the region, especially during winter and during migration. These include osprey, ferruginous hawk, Cooper’s hawk, sharp-shinned hawk, northern harrier, prairie falcon, merlin, and long-eared owl (Table 3). None of these raptors are expected to nest on the site due to lack of suitable habitat, but all of them are expected to fly over the site and occasionally forage on the site. Suitable winter or migratory season foraging habitat for all of these raptors is widely available throughout the region.

Upland Perching Birds. Several upland perching bird species are included in the CDFW Special Animals compilation (CDFW, 2018b). These include Costa’s hummingbird, loggerhead shrike, LeConte's thrasher, black-tailed gnatcatcher, California horned lark, southern California rufous-crowned sparrow, and Lawrence’s goldfinch. Costa’s hummingbird, loggerhead shrike, and California horned lark were all observed on the site during the field surveys. The remaining species are likely to occur on the site (based on their habitat and geographic range).

Other Mammals. Several mammal species range widely through desert habitats, either among partially isolated mountain ranges (e.g., Nelson’s bighorn sheep, described above) or more often in valleys. These include American badger and desert kit fox. Desert kit fox is addressed above. American badger is a California species of special concern. Two potential American badger burrows were observed within the survey area during 2019 (Figure 5).

3.3 Native Birds: Migratory Bird Treaty Act / California Fish and Game Code

The federal Migratory Bird Treaty Act (MBTA) prohibits take of any migratory bird, including eggs or active nests, except as permitted by regulation (e.g., licensed hunting of waterfowl or upland game species). Under the MBTA, “migratory bird” is broadly defined as “any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle” and thus applies to most native bird species. California Fish and Game Code Section 3503 prohibits take, possession, or needless destruction of bird nests or eggs; Section 3503.5 prohibits take or possession of birds of prey or their eggs; and Section 3513 prohibits take or possession of any migratory nongame bird. With the exception of a few non-native birds such as European starling, the take of any birds or loss of active bird nests or young is regulated by these statutes. Most of these species have no other special conservation status as defined above.

The entire AM site and surrounding area provides suitable nesting habitat for numerous resident and migratory bird species. Many adult birds would flee from equipment during project construction; however, nestlings and eggs would be vulnerable. If initial site grading or brush removal were to take place during nesting season, then it would likely destroy bird nests, including eggs or nestling birds. For most birds, these impacts can be avoided by scheduling initial clearing and grading outside the nesting season. Or, if initial clearing and grading are undertaken during nesting season, work may be limited only to areas where no nesting birds are present, as documented by pre-construction nest surveys. One special-status species, the burrowing owl, is unlikely to flee the site during construction, even outside the nesting season, due to its characteristic behavior of taking cover in burrows. Avoidance of burrowing owls during initial clearing and grading necessitates pre-construction surveys for active burrows, and follow-up measures to "passively relocate" the owls if they are present. Passive relocation may require authorization from CDFW.

Some birds will be likely to nest in the AM site during construction, even after initial grading and clearing. Depending on the species, birds may nest on the ground close to equipment; on foundations, structures, or construction trailers; or on idle vehicles or construction equipment left overnight or during a long weekend. The species most likely to nest in the AM site during construction are common ravens, house finches, and mourning doves, all of which are protected by the MBTA and Fish and Game Code. Due to the high probability that birds may nest on site during construction, regular monitoring and nest site management may be necessary throughout the breeding season. Due to documented predation by common ravens on hatchling and juvenile desert tortoises, it is noteworthy that common ravens are seen regularly throughout the vicinity.

3.4 Wildlife Corridor and Movement

3.4.1 Bird Migration in the San Gorgonio Pass

The San Gorgonio Pass is a high-use nocturnal flyway for migratory songbirds. McCrary et al. (1983) estimated 32 million birds flew through the Coachella Valley during spring of 1982, and recorded rates of 5,000–10,000 birds per hour through the Valley. A large proportion of these migratory birds would have migrated through the San Gorgonio Pass, at the northwest margin of the Coachella Valley. Most of these migratory birds flew higher than the existing or proposed turbines, but about 11 percent were at altitudes within the blade-swept areas of the proposed turbines. Special-status migratory birds reported in the CNDDB (including Vaux's swift, yellow warbler, white-faced Ibis, and least Bell's vireo) as well as many other common and special-status species may migrate over the site seasonally.

3.4.2 Wildlife Corridor

The ability for wildlife to move freely among populations is important to long-term genetic variation and demography. Fragmentation and isolation of natural habitat may cause loss of native species diversity in fragmented habitats. In the short term, wildlife movement may also be important to individual animals' ability to occupy their home ranges, if their ranges extend across a potential movement barrier. These considerations are especially important for rare, threatened, or endangered species, and wide-ranging species such as large mammals, which exist in low population densities.

The California Essential Habitat Connectivity Project was commissioned by the California Department of Transportation (Caltrans) and CDFW to create a statewide assessment of essential habitat connectivity to be used for conservation and infrastructure planning (Caltrans and CDFW, 2010). One of its goals was to create the Essential Connectivity Map, which depicts large, relatively natural habitat blocks that support native biodiversity (natural landscape blocks) and areas essential for ecological connectivity between them (essential connectivity areas). This map does not reflect the needs of particular species but is based on overall biological connectivity and ecological integrity. A more detailed analysis is required to assess local and regional needs for connectivity and develop linkage designs based on the requirements of individual species.

The Essential Connectivity Map identifies the San Bernardino Mountains and the San Jacinto Mountains, to the north and south of the AM site as natural landscape blocks. There are also essential connectivity areas between these natural landscape blocks that include the AM site.

Additionally, the AM site is located within the Stubbe and Cottonwood Canyons Conservation Area and the Whitewater Canyon Conservation Area as identified in the CVMSHCP (CVAG 2007). These Conservation Areas were identified as an important part of a Linkage and Biological Corridor linking the San Bernardino Mountains portion of the Transverse Ranges with the Peninsular Ranges (San Jacinto and Santa Rosa Mountains). The significance of this corridor is noted in Missing Linkages: Restoring Connectivity to the California Landscape (Penrod, 2001). It is likely to be used by predators and large mammals, including coyotes, bobcats, mountain lions, and foxes to move between the two mountain ranges.

3.5 Vegetation and Habitat

3.5.1 Vegetation

Vegetation descriptions and names are based on alliance level nomenclature of Sawyer et al. (2009). Each vegetation type is also defined according to Holland (1986) and to Mayer and Laudenslayer (1988) whenever possible. None of the vegetation types identified on the AM site are classified as sensitive (CDFW 2018c). Common names of plant species are used throughout the following descriptions; Latin names for each species may be found in Attachment 4 (Species List).

Brittlebush Scrub. This vegetation is characterized by the dominance of brittlebush. It is the most abundant vegetation on site and is found primarily on exposed, west- and south-facing slopes. Many other species were observed within brittlebush scrub, but were present in either low numbers or in small patches. Other species observed included California jointfir, cheesebush, California buckwheat, beavertail cactus, Mojave yucca, and chaparral yucca. Brittlebush is a common to dominant species in desert shrublands and in coastal scrub of the interior valleys west of the project vicinity. On the AM site, brittlebush scrub is similar to descriptions of Riversidean Sage Scrub (Holland 1986), Coastal Scrub (De Becker 1988) and Desert Scrub (Laudenslayer and Boggs 1988).

California Juniper Woodland. This vegetation is characterized by the dominance of California juniper. Within the site it is found on a single north-facing slopes along the northern edge of the site. Additional species observed within juniper woodland include California buckwheat, Mojave yucca, and narrow-leaved goldenbush. This vegetation matches descriptions of Semi-Desert Chaparral and Cismontane Juniper Woodland and Scrub (Holland 1986) and best matches the habitat description for Mixed Chaparral (England 1988).

California Sagebrush–California Buckwheat Scrub. This vegetation is characterized by the co-dominance of California sagebrush and California buckwheat. Within the site it is most common on disturbed soils such as along road cuts and adjacent to graded areas. Additional species, similar to those listed above in brittlebush scrub, are also found in low numbers. This vegetation matches descriptions of Riversidean Sage Scrub and Upper Sonoran Subshrub Scrub (Holland 1986) and best matches the habitat description for Coastal Scrub (De Becker 1988).

Creosote Bush–Brittlebush Scrub. This vegetation is characterized by the co-dominance of creosote bush and brittlebush. It is found throughout much of the site on areas with relatively flat topography. Other species present include white bursage, Mojave yucca, narrow-leaved goldenbush, silver cholla, and California buckwheat. This vegetation best matches the description of Sonoran Creosote Bush Scrub (Holland 1986) and the habitat description of Desert Scrub (Laudenslayer and Boggs 1988).

Developed. The remainder of the survey area is occupied by roads, cleared areas, and building or O&M pads for the existing wind turbines. These areas are primarily unvegetated but there are some ruderal species present, including red brome, red-stemmed filaree, and schismus grass. In addition, there are several native shrubs on and adjacent to the building pads, such as California buckwheat, narrow-leaved goldenbush, and deerweed. These areas do not match published vegetation descriptions.

3.5.2 CVMSHCP Natural Communities

The CVMSHCP names and describes natural communities that are present throughout the plan area. Within the survey site one of these natural communities was mapped. The remainder of the survey area is mapped as wind energy.

Sonoran Mixed Woody and Succulent Scrub: This natural community is characterized by presence of cactus and other stem succulents. It is similar to creosote bush scrub, as described in the CVMSHCP but is more varied and usually has a higher plant density. In addition to creosote bush and other associated perennial shrubs, typical species include silver cholla, pencil cholla, prickly pear, and beavertail cactus.

3.6 CVMSHCP Conservation Areas

The CVMSHCP includes mapped “modeled habitat” for certain covered species. Modeled habitat for the following three species is located within the AM Project Area (see Figure 4):

- Coachella Valley milk-vetch: 4.3 acres (of 41,098 acres of modeled habitat in the MSHCP area; field survey confirms the modeled habitat is not suitable; see Table 3 and text above)
- Coachella Valley Jerusalem cricket: 4.3 acres (of 27,446 acres of modeled habitat in the MSHCP area; field survey confirms the modeled habitat is not suitable; see Table 3)
- Desert tortoise: 645 acres (i.e., the entire Project area; of 587,926 acres of modeled habitat in the MSHCP area)

The CVMSHCP identifies several Conservation Areas within its coverage area. The entire site is within the Stubbe and Cottonwood Canyons Conservation Area and the Whitewater Canyon Conservation Area of the CVMSHCP (Figure 6). Within each Conservation Area, the CVMSHCP specifies acreage caps on various habitat categories such as core habitat for desert tortoise and desert dry wash woodland. The applicant will prepare and submit a status summary of all habitat impacts, by conservation area and category, to support the MSHCP consistency review.

Stubbe and Cottonwood Canyons Conservation Area. The Stubbe and Cottonwood Canyons Conservation Area was established to conserve several covered species, but the primary goal was to conserve the desert tortoise population that is located on the mesas to the west of the Whitewater River. This population of desert tortoise, which has been studied extensively by Dr. Jeff Lovich for many years and is discussed in detail in Section 3.2 (Special-status Wildlife), above, is centered to the north of the AM site. This population of desert tortoise is believed to be the densest population within the CVMSHCP plan area, although very little desert tortoise sign (none of it recent) was observed within the AM site.

In addition to desert tortoise, this Conservation Area contains suitable habitat for several riparian birds including least Bell’s vireo, southwestern willow flycatcher, summer tanager, yellow-breasted chat, and yellow warbler. Riparian habitat is absent from the AM site therefore the proposed project would not impact this habitat or directly impact these covered species. Habitat for Coachella Valley milkvetch, Coachella Valley Jerusalem cricket, gray vireo, Le Conte’s thrasher, burrowing owl, Coachella Valley round-tailed ground squirrel, and Palm Springs pocket mouse is also present within the Conservation Area. The site lacks suitable habitat for many of these species with the exception of Le Conte's thrasher and burrowing owl.

To avoid or minimize impacts to the covered species discussed above, the proposed project will implement the Required Avoidance, Minimization, and Mitigation Measures discussed in Section 4.4 of the Final Major Amendment to the CVMSHCP (CVAG, 2016). The proposed project will also implement measures discussed in the Land Use Adjacency Guidelines, Section 4.5 of the Final Major Amendment to the CVMSHCP (CVAG, 2016). These measures will apply to all portions of the project site that are within the Conservation Area.

Whitewater Canyon Conservation Area. The Whitewater Canyon Conservation Area was established to conserve several covered species, but the primary goal was to conserve habitat for the arroyo toad, riparian birds, desert tortoise, and triple-ribbed milkvetch. Since the CVMSHCP was published it was determined that the arroyo toad record from whitewater was incorrectly identified and this species is now considered to be absent from the CVMSHCP area. Desert tortoise habitat and riparian bird habitat are discussed above. A minimal amount of suitable habitat for triple-ribbed milkvetch is present within the AM site but none were observed during the focused survey.

In addition to the covered species discussed above, this Conservation Area contains suitable habitat for Coachella Valley milkvetch, Little San Bernardino Mountains linanthus, Coachella Valley Jerusalem cricket, desert tortoise, gray vireo, Le Conte's thrasher, Coachella Valley round-tailed ground squirrel, southern yellow bat, and Palm Springs pocket mouse. Habitat for these species, with the exception of desert tortoise and Le Conte's thrasher is absent from the site.

4.0 References

American Ornithologists' Union. 1998. Check-list of the North American Birds, 7th ed. Committee on Classification and Nomenclature, American Ornithologists' Union, Washington DC.

Amsberry, K. and R.J. Meinke. 2007. Status evaluation of *Astragalus tricarinatus* (triple-ribbed milkvetch). Report prepared by the Oregon Department of Agriculture, Native Plant Conservation Program for the California Department of Fish and Game.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, D.H. Wilken, eds. 2012. The Jepson Manual: Vascular Plants of California, 2nd ed. University Press, Berkeley, California.

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press of Kentucky, Lexington, Kentucky.

BLM (Bureau of Land Management). 2017. Amendment to Section 7 formal consultation request and biological assessment for the Eagle Mountain Pumped Storage Hydroelectric Project. Memorandum from California Desert District, Moreno Valley, CA to USFWS Palm Springs Fish and Wildlife Office, Palm Springs, CA (8 Sep).

CDFG (California Department of Fish and Game). 2012. Staff Report on Burrowing Owl Mitigation. March 7. Online: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843&inline

CDFW (California Department of Fish and Wildlife). 2019a. California Natural Diversity Database (CNDDB), Rarefind, Version 3.1.1. Heritage section, CDFW, Sacramento.

_____. 2019b. Special Vascular Plants, Bryophytes, and Lichens List. CDFW, Sacramento. Online: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline

_____. 2019c. Evaluation of the Petition from the Xerces Society, Defenders of Wildlife, and The Center

For Food Safety To List Four Species Of Bumble Bees As Endangered Under The California Endangered Species Act (April 4).

______. 2018a. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. Unpublished. California Department of Fish and Wildlife, Sacramento, California.

______. 2018b. Special animals list. CDFW, Sacramento. Online: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline

______. 2018c. California Natural Community List. [online]: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline (accessed August 2019).

California Department of Transportation (CalTrans) and California Department of Fish and Wildlife (CDFW). 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Online: http://www.dfg.ca.gov/habcon/connectivity/

CNPS (California Native Plant Society). 2019. Inventory of rare and endangered plants. California Native Plant Society. Sacramento. Online: http://www.cnps.org/inventory. Accessed August 2019.

CVAG (Coachella Valley Association of Governments). 2007. Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP). Online: http://www.cvmshcp.org/

______. 2016. Final Major Amendment to the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP). Online: http://www.cvmshcp.org/

CVCC (Coachella Valley Conservation Commission). 2014. December 2014 Biological Monitoring Protocol for Stenopelmatus cahuilaensis, Coachella Valley Jerusalem Cricket. University of California Riverside Center for Conservation Biology and CVCC Biological Working Group. http://www.cvmshcp.org/pdf%20files/BWG_Materials/2014-2015%20CVJC%20Protocol%20final.pdf

CCH (Consortium of California Herbaria). 2019. Botanical specimen data provided by the participants of the Consortium of California Herbaria. Online*:* http://ucjeps.berkeley.edu/consortium/

De Becker, S. 1988. Coastal scrub. Pages 108-109 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento CA.

eBird.org. 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. [Online]: http://www.ebird.org. Accessed: August 2019.

England, A.S. 1988. Mixed chaparral. Pages 104-105 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento CA.

Ervin, E.E., K.R. Beaman, and R.N. Fischer. 2013. Correction of Locality Records for the Endangered Arroyo Toad (*Anaxyrus californicus*) from the Desert Region of Southern California. Bulletin of the Southern California Academy of Sciences 112: 197-205.

Feldhamer, G.A., B.C. Thompson, and J.A. Chapman, eds. 2003. Wild Mammals of North America: Biology, Management and Conservation, 2nd ed. Johns Hopkins University Press, Baltimore MD.

Gannon, W.L. 2003. Bats (Vespertilionidae, Molossidae, Phyllostomidae). Pages 56-74 in Feldhamer, G.A., B.C. Thompson, and J.A. Chapman, eds. Wild Mammals of North America: Biology, Management and Conservation, 2nd ed. Johns Hopkins University Press, Baltimore MD. 1216 pp.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. The Distribution of the Birds of California. Cooper Ornithological Club, Berkeley (reprint 1986 by Artemisia Press, Lee Vining, CA).

Hall, E.R. 1981. The Mammals of North America. John Wiley and Sons, New York.

Hatfield, R., Jepsen, S., Thorp, R., Richardson, L. & Colla, S. 2015. Bombus crotchii. The IUCN Red List of Threatened Species 2015: e. T44937582A46440211. http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T44937582A46440211.en. Accessed August 2019.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished report, Non-game Heritage Program, California Department of Fish and Game, Sacramento. 156 pp.

iNaturalist.org. 2019. Observations of Crotch's bumble bee (Bombus crotchii). [online]: https://www.inaturalist.org/observations?place_id=any&taxon_id=271451 Accessed August 2019.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. California Dept. of Fish and Game, Sacramento.

Jepson (Jepson Flora Project). 2019. Jepson eFlora. [Online]: http://ucjeps.berkeley.edu/IJM.html Accessed August 2019.

Jericho Systems, Inc. 2018. Biological Resources Assessment, Focused Burrowing Owl Survey, Desert Tortoise Protocol Survey, Jurisdictional Delineation, and CVMSHCP Consistency Analysis for the Alta Mesa 640 Windfarm, Whitewater, Riverside County, California.

Klauber, L.M. 1972. Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind. 2nd ed. Univ. California Press, Berkeley. 1533 pp.

Kochert, M. N., K. Steenhof, C. L. Mcintyre and E. H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Online: http://bna.birds.cornell.edu/bna/species/684doi:10.2173/bna.684

LaDoux, T. Botanist, Joshua Tree National Park. 2008. Personal communication with Scott D. White reg. *Astragalus tricarinatus*.

Laudenslayer, W.F., Jr. and J.R. Boggs. 1988. Desert scrub. Pages 114-115 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento, CA.

Lovich, J.E., and R. Daniels,.2000. Environmental Characteristics of Desert Tortoise (*Gopherus agassizii*) Burrow Locations in an Altered Industrial Landscape. Chelonian Conservation and Biology Vol. 3 No. 4.

Lovich, J.E., J.R. Ennen, S. Madrak, K. Meyer, C. Loughran, C. Bjurlin, T. Arundel, W. Turner, C. Jones, and G.M. Groenendaal. 2011. Effects of wind energy production on growth, demography, and survivorship of a desert tortoise (*Gopherus agassizii*) population in southern California with comparisons to natural populations. Herpetological Conservation and Biology 6(2):161-174.

Mayer, K.E. and W.F. Laudenslayer Jr. 1988. A Guide to the Wildlife Habitats of California. California Department of Forestry and Fire Protection, Sacramento.

McCrary, M.D., R.L. McKernan, R.E. Landry, W.D. Wagner, and R.W. Schreiber. 1983. Nocturnal Avian Migration Assessment of the San Gorgonio Wind Resource Study Area, Spring 1982. Report prepared for Southern California Edison Company, Rosemead, California.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim golden eagle technical guidance: inventory and monitoring protocols; and other recommendations in support of eagle management and permit issuance. Division of Migratory Bird Management, Arlington Virginia. 26pp.

Penrod, K. 2001. Missing linkages: restoring connectivity to the California landscape. Proceedings of interagency workshop (November 2).

Pierson, E.D. and W.E. Rainey. 1998. California leaf-nosed bat, *Macrotus californicus* Pallid bat, *Antrozous pallidus*, Townsend's big-eared bat, *Corynorhinus townsendii*. Western mastiff bat, *Eumops perotis*, pocketed free-tailed bat *Nyctinomops femorosaccus*, and big free-tailed bat *Nyctinomops macrotis*. Pages 27-41 and 66-76 in Bolster, B.C. (ed.) Terrestrial Mammal Species of Special Concern in California. Draft Final Report prepared by P.V. Brylski, P.W. Collins, E.D. Pierson, W.E. Rainey and T.E. Kucera. Report submitted to California Department of Fish and Game Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No.FG3146WM. http://www.dfg.ca.gov/wildlife/nongame/ssc/1998mssc.html

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evans. 2009. Manual of California Vegetation, 2nd ed. California Native Plant Society, Sacramento, California. 1300 pp.

Sibley, D.A. 2000. Sibley Guide to Birds. A. A. Knopf, New York, NY.

Stebbins, R.C. 2003. Western Reptiles and Amphibians, 3rd ed. Houghton Mifflin Company, Boston Mass.

USFWS (US Fish and Wildlife Service). 2018. Recovery Plan for the southern California distinct population segment of the mountain yellow-legged frog. U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California.

_____. 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). USFWS, Sacramento, CA. 227 pp.

_____. 2010. Preparing for any action that may occur within the range of the Mojave Desert tortoise (*Gopherus agassizii*), 2010 Field Season. USFWS Desert Tortoise Recovery Office, Reno, NV. 18 pp.

_____. 2009a. Endangered Species Act Formal Consultation on the Proposed Mesa Repowering – Turbine Replacement Project Riverside County, California (CA-660.43). Carlsbad Fish and Wildlife Service Office, Carlsbad, CA.

_____. 2009b. Desert Tortoise (Mojave Population) Field Manual: (*Gopherus agassizii*). Region 8, Sacramento, CA.

_____. 2007. Protection of eagles; definition of ‘‘disturb.’’ Federal Register 72:31132 -31140 (5 Jun).

_____. 1994. Endangered and threatened wildlife and plants; determination of critical habitat for the Mojave population of the desert tortoise. Federal Register 59:5820-5866 (8 Feb).

USGS (US Geological Survey). 2019. Mineral Resources Data System mine data, Riverside County, California. https://mrdata.usgs.gov/mrds/

WRCC (Western Regional Climate Center). 2019. Precipitation data summary for Cabazon, California. https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCCAB

White, S.D. 2004. Noteworthy collections: *Astragalus tricarinatus*. Crossosoma 30:23-25.

Wilkerson, R.L. and R.B. Siegel. 2011. Distribution and abundance of western burrowing owls (*Athene cunicularia hypugaea*) in southeastern California. Southwestern Naturalist 56:378-384.

Wilson, D.E. and S. Ruff, eds. 1999. Smithsonian Book of North American Mammals. Smithsonian Institution Press, Washington DC.

Zeiner, D.C., W.F. Laudenslayer Jr., and K.E. Mayer. 1988. California’s Wildlife: Volume I. Amphibians and Reptiles. Sacramento, California: California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California, in California Wildlife Habitat Relationships System, California Department of Fish and Wildlife, California Interagency Wildlife Task Group.

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PROJECT MEMORANDUM
MESA/ALTA MESA DELIVERY ACCESS ROUTE

Date: January 13, 2021
To: Berk Gursoy and Jonathan Kirby
From: Vida Strong and Scott White
Subject: Biological Survey Results for Proposed Access Route

Introduction

Brookfield Renewable Energy (Brookfield) retained Aspen Environmental Group (Aspen) to conduct a biological survey of the proposed Mesa/Alta Mesa Delivery Access Route (project) along Rockview Drive, located in the community accessed from Haugen-Lehmann Way in the San Gorgonio Pass in Riverside County, California (Figure 1, Attachment 1).

Project Description

The survey area is approximately 4.6 acres and contains a portion of Rockview Drive, starting at the intersection of Cottonwood Avenue and Rockview Drive, and ending at Pomander Place road. It consists of the roadway right-of-way which primarily includes an existing dirt road with vegetation along its margins. The project would widen Rockview Drive to a width of 16 feet by removing vegetation along the pre-existing road margins. The survey area is shown on the White Water USGS 7.5-minute Quad (USGS 1951). The elevation ranges from 1,580 to 1,594 feet above mean sea level. With the exception of Cottonwood Canyon Wash to the east and natural open space to the west, all lands surrounding the survey area are predominantly open space land reserved for housing with few developed land plots. Representative photos of the survey area are provided in Attachment 2.

Survey Methodology

Aspen biologist Jacob Aragon completed the biological survey on January 4, 2021. Prior to conducting the survey, Mr. Aragon reviewed the California Natural Diversity Database (CNDDB) to search for all known occurrences of special-status plant and wildlife species from the survey area (CDFW 2021). There are no desert tortoise records within the survey area and the nearest desert tortoise record is 1.6 miles to the northeast. There are recorded occurrences of burrowing owls in the vicinity of the survey area and the nearest record is 0.43 miles to the east. There are very few special-status plant records within 1.5 miles of the survey area. Although a focused special-status plant survey was not conducted, Mr. Aragon assessed habitat for special-status plants such as yellow hairy sand verbena (*Abronia villosa* var. *aurita*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), white bracted spineflower (*Chorizanthe xanti* var. *leucotheca*) which are known from within about 3 miles of the survey area.

The field assessment consisted of reconnaissance-level biological surveys for special-status wildlife and plants and was conducted by walking linear along the vegetation margins on each side of the road. The field survey specifically targeted Mojave Desert tortoise sign (e.g., live tortoises, scat, burrows, carcasses, courtship rings, drinking depressions, tracks, or other indication of current or previous tortoise occurrence), burrowing owl sign (e.g., live owls, pellets, burrows, feathers, or other indication at burrows), and general special-status wildlife and plant species (CBOC 1993, CDFW 2018, USFW 2019). The assessment occurred outside the active season for desert tortoise, outside the breeding season for burrowing owl, and outside the flowering season. All plant and wildlife species identified were recorded in field notes. Plants of uncertain identity were collected and identified later using keys, descriptions, and illustrations in Baldwin et al. (2012) and other regional references.

Results

No desert tortoise, burrowing owl, or other special-status wildlife and plant species were observed during the survey. Vegetation and habitat within the survey area can be described and named based on alliance level nomenclature in A Manual of California Vegetation (Sawyer et al. 2009) and Holland (1986) and are as follows:

Brittle bush scrub (*Encelia farinosa* Shrubland Alliance). This vegetation community is characterized by a dominance of brittle bush (*Encelia farinosa*). The brittle bush forms a dense nearly monotypic stand of shrubs with very little diversity. Burrobrush (*Ambrosia Salsola*), creosote bush (*Larrea tridentata*), and silver cholla (*Cylindropuntia echinocarpa*) are present in very low numbers. Brittle bush scrub is present in areas that appear to have been disturbed in the past. This vegetation best matches the descriptions of Riversidean desert scrub (Holland 1986).

Developed/Ruderal. The remainder of the survey area are occupied by unpaved dirt roads and immediate roadside vegetation. These areas are primarily unvegetated but there are some ruderal species present, including brome grasses (*Bromus* spp.) and schismus grass (*Schismus barbatus*). These areas do not match published vegetation descriptions.

In addition, there was moderate to heavy trash and dump sites progressing when travelling eastward. All wildlife and plant species observed during the surveys are listed in Attachment 3.

References

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, D.H. Wilken, eds. 2012. The Jepson Manual: Vascular Plants of California, 2nd ed. University Press, Berkeley, California.

CBOC (California Burrowing Owl Consortium). 1993. Burrowing owl survey protocol and mitigation guidelines. Alviso, California. 13 pp.

CDFW (California Department of Fish & Wildlife). 2021. California Natural Diversity Database (CNDDB), Rarefind, Version 3.1.1. Heritage section, CDFW, Sacramento.

______. 2018. Protocols for surveying and evaluating impacts to special-status native plant populations and sensitive natural communities. CDFW, Sacramento, CA, 12 pp. Online: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished report, Non-game Heritage Program, California Department of Fish and Game, Sacramento. 156 pp.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evans. 2009. Manual of California Vegetation, 2nd ed. California Native Plant Society, Sacramento, California. 1300 pp.

USFWS (U.S. Fish and Wildlife Service). 2019. Preparing for any action that may occur within the range of the Mojave Desert tortoise (*Gopherus Agassizii*).

USGS (U.S. Geological Survey). 1951. White Water, California 7.5-minute Topographic Quadrangle.

Attachment 1 – Figures

Figure 1

Delivery Route Survey Area

Attachment 2 – Photo Exhibit

Photo 1: Intersection of Cottonwood Rd and Rockview Dr, facing east.

Photo 2: Brittlebush scrub vegetation through-out site, Rockview Dr. facing northeast.

Photo 3: North vegetation margin along Rockview Dr., facing east.

Photo 4: South vegetation margin and developed land plot along Rockview Dr., facing west.

Photo 5: Rockview Dr. facing west near eastern-most land plot.

Photo 6: Intersection of Pomander Pl. and Rockview Dr., facing west.

Attachment 3 – Species Observed

Latin Name	Common Name
VASCULAR PLANTS	
Dicotyledons	
EPHEDRACEAE	EPHEDRA FAMILY
Ephedra nevadensis	Nevada ephedra, desert tea
ASTERACEAE	ASTER FAMILY
Ambrosia salsola	Common burrobrush, cheesebush
Bebbia juncea var. *aspera*	Sweetbush
Encelia farinosa	Brittlebush
Ericameria paniculata	Black-banded rabbitbrush, punctate rabbitbrush
BRASSICACEAE	MUSTARD FAMILY
* *Brassica tournefortii*	Sahara mustard, wild turnip
CACTACEAE	CACTUS FAMILY
Cylindropuntia echinocarpa	Silver cholla
Opuntia basilaris var. *basilaris*	Beavertail cactus
CLEOMACEAE	SPIDERFLOWER FAMILY
Peritoma arborea	Bladderpod
ZYGOPHYLLACEAE	CALTROP FAMILY
Larrea tridentata	Creosote bush
Monocotyledons	
AGAVACEAE	CENTURY PLANT FAMILY, AGAVE FAMILY
Yucca schidigera	Mojave yucca
POACEAE	GRASS FAMILY
* *Bromus* sp.	Unid. annual brome grass
* *Schismus* sp.	Mediterranean grass
VERTEBRATE ANIMALS	
REPTILIA	REPTILES
IGUANIDAE	IGUANID LIZARDS
Uta stansburiana	Side-blotched lizard
AVES	BIRDS
CATHARTIDAE	VULTURES
Cathartes aura	Turkey vulture
ACCIPITRIDAE	HAWKS, EAGLES, HARRIERS
Buteo jamaicensis	Red-tailed hawk
PHASIANIDAE	GROUSE AND QUAIL
Callipepla californica	California quail
COLUMBIDAE	PIGEONS AND DOVES
Zenaida macroura	Mourning dove
TYRANNIDAE	TYRANT FLYCATCHERS
Sayornis saya	Say's phoebe
Tyrannus verticalis	Western kingbird
CORVIDAE	CROWS AND JAYS
Corvus corax	Common raven
TROGLODYTIDAE	WRENS
Thryomanes bewickii	Bewick's wren
MUSCICAPIDAE	THRUSHES AND ALLIES
Polioptila caerula	Blue-gray gnatcatcher
MIMIDAE	MOCKINGBIRDS AND THRASHERS

Latin Name	Common Name
Toxostoma redivivum	California thrasher
EMBERIZIDAE	SPARROWS, WARBLERS, TANAGERS
Zonotrichia leucophrys	White-crowned sparrow
FRINGILLIDAE	FINCHES
Haemorhous mexicanus	House finch
MAMMALIA	MAMMALS
LEPORIDAE	HARES AND RABBITS
Lepus californicus deserticola	Black-tailed jackrabbit
Sylvilagus sp.	Cottontail
CANIDAE	FOXES, WOLVES AND COYOTES
Canis familiaris	Domestic dog

Species introduced to California are indicated by an asterisk. This list includes only species observed on the site. Invertebrate species observed throughout the site were not included in this list. Other species may have been overlooked or unidentifiable due to season (amphibians are active during rains, reptiles during summer, some birds (and bats) migrate out of the area for summer or winter, some mammals hibernate, many plants are identifiable only in spring). Plants were identified using keys, descriptions, and illustrations in Baldwin et al (2012). Plant taxonomy and nomenclature generally follow Baldwin et al. (2012). Wildlife taxonomy and nomenclature generally follow Stebbins (2003) for amphibians and reptiles, AOU (1998) for birds, and Wilson and Ruff (1999) for mammals.

Appendix D

Jurisdictional/Aquatic Delineations

- CDFW Jurisdictional Delineation
- USACE/RWQCB Aquatic Resource Delineation

ALTA MESA WIND PROJECT
Jurisdictional Waters of the State
Pursuant to California Fish and Game Code Section 1602

Prepared for:

Brookfield

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January 2021

Contents

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Attachments

ALTA MESA WIND PROJECT
Jurisdictional Waters of the State Pursuant to California Fish and Game Code Section 1602

Aspen Environmental Group
January 2021

1.0 Introduction

This report presents the methods and results of a field delineation of California Department of Fish and Wildlife (CDFW) jurisdictional streambeds conducted in 2020 at the proposed Alta Mesa Wind Project site. The Project site is located on privately owned land in unincorporated Riverside County, California (Figure 1). CDFW regulates "bed and banks" of streambeds or lakebeds as well as adjacent riparian vegetation or habitat. In addition to CDFW regulation, the Colorado River Basin Regional Water Quality Control Board (RWQCB) and the U.S. Army Corps of Engineers (USACE) may regulate streambeds on the site, according to differing delineation criteria. RWQCB and USACE jurisdiction on the Project site are addressed in a separate aquatic resources delineation. Throughout this report "Impact Area" refers to all portions of the Project site that may be impacted by vegetation clearing, grading, and other project activities.

1.1 Project Description

AM Wind Repower LLC (Alta Mesa), a subsidiary of Brookfield Renewable Energy (Brookfield), as owner of the Alta Mesa Wind Project (Alta Mesa Wind), is planning to repower the existing wind project located in Riverside County, approximately 11 miles northwest of the City of Palm Springs. Alta Mesa is an existing 27 megawatt (MW) wind project with 159 turbines located on land zoned Wind Energy (W-E). W-E zoning allows the development of wind energy subject to approval of a Commercial WECS application. The existing turbines heights range from 114 to 145 feet. The existing 159 turbines will be removed first quarter 2021 under existing permits.

Alta Mesa proposes to construct the Alta Mesa Wind Project (herein, "Project"" or "project"), which would include constructing, operating, maintaining, and decommissioning 7 new WTGs. The Project would produce 27 MW of wind energy. The new facilities would be decommissioned at the end of their estimated 30-year useful life. Alta Mesa is planning to construct the Project in tandem with the adjacent Mesa wind repowering project that is situated on BLM lands and is currently going through a separate but similar permitting process. Concurrent repowering of the two projects (as opposed to two separate construction projects) would provide efficiencies and minimize total ground disturbance, traffic, and temporary impacts on environmental resources. The layout of the two projects is also being considered as one to minimize the viewshed impact while producing the most green energy.

The nearest sensitive receptors to the new WTGs are rural residences in Bonnie Bell, the closest of which are 4,500 and 4,900 feet east of the Project.

The Project will necessitate ground disturbance for access roads and WTG construction pads. In most cases the new access roads will follow existing roads and new disturbance will be kept to a minimum. However, some roads will need to be widened, and some of the new turbines will be located away from existing disturbances. The total estimated disturbed area for the Project would be a total of up to 67.3 acres, of which 18.8 acres is already disturbed and 48.5 acres would be new disturbance. Of the 67.3 acres, less than 25 acres would be permanent, and 42.3 would be temporary. Of the 42.3 acres of temporary impacts, 32.4 acres would be a buffer area where vegetation removal is not anticipated but there may be some need for drive and crush due to trucks backing up or other unanticipated construction work. Plus, an additional 13.2 acres of ground disturbance would occur along the main access road to the Project site and an additional 13 acres of ground disturbance would occur in the temporary construction yard, both within the Mesa Wind Project ROW project area. Both the main access road and construction yard would be shared by the Alta Mesa Wind Project and the Mesa Wind Project Repower which are being permitted concurrently. Ground disturbance is associated with turbine siting, cut/fill, temporary construction yards, and widening of access roads. The Project would use existing disturbed areas and would avoid steep slopes whenever possible.

1.2 Project Location

The Project site is located in unincorporated Riverside County, on private lands approximately 11 miles northwest of the City of Palm Springs. It is west of the Whitewater River and east of Cottonwood Creek, shown on the White Water USGS 7.5-minute topographic quad (USGS, 1955). The nearest proposed new WTG site and nearest existing legacy turbine are both approximately one mile west of the active Whitewater River channel.

2.0 Site Conditions

2.1 Topography and Surrounding Land Uses

Elevation of the Project site ranges from approximately 2,160 feet at the southeastern corner to approximately 2,821 feet in the northwestern portion of the site. The elevation of the access road drops down to 1,560 feet near Cottonwood Creek. Most surrounding lands are natural open space, with the exception of adjacent parcels to the north and west that are also in use for wind energy production (the Mesa Wind Project). Nearby communities include the community of Whitewater accessed from Haugen-Lehmann Way, southwest of the site; the community of Bonnie Bell to the east; and the community of Snow Creek south of Interstate 10.

2.2 Vegetation

Vegetation was mapped throughout the survey area during the 2020 site visits. Polygons were drawn on hard copy aerial images and digitized in ArcGIS once back in the office. The smallest mapping unit was approximately 0.25 acres. Any vegetation map is subject to imprecision for several reasons:

- Vegetation types tend to intergrade on the landscape so that there are no true boundaries in the vegetation itself. In these cases, a mapped boundary represents best professional judgment.
- Vegetation types as they are named and described tend to intergrade; that is, a given stand of real-world vegetation may not fit into any named type in the classification scheme used. Thus, a mapped and labeled polygon is given the best name available in the classification, but this name does not imply that the vegetation unambiguously matches its mapped name.
- Vegetation tends to be patchy. Small patches of one named type are often included within mapped polygons of another type. The size of these patches varies, depending on the minimum mapping units and scale of available aerial imagery.
- Photo interpretation of some types is difficult, such as distinguishing brittlebush scrub from California

sagebrush-California buckwheat scrub.

Vegetation mapping units (see Figure 2), descriptions and names are based on alliance level nomenclature in *A Manual of California Vegetation* (Sawyer et al. 2009). Each vegetation type is also defined according to Holland (1986) whenever possible. Common names of plant species are used throughout the following descriptions; Latin names for each species may be found in Attachment B (Species List).

- **Brittle Bush Scrub.** This vegetation is characterized by the dominance of brittlebush. It is the most abundant vegetation on site and is found primarily on exposed, west- and south-facing slopes. Many other species were observed within brittlebush scrub, but were present in either low numbers or in small patches. Other species observed included California jointfir, cheesebush, California buckwheat, beavertail cactus, Mojave yucca, and chaparral yucca. Brittlebush is a common to dominant species in desert shrublands and in coastal scrub of the interior valleys west of the Project vicinity. On the AM site, brittlebush scrub is similar to descriptions of Riversidean Sage Scrub (Holland 1986), Coastal Scrub (De Becker 1988) and Desert Scrub (Laudenslayer and Boggs 1988).

- **California Juniper Woodland.** This vegetation is characterized by the dominance of California juniper. Within the site it is found on a single north-facing slopes along the northern edge of the site. Additional species observed within juniper woodland include California buckwheat, Mojave yucca, and narrow-leaved goldenbush. This vegetation matches descriptions of Semi-Desert Chaparral and Cismontane Juniper Woodland and Scrub (Holland 1986) and best matches the habitat description for Mixed Chaparral (England 1988).

- **California Sagebrush–California Buckwheat Scrub.** This vegetation is characterized by the co-dominance of California sagebrush and California buckwheat. Within the site it is most common on disturbed soils such as along road cuts and adjacent to graded areas. Additional species, similar to those listed above in brittlebush scrub, are also found in low numbers. This vegetation matches descriptions of Riversidean Sage Scrub and Upper Sonoran Subshrub Scrub (Holland 1986) and best matches the habitat description for Coastal Scrub (De Becker 1988).

- **Creosote Bush–Brittlebush Scrub.** This vegetation is characterized by the co-dominance of creosote bush and brittlebush. It is found throughout much of the site on areas with relatively flat topography. Other species present include white bursage, Mojave yucca, narrow-leaved goldenbush, silver cholla, and California buckwheat. This vegetation best matches the description of Sonoran Creosote Bush Scrub (Holland 1986) and the habitat description of Desert Scrub (Laudenslayer and Boggs 1988).

- **Desert willow woodland**. This vegetation is characterized by the dominance of desert willow. It is not found within the limits of the Alta Mesa right-of-way but is found within the Impact Area along the access road at Cottonwood Creek on private land. Other species observed within this vegetation include California broom-sage, cheesebush, brittlebush, and punctate rabbit-brush. This vegetation best matches the description of Mojave Desert Wash Scrub (Holland 1986).

- **Developed.** The remainder of the survey area is occupied by roads, cleared areas, and building or O&M pads for the existing wind turbines. These areas are primarily unvegetated but there are some ruderal species present, including red brome, red-stemmed filaree, and schismus grass. In addition, there are several native shrubs on and adjacent to the building pads, such as California buckwheat, narrow-leaved goldenbush, and deerweed. These areas do not match published vegetation descriptions.

2.3 Climate

The site is at the western margin of the Colorado Desert and the Coachella Valley. The climate is typical of regional deserts, with extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies. The Colorado Desert experiences more summer precipitation than the northern deserts, and although annual precipitation is low overall, a substantial portion of it falls during August and September, usually as brief and intense thunderstorms. The San Gorgonio Pass area experiences higher winds and higher annual rainfall than most of the Colorado Desert, due to its location between the San Bernardino and San Jacinto Mountains, at the boundary of the less-arid cismontane region of California.

Average annual rainfall recorded at the Palm Springs weather station, located approximately 10 miles to the southeast, is 4.85 inches (12.32 cm; U.S Climate Data 2020). Seasonal rainfall variability is extremely high in the region. The average annual high temperature is 89 degrees Fahrenheit, and the average daily winter low temperature is 60.3 (U.S Climate Data 2020).

During early 2019, the region experienced several significant storms, the first of which moved through the area on January 15, 2019. The second and more significant storm moved through the region on February 14 and 15, 2019. This larger storm inundated many streambeds throughout the region and caused significant flooding and damage in watersheds such as Mission Creek, Whitewater River, and Chino Canyon. Rainfall during 2018-2019 rainy season was more than 180 percent of average at 9.11 inches, with more than 4.32 inches falling in February alone (23.32 cm; U.S Climate Data 2020). Field work for this delineation was completed after these significant storms, and this higher than average rainfall in the region is expected to have clearly defined low flow channels within the Project site.

2.4 Hydrology, Geomorphology, and Geology

The Project site is located in the San Bernardino Mountain foothills, in the San Gorgonio Pass, between the San Bernardino and San Jacinto Mountains. The San Bernardino Mountains are part of the east-west trending Transverse Ranges of southern California. The mountains are primarily composed of granitic bedrock. Parent material is largely composed of partially or wholly consolidated granitic alluvium, which has been eroded by storm runoff into dissected channels draining mainly toward the south.

The Project site is located within the Salton Sea Transboundary Watershed (USGS Hydrologic Unit 18100200). Runoff from the eastern portion of the Project site drains eastward to the Whitewater River, which is a tributary of the Salton Sea (Figure 3). Runoff from the remainder of the site drains to the south and west into Cottonwood Creek and the San Gorgonio River to the south of Interstate 10 (I-10). Part of the Whitewater River are perennial blueline stream and Cottonwood Creek is an ephemeral blueline stream (USGS Whitewater 7.5-minute topographic quadrangle). Two major fault zones run through the San Gorgonio Pass in close proximity to the Project site. The San Andreas Fault crosses from east to west through the Project site and the San Gorgonio Fault crosses east to west just to the south of the Project site (USGS, 2020). Fissures along these faults can allow upwelling of groundwater which can create surface ponds (sag ponds) and springs. These features were not observed within the Project site but are present in Whitewater Canyon to the east of the Project site.

2.5 Soils

The Project site is located within two soil survey areas. Soils throughout the majority of the Project site are mapped on the Soil Survey Geographic Soil Map (SSURGO) (NRCS 2020a). The northern portion of the

Project site is not included in the SSURGO mapping boundaries; therefore U.S. General Soil Map data were used for this portion of the project area (NRCS 2020c). Soils data from this source is presented in Table 1 and shown on Figure 4 for the Impact Area. The Project Impact Areas are primarily comprised of Chuckawalla cobbly fine sandy loam (CnE), 55 acres total, and Lithic Torripsamments (LR).

All of the mapped soil types are described as well-drained or somewhat excessively drained and are not prone to flooding. In general, the descriptions of soil types within the Project site indicate that hydric soils conditions are not expected. However, several of the mapped soil types may contain hydric soil inclusions: CdE, LR, and MaD (NRCS 2020a and 2020b; see Table 1). Based on soil textures and topography, any such hydric inclusions would be located on areas where surface or subsurface ground water is regularly present, such as stream channels with seasonal or perennial flow, or in impoundments.

Table 1. Soil Types within the Project Site

Map Unit Symbol	Map Unit Name	Description
CdC	Carsitas gravelly sand, 0 to 9 percent slopes	Excessively-drained; generally about 800 ft. elevation; parent material of gravelly alluvium derived from granite; depth to water table generally more than 80 in; not prone to flooding; gravelly sand (0–60 in).
ChC	Carsitas cobbly sand, 2 to 9 percent slopes	Excessively-drained; generally about 800 ft. elevation; parent material of gravelly alluvium derived from granite; depth to water table generally more than 80 in; not prone to flooding; cobbly sand (0-10 in., gravelly sand (10-60 in.).
CnC	Chuckawalla cobbly fine sandy loam, 2 to 9 percent slopes	Well-drained; generally 400 – 1000 ft elevation; parent material of gravelly alluvium; depth to water table more than 80 in; not prone to flooding; cobbly fine sandy loam (0–12 in), very gravelly fine sandy loam (12–60 in).
CnE	Chuckawalla cobbly fine sandy loam, 9 to 30 percent slopes	Well-drained; generally 400 – 1000 ft elevation; parent material of gravelly alluvium; depth to water table more than 80 in; not prone to flooding; cobbly fine sandy loam (0–12 in), very gravelly fine sandy loam (12–60 in).
GP	Gravel pits and dumps	Sandy and gravelly alluvium; extremely gravelly coarse sand (0-6 in.), extremely gravelly sand (6-60 in.).
LR[1]	Lithic Torripsamments-Rock outcrop complex	Excessively-drained; generally 650 – 9,000 ft elevation; parent material of sandy alluvium derived from sandstone; depth to water table more than 80 in; not prone to flooding; sands overlying bedrock – sand (0–4 in), bedrock (4–14 in); rock outcrop – unweathered bedrock (0–60 in).
MaD[1]	Myoma fine sand, 5 to 15 percent slopes	Somewhat excessively-drained; generally, at 200 – 1,800 ft. elevation; parent material of alluvium; depth to water table generally more than 80 inches; not prone to flooding; fine sand (0 – 18 in), sand (18 – 60 in).
s1053	Springdale-Rock outcrop-Etsel family	*Springdale Series* – Somewhat excessively-drained; terrace treads and risers at 150 – 3,500 ft. elevation; moderately coarse-textured alluvium dominantly from granite; slopes of 0 – 70 percent; gravelly ashy coarse sandy loam (0 – 13 in), very gravelly loamy and coarse sand (13 – 25 in); variegated very cobbly coarse sand (25 – 61 in). *Etsel Series* – Somewhat excessively-drained; mountains at 150 – 3,500 ft. elevation; moderately coarse-textured alluvium dominantly from granite; slopes of 15 – 85 percent; gravelly loam (0 – 3 in), very gravelly loam (3 – 7 in); fractured and hard, slightly weathered, fine grained sandstone and shale (7 in).
BA	Badlands	Excessively-drained; generally, in uplands; parent material of consolidated sandy alluvium; weathered bedrock (0–60 in).
-	Not mapped	Areas in which the soil type was not mapped by surveyors.

3.0 Regulatory Background

California Department of Fish and Wildlife regulates waters of the State under Sections 1600-1617 of the California Fish and Game Code. Section 1602 of the California Fish and Game Code requires notification to CDFW if a project would substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake. If CDFW determines that a proposed project may substantially adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement (LSAA) is required. In practice, CDFW generally holds jurisdiction over the bed and banks of any perennial, intermittent or ephemeral streambed, lakebed, or channel where evidence of flowing or standing water (including channels formed by infrequent storm runoff). Additionally, CDFW takes jurisdiction over riparian vegetation adjacent to the bed and banks. CDFW uses the soils, hydrology, and vegetation criteria to identify wetlands, but may define a wetland based on only one or two of these criteria, depending on site-specific conditions. There is no requirement for downstream connection, and CDFW holds jurisdiction over wetlands or non-wetland waters that may be isolated from other jurisdictional waters.

4.0 Delineation Methodology

All ephemeral washes and erosional features within the Project site are waters of the State, as defined by CDFW. The field methods described here focused on locations of anticipated or potential impacts (i.e., streambed alterations or dredge or fill activity, according to the relevant regulations). Aspen biologists Justin Wood and Jacob Aragon visited the Project site on March 26, 2020 to conduct the jurisdictional delineation of the Project site. Prior to conducting the 2020 field assessment, Mr. Wood reviewed current and historic aerial photographs, detailed topographic maps, available soils information, and local and state hydric soil list information to evaluate potential jurisdictional features.

All drainages that cross through or originate within the Impact Area were visited in field and mapped on high-resolution aerial photographs (see Figure 5). GPS points were recorded using a Trimble Juno SB GPS unit where each drainage intersects the Impact Area. The width of each jurisdictional drainage was recorded, based on the CDFW jurisdictional criteria (i.e., the top of the banks of each channel). For the larger drainages, Mr. Wood walked the centerline of the drainage throughout the Project site. Field maps were digitized using Global Information System (GIS) technology and the total area of jurisdictional features was calculated.

5.0 Results

All CDFW jurisdictional streambeds within the survey area are ephemeral desert washes. No wetlands are present within the survey area. These washes and channels exhibited field indicators of active flow such as water marks, linear deposits of sediment and/or plant debris, bank scour, and erosion. Using a combination of vegetation mapping, bed/bank delineation, and field observations, the Project is expected to result in the impacts to CDFW jurisdictional streambeds as shown in Table 2.

A total of 9 ephemeral desert washes and erosional features were mapped within the Project site. The length and acreages of these features are shown below in Table 2 and their locations are shown on Figure 5. These ephemeral desert washes and erosional features appear to meet the definition of CDFW jurisdictional streambeds as outlined in Section 1602 of the California Fish and Game Code and regulated by the CDFW.

Table 2. CDFW Jurisdictional Streambeds within the Project Site

Drainage Number (see Figure 5)[1]	Impact Area						
	Area (acres)	Length (linear feet)	Approximate depth	Square Feet	Cubic Yards	Cut / Fill	Work Type Category / New Construction (NC) or Replace Existing Structure (RES)
1	0.00	50	(0.5)	132	(2)	Cut	NC Low water crossing, Road/trail
2	0.02	70	6.00	796	177	Fill	NC Low water crossing, Road/trail

3	0.44	450	3.00	19,095	2122	Fill	NC Road/trail, Other (Turbine pad)
4	0.04	450	(5.00)	1,821	(337)	Cut	NC Road/trail, Other (Turbine pad)
5	0.01	60	(4.00)	262	(39)	Cut	NC Other (Turbine pad)
6	0.03	224	8.00	1,116	331	Fill	NC Other (Turbine pad)
7	0.01	95	7.00	300	78	Fill	NC Other (Turbine pad)
8	0.03	363	4.00	1,092	162	Fill	NC Other (Turbine pad)
9	0.06	762	2.00	2,693	199	Fill	NC Other (Turbine pad)
Total	0.64	2524		27,307	Cut: 378 Fill: 3069		

The conclusions presented above represent observations made in the field and on Aspen's knowledge and experience with the CDFW, including regulatory guidance documents and manuals. The CDFW will have final authority in determining the status and presence and extent of jurisdictional streambeds.

6.0 References

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished report available from California Department of Fish and Game, Sacramento, California.

NRCS (Natural Resource Conservation Service). 2020a. Web Soil Survey 2.0. http://websoilsurvey.nrcs.usda.gov/. Website accessed July 2020.

______. 2020b. National Hydric Soil List by State. http://soils.usda.gov/use/hydric/. Website accessed July 2020. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1316619.html. Accessed August 2020.

______. 2020c. U.S. General Soil Map (STATSGO2). http://soils.usda.gov/survey/geography/ssurgo/description_statsgo2.html Accessed July 2020.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society, Sacramento, CA. 1300 pp.

U.S. Climate Data, 2020. U.S. Climate Data Website. https://www.usclimatedata.com/climate/palm-springs/california/united-states/usca0828. Accessed July 2020.

USGS (United States Geological Survey). 2020. Interactive Fault Map. https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf Accessed July 2020.

______. 1955. Whitewater, California 7.5-minute Topographic Quadrangle.

Attachment 1 – Figures

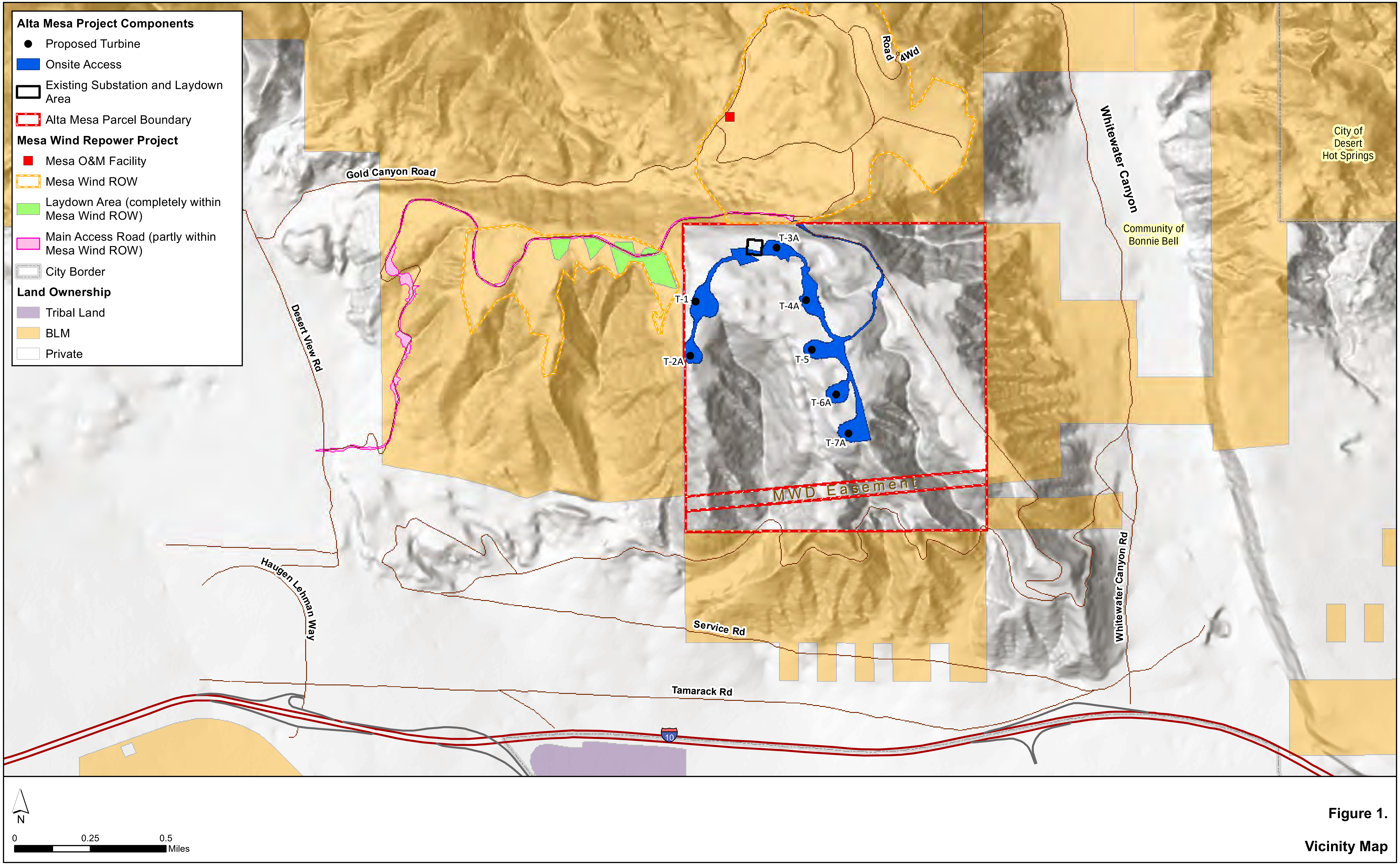


Figure 1.

Vicinity Map

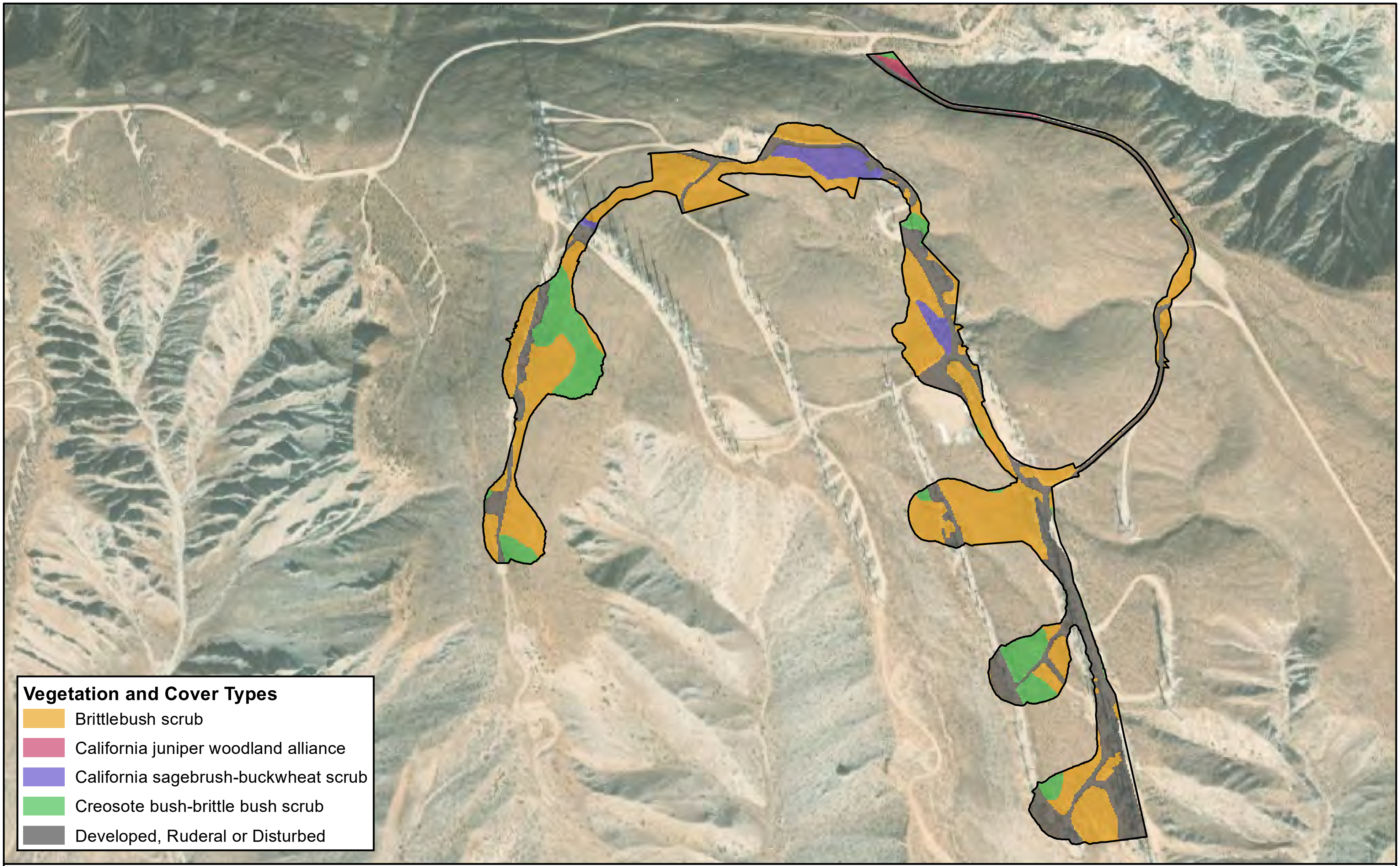


Figure 2.

Vegetation and Land Cover

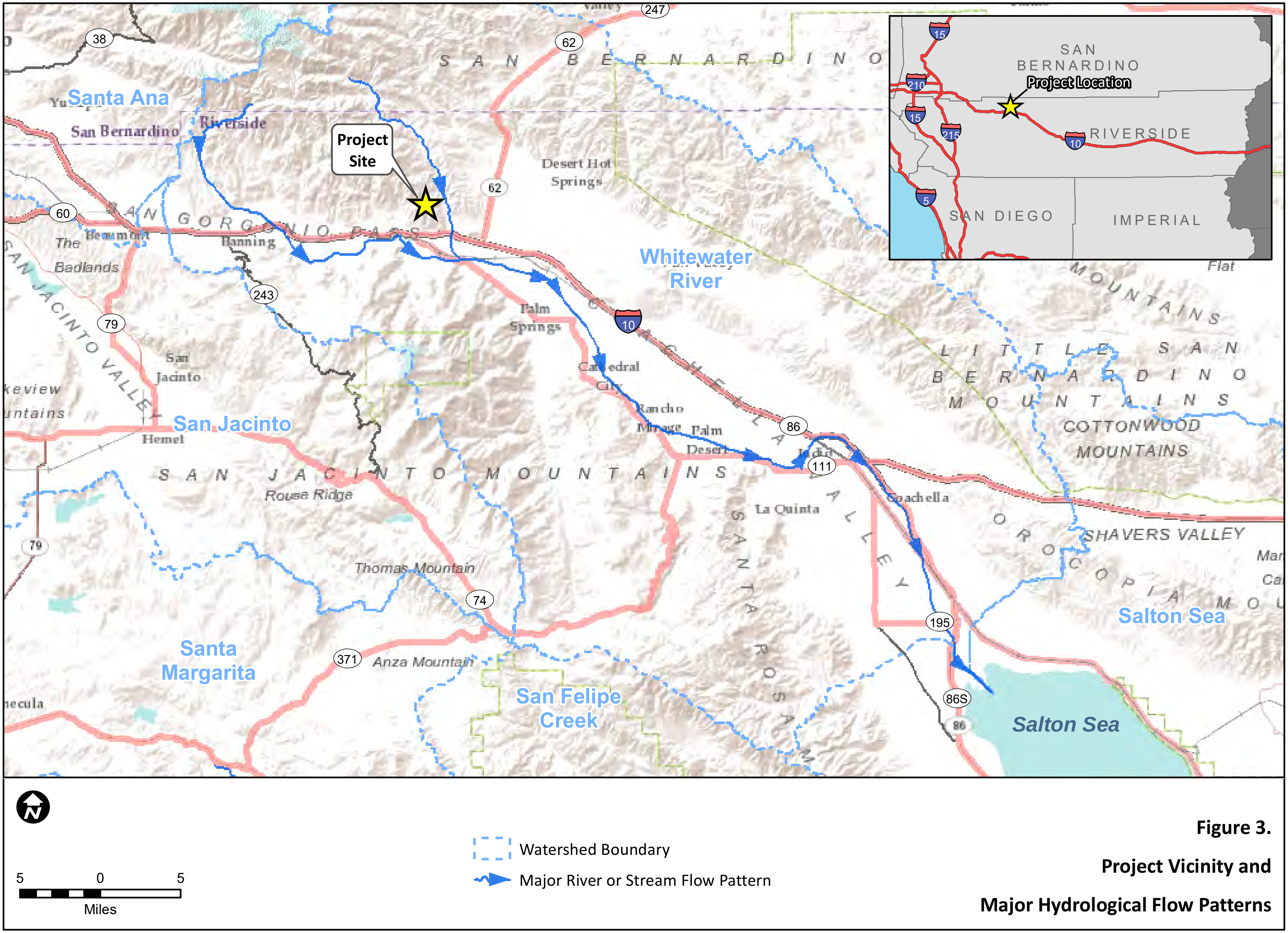
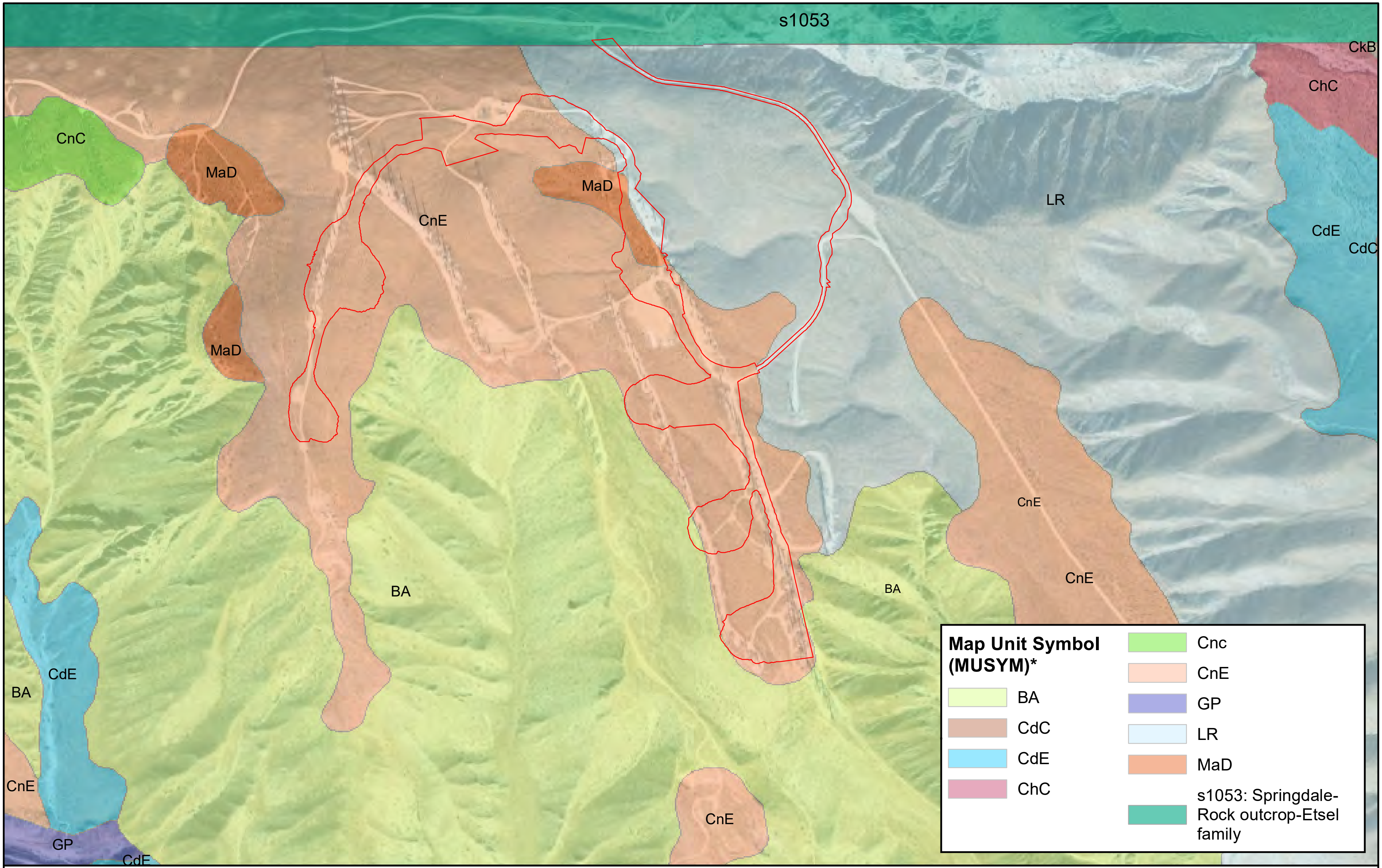


Figure 3.

Project Vicinity and

Major Hydrological Flow Patterns



*Descriptions of each soil type can be found in Table 3.1

Figure 4.

Soils

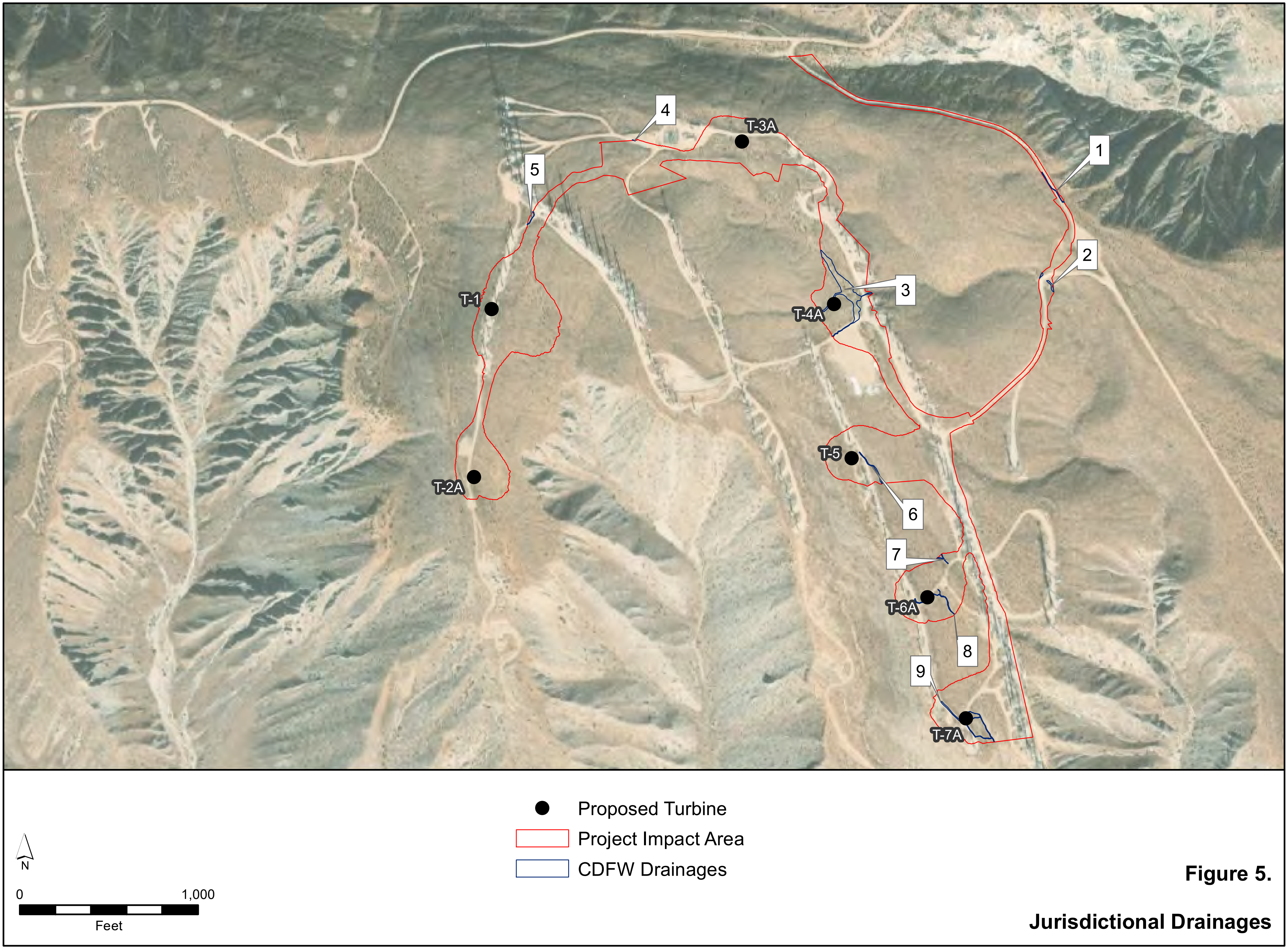


Figure 5.

Jurisdictional Drainages

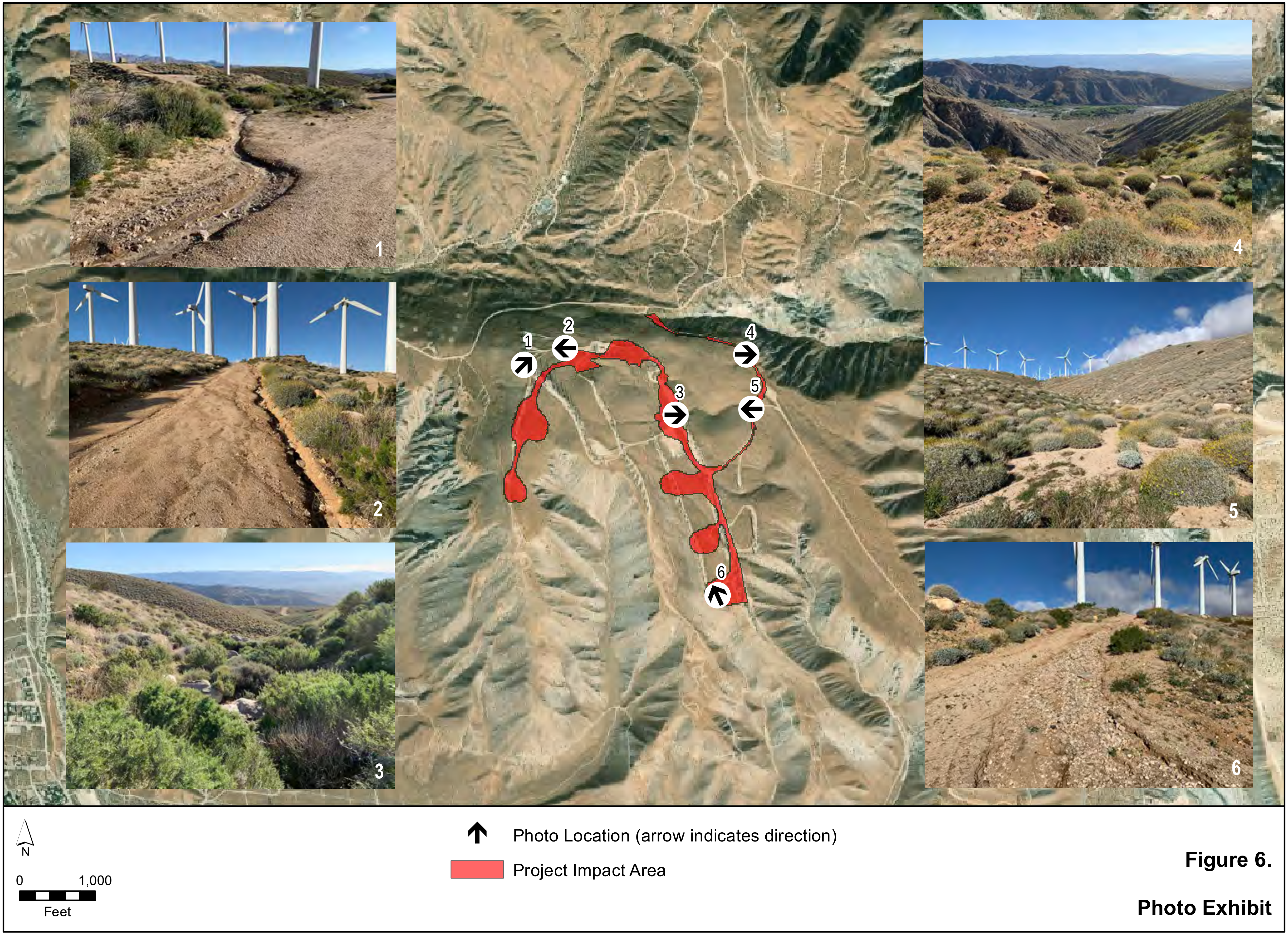


Figure 6.

Photo Exhibit

Attachment 2 – Observed Species List

Latin Name	Common Name
VASCULAR PLANTS	
Dicotyledons	
SELAGINELLACEAE	SPIKE-MOSS FAMILY
Selaginella bigelovii	Bigelow spike moss
CUPRESSACEAE	CYPRESS FAMILY
Juniperus californica	California juniper
EPHEDRACEAE	EPHEDRA FAMILY
Ephedra californica	Desert tea
ANACARDIACEAE	SUMAC or CASHEW FAMILY
Rhus ovata	Sugar bush
ASTERACEAE	ASTER FAMILY
Acamptopappus sphaerocephalus	Rayless goldenhead
Ambrosia acanthicarpa	Annual bur-sage
Ambrosia dumosa	White bur-sage, burrobush
Ambrosia salsola	Common burrobrush, cheesebush
Artemisia californica	California sagebrush
Bahiopsis parishii	Parish's goldeneye
Bebbia juncea var. *aspera*	Sweetbush
Brickellia californica	California brickellbush
Chaenactis fremontii	Fremont pincushion
Corethrogyne filaginifolia	California-aster, sand-aster
Encelia farinosa	Brittlebush
Encelia frutescens	Rayless encelia
Encelia virginensis	Virgin River encelia
Ericameria linearifolia	Interior goldenbush
Ericameria nauseosa	Common rabbitbrush
Ericameria paniculata	Black-banded rabbitbrush, punctate rabbitbrush
Ericameria pinifolia	Pine-bush, pine goldenbush
Eriophyllum wallacei	Wallace's woolly daisy
Geraea canescens	Desert-sunflower
Gutierrezia sarothre	Matchweed
Lasthenia gracilis	Goldfields
Lasthenia californica	California goldfields
* *Logfia gallica*	Daggerleaf cottonrose
Malacothrix glabrata	Desert dandelion
Rafinesquia neomexicana	Desert chicory
Stephanomeria exigua	Wreath plant
Stephanomeria pauciflora	Wire-lettuce, desert straw
Tetradymia comosa	Hairy horsebrush
Uropappus lindleyi	Silverpuffs
BORAGINACEAE	BORAGE OR WATERLEAF FAMILY
Amsinckia intermedia	Large flower rancher's fiddleneck
Amsinckia tessellata	Checker fiddleneck
Cryptantha angustifolia	Narrow-leaved cryptantha
Cryptantha barbigera	Bearded cryptantha
Cryptantha muricata	Prickly cryptantha
Emmenanthe penduliflora	Whispering bells
Eucrypta chrysanthemifolia	Spotted eucrypta
Nemophila menziesii	Baby blue eyes
Pectocarya linearis ssp. *ferocula*	Narrow-toothed pectocarya, comb-bur
Phacelia distans	Common phacelia

	Phacelia minor	Wild canterbury bells
BRASSICACEAE		MUSTARD FAMILY
*	*Brassica tournefortii*	Sahara mustard, wild turnip
*	*Hirschfeldia incana*	Shortpod mustard
	Lepidium nitidum	Shining peppergrass
*	*Sisymbrium orientale*	Hare's ear cabbage
	Streptanthella longirostris	Streptanthella
	Tropidocarpum gracile	Slender adobe-pod
CACTACEAE		CACTUS FAMILY
	Cylindropuntia echinocarpa	Silver cholla
	Cylindropuntia ramosissima	Pencil cholla
	Echinocereus engelmannii	Engelmann hedgehog cactus
	Opuntia basilaris var. *basilaris*	Beavertail cactus
CHENOPODIACEAE		GOOSEFOOT FAMILY
	Atriplex canescens	Four-wing saltbush
	Grayia spinosa	Spiny hop-sage
CLEOMACEAE		SPIDERFLOWER FAMILY
	Peritoma arborea	Bladderpod
CRASSULACEAE		STONECROP FAMILY
	Crassula connata	Pygmy-weed
	Dudleya lanceolata	Lance-leaved dudleya
	Dudleya saxosa spp. *aloides*	Desert dudleya
CUCURBITACEAE		GOURD FAMILY, CUCUMBER FAMILY
	Marah macrocarpa	Chilicothe, wild cucumber
EUPHORBIACEAE		SPURGE FAMILY
	Stillingia linearifolia	Linear-leaved stillingia
FABACEAE		LEGUME FAMILY, PEA FAMILY
	Acmispon glaber var. *glaber*	Deerweed
	Acmispon strigosus	Desert lotus
	Lupinus bicolor	Annual lupine
	Lupinus concinnus	Bajada lupine
	Lupinus sparsiflorus	Coulter's lupine
	Psorothamnus emoryi	Emory indigo-bush, dye-weed
	Senegalia greggii	Catclaw acacia
GERANIACEAE		GERANIUM FAMILY
*	*Erodium cicutarium*	Redstem filaree
LAMIACEAE		MINT FAMILY
	Salvia apiana	White sage
	Salvia columbariae	Chia
	Scutellaria mexicana	Bladder-sage, paper bag bush
LOASACEAE		LOASA FAMILY, STICK-LEAF FAMILY
	Mentzelia involucrata	Sand blazing star
MALVACEAE		MALLOW FAMILY
	Sphaeralcea ambigua var. *ambigua*	Apricot mallow, desert mallow
MONTIACEAE		MINER'S LETTUCE FAMILY, MONTIA FAMILY
	Calyptridium monandrum	Pussypaws, common calyptridium
NYCTAGINACEAE		FOUR O'CLOCK FAMILY
	Abronia villosa var. *villosa*	Sand verbena
	Mirabilis laevis var. *villosa*	Desert wishbone bush
ONAGRACEAE		EVENING-PRIMROSE FAMILY
	Camissonia campestris	Field evening-primrose
	Camissoniopsis bistorta	California sun cup

	Camissoniopsis pallida	Pale suncup
	Eremothera boothii ssp. *condensata*	Booth's evening primrose
	Eulobus californica	California false mustard
PAPAVERACEAE		POPPY FAMILY
	Eschscholzia parishii	Parish's gold poppy
PLANTAGINACEAE		PLANTAIN FAMILY
	Plantago ovata	Desert plantain
POLEMONIACEAE		PHLOX FAMILY
	Eriastrum eremicum ssp. *eremicum*	Desert woolly-star
	Gilia angelensis	Chaparral gilia, common gilia
	Gilia capitata	Blue field gilia
	Gilia ochroleuca ssp. *exilis*	Volcanic gilia
	Leptosiphon liniflorus	Flax-flowered linanthus
POLYGONACEAE		BUCKWHEAT FAMILY
	Chorizanthe brevicornu	Brittle spine flower
	Eriogonum elongatum var. *elongatum*	Long-stem wild buckwheat, wand buckwheat
	Eriogonum fasciculatum	California buckwheat
	Eriogonum inflatum	Desert trumpet
RANUNCULACEAE		BUTTERCUP FAMILY
	Delphinium parishii ssp. *parishii*	Parish's larkspur
SOLANACEAE		NIGHTSHADE FAMILY
	Lycium andersonii	Anderson box-thorn
ZYGOPHYLLACEAE		CALTROP FAMILY
	Larrea tridentata	Creosote bush
Monocotyledons		
AGAVACEAE		CENTURY PLANT FAMILY, AGAVE FAMILY
	Hesperoyucca whipplei	Chaparral yucca
	Yucca schidigera	Mojave yucca
POACEAE		GRASS FAMILY
*	*Avena barbata*	Slender wild oat
*	*Bromus berteroanus*	Chilean chess
*	*Bromus madritensis* ssp. *rubens*	Red brome
*	*Bromus tectorum*	Cheat grass
	Festuca microstachys	Small fescue
	Festuca octoflora	Sixweeks grass, slender fescue
	Hilaria rigida	Big galleta
*	*Hordeum murinum*	Wall barley, hare barley
	Poa secunda	Nevada blue grass, nodding blue grass
*	*Schismus barbatus*	Mediterranean schismus
	Stipa hymenoides	Sand rice grass, Indian rice grass
	Stipa speciosa	Desert needle grass
THEMIDACEAE		BRODIAEA FAMILY
	Dichelostemma capitatum	Blue dicks, wild hyacinth
VERTEBRATE ANIMALS		
REPTILIA		REPTILES
TESTUDINIDAE		LAND TORTOISES
**	*Gopherus agassizii*	Desert tortoise (scat and burrow)
IGUANIDAE		IGUANID LIZARDS
	Phrynosoma platyrhinos	Desert horned lizard
	Sauromalus ater	Common chuckwalla

Sceloporus magister	Desert spiny lizard
Uta stansburiana	Side-blotched lizard
TEIIDAE	WHIPTAILS
Aspidoscelis tigris tigris	Great Basin whiptail
VIPERIDAE	VIPERS
** *Crotalus ruber*	Red diamond rattlesnake
AVES	BIRDS
ACCIPITRIDAE	HAWKS, EAGLES, HARRIERS
Buteo jamaicensis	Red-tailed hawk
FALCONIDAE	FALCONS
Falco sparverius	American kestrel
PHASIANIDAE	GROUSE AND QUAIL
Alectoris chukar	Chukar
COLUMBIDAE	PIGEONS AND DOVES
Zenaida macroura	Mourning dove
CUCULIDAE	CUCKOOS
Geococcyx californianus	Greater roadrunner
STRIGIDAE	TYPICAL OWLS
** *Athene cunicularia*	Burrowing owl
TROCHILIDAE	HUMMINGBIRDS
Calypte anna	Anna's hummingbird
** *Calypte costae*	Costa's hummingbird
TYRANNIDAE	TYRANT FLYCATCHERS
Sayornis saya	Say's phoebe
Tyrannus vociferans	Cassin's kingbird
Tyrannus verticalis	Western kingbird
ALAUDIDAE	LARKS
** *Eremophila alpestris*	Horned lark
CORVIDAE	CROWS AND JAYS
Corvus corax	Common raven
TROGLODYTIDAE	WRENS
Salpinctes obsoletus	Rock wren
MUSCICAPIDAE	THRUSHES AND ALLIES
Polioptila caerula	Blue-gray gnatcatcher
Sialia mexicana	Western bluebird
MIMIDAE	MOCKINGBIRDS AND THRASHERS
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
PTILOGONATIDAE	SILKY FLYCATCHERS
Phainopepla nitens	Phainopepla
LANIIDAE	SHRIKES
** *Lanius ludovicianus*	Loggerhead shrike
EMBERIZIDAE	SPARROWS, WARBLERS, TANAGERS
Vermivora celata	Orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Piranga ludoviciana	Western tanager
Chondestes grammacus	Lark sparrow
Amphispiza bilineata	Black-throated sparrow
Artemisiospiza nevadensis	Sagebrush sparrow
Sturnella neglecta	Western meadowlark
FRINGILLIDAE	FINCHES
Haemorhous mexicanus	House finch
MAMMALIA	MAMMALS

LEPORIDAE	HARES AND RABBITS
Lepus californicus deserticola	Black-tailed jackrabbit
Sylvilagus audubonii	Desert cottontail
GEOMYIDAE	POCKET GOPHERS
Thomomys bottae	Botta pocket gopher
CRICETIDAE	RATS AND MICE
Neotoma lepida	Desert wood rat (middens)
CANIDAE	FOXES, WOLVES AND COYOTES
Canis latrans	Coyote (scat and tracks)
MUSTELIDAE	WEASELS AND SKUNKS
** *Taxidea taxus*	American badger (burrow)

Non-native species are indicated by an asterisk. Special-status species are indicated by two asterisks. Other species may have been overlooked or inactive/absent because of the season (amphibians are active during rains, reptiles during summer, some birds (and bats) migrate out of the area for summer or winter, some mammals hibernate etc.). Taxonomy and nomenclature generally follow Stebbins (2003) for amphibians and reptiles, AOU (1998) for birds, Jones et al. (1992) for mammals, and Baldwin et al. (2012) for plants.

ALTA MESA WIND PROJECT
Aquatic Resource Delineation Report

Prepared for:

Brookfield

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January 2021

Contents

Tables

Attachments

Abbreviations and Acronyms

Alta Mesa	AM Wind Repower LLC
BLM	Bureau of Land Management
Brookfield	Brookfield Renewable Energy
CDFW	California Department of Fish and Wildlife
CWA	Clean Water Act
CSWRCB	California State Water Resource Control Board
EPA	Environmental Protection Agency
I-10	Interstate 10
MW	megawatt
OHWM	Ordinary High Water Mark
RWCQB	Regional Water Quality Control Board
SSURGO	Soil Survey Geographic Soil Map
USACE	US Army Corps of Engineers
WDR	Waste Discharge Requirements
WTG	Wind Turbine Generator

ALTA MESA WIND PROJECT
Aquatic Resource Delineation Report

Aspen Environmental Group
January 2021

1.0 Introduction

This report presents the methods and results of a field delineation of waters of the U.S. and waters of the State as defined by an Ordinary High Water Mark (OHWM) conducted in 2020 at the proposed Alta Mesa Wind Project site. The Project site is located on private lands in unincorporated Riverside County, California (Figure 1). The Colorado River Basin Regional Water Quality Control Board (RWQCB) regulates ephemeral channels on the site as waters of the State, defined by presence of an OHWM. The US Army Corps of Engineers (USACE) may also regulate these channels as waters of the US, dependent on applicability of recent changes in the definition of waters of the US. This delineation identifies all potentially jurisdictional waters on the Project site according to the presence of an OHWM, in support of any applicable RWQCB or USACE permitting requirement. In addition to RWQCB and USACE regulation, the California Department of Fish and Wildlife (CDFW) may regulate waters of the State according to differing delineation criteria. Potential CDFW jurisdiction on the site is addressed in a separate report. Throughout this report “Impact Area” refers to all portions of the Project site that may be impacted by vegetation clearing, grading, and other project activities. “Impact Area Buffer” is used to define areas that may be impacted by crushing of vegetation and other temporary impacts, but no ground disturbance. “Project site” refers to both the Impact Area and the Impact Area Buffer. Note that the main access road to the Alta Mesa Wind Project site traverses the Mesa Wind Project Repower site and therefore, the main access road is included in the Jurisdictional Delineation Report and corresponding RWQCB permit application for the Mesa Wind Repower Project.

1.1 Project Description

AM Wind Repower LLC (Alta Mesa), a subsidiary of Brookfield Renewable Energy (Brookfield), as owner of the Alta Mesa Wind Project (Alta Mesa Wind), is planning to repower the existing wind project located in Riverside County, approximately 11 miles northwest of the City of Palm Springs. Alta Mesa is an existing 27 megawatt (MW) wind project with 159 turbines located on land zoned Wind Energy (W-E). W-E zoning allows the development of wind energy subject to approval of a Commercial WECS application. The existing turbines heights range from 114 to 145 feet. The existing 159 turbines will be removed first quarter 2021 under existing permits.

Alta Mesa proposes to construct the Alta Mesa Wind Project (herein, “Project”” or “project”), which would include constructing, operating, maintaining, and decommissioning 7 new WTGs. The Project would produce 27 MW of wind energy. The new facilities would be decommissioned at the end of their estimated 30-year useful life. Alta Mesa is planning to construct the Project in tandem with the adjacent Mesa wind repowering project that is situated on BLM lands and is currently going through a separate but similar permitting process. Concurrent repowering of the two projects (as opposed to two separate construction projects) would provide efficiencies and minimize total ground disturbance, traffic, and temporary impacts on environmental resources. The layout of the two projects is also being considered as one to minimize the viewshed impact while producing the most green energy.

The nearest sensitive receptors to the new WTGs are rural residences in Bonnie Bell, the closest of which are 4,500 and 4,900 feet east of the Project.

The Project will necessitate ground disturbance for access roads and WTG construction pads. In most cases the new access roads will follow existing roads and new disturbance will be kept to a minimum. However, some roads will need to be widened, and some of the new turbines will be located away from existing disturbances. The total estimated disturbed area for the Project would be a total of up to 67.3 acres, of which 18.8 acres is already disturbed and 48.5 acres would be new disturbance. Of the 67.3 acres, less than 25 acres would be permanent, and 42.3 would be temporary. Of the 42.3 acres of temporary impacts, 32.4 acres would be a buffer area where vegetation removal is not anticipated but there may be some need for drive and crush due to trucks backing up or other unanticipated construction work. Plus, an additional 13.2 acres of ground disturbance would occur along the main access road to the Project site and an additional 13 acres of ground disturbance would occur in the temporary construction yard, both within the Mesa Wind Project ROW project area. Both the main access road and construction yard would be shared by the Alta Mesa Wind Project and the Mesa Wind Project Repower which are being permitted concurrently. Ground disturbance is associated with turbine siting, cut/fill, temporary construction yards, and widening of access roads. The Project would use existing disturbed areas and would avoid steep slopes whenever possible.

1.2 Project Location

The Project site is located on private lands in unincorporated Riverside County. It is west of the Whitewater River and east of Cottonwood Creek, shown on the White Water USGS 7.5-minute topographic quad (USGS, 1955). The Project site is approximately one mile west of the active Whitewater River channel.

2.0 Site Conditions

2.1 Topography and Surrounding Land Uses

Elevation of the Project site ranges from approximately 2,160 feet at the southeastern corner to approximately 2,821 feet in the northwestern portion of the site. The elevation of the access road drops down to 1,560 feet near Cottonwood Creek. Most surrounding lands are natural open space, with the exception of adjacent parcels to the north and west that are also in use for wind energy production (the Mesa Wind Project). Nearby communities include the community of Whitewater accessed from Haugen-Lehmann Way, southwest of the site; the community of Bonnie Bell to the east; and the community of Snow Creek south of Interstate 10 (I-10).

2.2 Vegetation

Vegetation was mapped throughout the survey area during the 2020 site visits. Polygons were drawn on hard copy aerial images and digitized in ArcGIS once back in the office. The smallest mapping unit was approximately 0.25 acres. Any vegetation map is subject to imprecision for several reasons:

- Vegetation types tend to intergrade on the landscape so that there are no true boundaries in the vegetation itself. In these cases, a mapped boundary represents best professional judgment.
- Vegetation types as they are named and described tend to intergrade; that is, a given stand of real-world vegetation may not fit into any named type in the classification scheme used. Thus, a mapped

and labeled polygon is given the best name available in the classification, but this name does not imply that the vegetation unambiguously matches its mapped name.

- Vegetation tends to be patchy. Small patches of one named type are often included within mapped polygons of another type. The size of these patches varies, depending on the minimum mapping units and scale of available aerial imagery.
- Photo interpretation of some types is difficult, such as distinguishing brittlebush scrub from California sagebrush-California buckwheat scrub.

Vegetation mapping units (see Figure 2), descriptions and names are based on alliance level nomenclature in *A Manual of California Vegetation* (Sawyer et al. 2009). Each vegetation type is also defined according to Holland (1986) whenever possible. Common names of plant species are used throughout the following descriptions; Latin names for each species may be found in Attachment B (Species List).

- **Brittle Bush Scrub.** This vegetation is characterized by the dominance of brittlebush. It is the most abundant vegetation on site and is found primarily on exposed, west- and south-facing slopes. Many other species were observed within brittlebush scrub, but were present in either low numbers or in small patches. Other species observed included California jointfir, cheesebush, California buckwheat, beavertail cactus, Mojave yucca, and chaparral yucca. Brittlebush is a common to dominant species in desert shrublands and in coastal scrub of the interior valleys west of the Project vicinity. On the AM site, brittlebush scrub is similar to descriptions of Riversidean Sage Scrub (Holland 1986), Coastal Scrub (De Becker 1988) and Desert Scrub (Laudenslayer and Boggs 1988).
- **California Juniper Woodland.** This vegetation is characterized by the dominance of California juniper. Within the site it is found on a single north-facing slopes along the northern edge of the site. Additional species observed within juniper woodland include California buckwheat, Mojave yucca, and narrow-leaved goldenbush. This vegetation matches descriptions of Semi-Desert Chaparral and Cismontane Juniper Woodland and Scrub (Holland 1986) and best matches the habitat description for Mixed Chaparral (England 1988).
- **California Sagebrush–California Buckwheat Scrub.** This vegetation is characterized by the co-dominance of California sagebrush and California buckwheat. Within the site it is most common on disturbed soils such as along road cuts and adjacent to graded areas. Additional species, similar to those listed above in brittlebush scrub, are also found in low numbers. This vegetation matches descriptions of Riversidean Sage Scrub and Upper Sonoran Subshrub Scrub (Holland 1986) and best matches the habitat description for Coastal Scrub (De Becker 1988).
- **Creosote Bush–Brittlebush Scrub.** This vegetation is characterized by the co-dominance of creosote bush and brittlebush. It is found throughout much of the site on areas with relatively flat topography. Other species present include white bursage, Mojave yucca, narrow-leaved goldenbush, silver cholla, and California buckwheat. This vegetation best matches the description of Sonoran Creosote Bush Scrub (Holland 1986) and the habitat description of Desert Scrub (Laudenslayer and Boggs 1988).
- **Desert willow woodland**. This vegetation is characterized by the dominance of desert willow. It is not found within the limits of the Alta Mesa right-of-way. Other species observed within this vegetation include California broom-sage, cheesebush, brittlebush, and punctate rabbit-brush. This vegetation best matches the description of Mojave Desert Wash Scrub (Holland 1986).
- **Developed.** The remainder of the survey area is occupied by roads, cleared areas, and building or

O&M pads for the existing wind turbines. These areas are primarily unvegetated but there are some ruderal species present, including red brome, red-stemmed filaree, and schismus grass. In addition, there are several native shrubs on and adjacent to the building pads, such as California buckwheat, narrow-leaved goldenbush, and deerweed. These areas do not match published vegetation descriptions.

2.3 Climate

The site is at the western margin of the Colorado Desert and the Coachella Valley. The climate is typical of regional deserts, with extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies. The Colorado Desert experiences more summer precipitation than the northern deserts, and although annual precipitation is low overall, a substantial portion of it falls during August and September, usually as brief and intense thunderstorms. The San Gorgonio Pass area experiences higher winds and higher annual rainfall than most of the Colorado Desert, due to its location between the San Bernardino and San Jacinto Mountains, at the boundary of the less-arid cismontane region of California.

Average annual rainfall recorded at the Palm Springs weather station, located approximately 10 miles to the southeast, is 4.85 inches (12.32 cm; U.S Climate Data 2020). Seasonal rainfall variability is extremely high in the region. The average annual high temperature is 89 degrees Fahrenheit, and the average daily winter low temperature is 60 (U.S Climate Data 2020).

During early 2019, the region experienced several significant storms. The first of which moved through the area on January 15, 2019. The second and more significant storm moved through the region on February 14 and 15, 2019. This larger storm inundated many streambeds throughout the region and caused significant flooding and damage in watersheds such as Mission Creek, Whitewater River, and Chino Canyon. Rainfall during 2018-2019 rainy season was more than 180 percent of average at 9.11 inches, with more than 4.32 inches falling in February alone (23.32 cm; U.S Climate Data 2020). This higher than average rainfall in the region is expected to have clearly defined low flow channels within the Project site.

2.4 Hydrology, Geomorphology, and Geology

The Project site is located in the San Bernardino Mountain foothills, in the San Gorgonio Pass, between the San Bernardino and San Jacinto Mountains. The San Bernardino Mountains are part of the east-west trending Transverse Ranges of southern California. The mountains are primarily composed of granitic bedrock. Parent material is largely composed of partially or wholly consolidated granitic alluvium, which has been eroded by storm runoff into dissected channels draining mainly toward the south.

The Project site is located within the Salton Sea Transboundary Watershed (USGS Hydrologic Unit 18100200). Runoff from the eastern portion of the Project site drains eastward to the Whitewater River, which is a tributary of the Salton Sea (Figure 3). Runoff from the remainder of the site drains to the south and west into Cottonwood Creek and the San Gorgonio River to the south of I-10. Part of the Whitewater River are perennial blueline stream and Cottonwood Creek is an ephemeral blueline stream (USGS Whitewater 7.5-minute topographic quadrangle). Two major fault zones run through the San Gorgonio Pass in close proximity to the Project site. The San Andreas Fault crosses from east to west through the project site and the San Gorgonio Fault crosses east to west just to the south of the Project site (USGS, 2020). Fissures along these faults can allow upwelling of groundwater which can create surface ponds (sag ponds) and springs. These features were not observed within the Project site but are present in Whitewater Canyon to the east of the Project site.

2.5 Soils

The Project site is located within two soil survey areas. Soils throughout the majority of the Project site are mapped on the Soil Survey Geographic Soil Map (SSURGO) (NRCS 2020a). The northern portion of the Project site is not included in the SSURGO mapping boundaries; therefore U.S. General Soil Map data were used for this portion of the project area (NRCS 2020c). Soils data from this source is presented in Table 1 and shown on Figure 4 for the Impact Area. The Project Impact Area is primarily comprised of Chuckawalla cobbly fine sandy loam (CnE), 55 acres total, and Lithic Torripsamments (LR).

All of the mapped soil types are described as well-drained or somewhat excessively drained and are not prone to flooding. In general, the descriptions of soil types within the Project site indicate that hydric soils conditions are not expected. However, several of the mapped soil types may contain hydric soil inclusions: CdC, LR, and MaD (NRCS 2019a and 2019b; see Table 1). Based on soil textures and topography, any such hydric inclusions would be located on areas where surface or subsurface ground water is regularly present, such as stream channels with seasonal or perennial flow, or in impoundments.

Table 1. Soil Types within the Project Site

Map Unit Symbol	Map Unit Name	Description
CdC	Carsitas gravelly sand, 0 to 9 percent slopes	Excessively-drained; generally about 800 ft. elevation; parent material of gravelly alluvium derived from granite; depth to water table generally more than 80 in; not prone to flooding; gravelly sand (0–60 in).
ChC	Carsitas cobbly sand, 2 to 9 percent slopes	Excessively-drained; generally about 800 ft. elevation; parent material of gravelly alluvium derived from granite; depth to water table generally more than 80 in; not prone to flooding; cobbly sand (0-10 in., gravelly sand (10-60 in.).
CnC	Chuckawalla cobbly fine sandy loam, 2 to 9 percent slopes	Well-drained; generally 400 – 1000 ft elevation; parent material of gravelly alluvium; depth to water table more than 80 in; not prone to flooding; cobbly fine sandy loam (0–12 in), very gravelly fine sandy loam (12–60 in).
CnE	Chuckawalla cobbly fine sandy loam, 9 to 30 percent slopes	Well-drained; generally 400 – 1000 ft elevation; parent material of gravelly alluvium; depth to water table more than 80 in; not prone to flooding; cobbly fine sandy loam (0–12 in), very gravelly fine sandy loam (12–60 in).
GP	Gravel pits and dumps	Sandy and gravelly alluvium; extremely gravelly coarse sand (0-6 in.), extremely gravelly sand (6-60 in.).
LR[1]	Lithic Torripsamments-Rock outcrop complex	Excessively-drained; generally 650 – 9,000 ft elevation; parent material of sandy alluvium derived from sandstone; depth to water table more than 80 in; not prone to flooding; sands overlying bedrock – sand (0–4 in), bedrock (4–14 in); rock outcrop – unweathered bedrock (0–60 in).
MaD[1]	Myoma fine sand, 5 to 15 percent slopes	Somewhat excessively-drained; generally, at 200 – 1,800 ft. elevation; parent material of alluvium; depth to water table generally more than 80 inches; not prone to flooding; fine sand (0 – 18 in), sand (18 – 60 in).
s1053	Springdale-Rock outcrop-Etsel family	*Springdale Series* – Somewhat excessively-drained; terrace treads and risers at 150 – 3,500 ft. elevation; moderately coarse-textured alluvium dominantly from granite; slopes of 0 – 70 percent; gravelly ashy coarse sandy loam (0 – 13 in), very gravelly loamy and coarse sand (13 – 25 in); variegated very cobbly coarse sand (25 – 61 in). *Etsel Series* – Somewhat excessively-drained; mountains at 150 – 3,500 ft. elevation; moderately coarse-textured alluvium dominantly from granite; slopes of 15 – 85 percent; gravelly loam (0 – 3 in), very gravelly loam (3 – 7 in); fractured and hard, slightly weathered, fine grained sandstone and shale (7 in).
BA	Badlands	Excessively-drained; generally, in uplands; parent material of consolidated sandy alluvium; weathered bedrock (0–60 in).
-	Not mapped	Areas in which the soil type was not mapped by surveyors.

3.0 Regulatory Background

Jurisdictional waters of the State and waters of the U.S. are regulated by the RWQCB and the USACE as summarized in the paragraphs that follow. Both agencies regulate both wetlands and non-wetland hydrologic features (e.g., intermittent stream channels). Both agencies also use soils, hydrology, and vegetation criteria defined by the USACE (1987) to evaluate wetlands, but they may apply differing standards to determine whether a given site is a wetland. The two agencies also have differing statutory definitions of their limits of jurisdiction in both non-wetland and wetland areas.

- **Regional Water Quality Control Boards**. The RWQCBs regulate waters of the State under Section 401 of the federal Clean Water Act (CWA) and under the California Porter-Cologne Water Quality Control Act. In cases where a project overlaps two RWQCB boundaries, the California State Water Resources Control Board (CSWRCB) is the regulatory authority. The Mesa Wind site is within the Colorado River RWQCB jurisdictional area. In addition, the CSWRCB announced a new regulatory program addressing waters of the State which is currently being implemented by the RWQCBs.

- **US Army Corps of Engineers**. The USACE regulates waters of the US under Section 404 of the federal CWA. The interpretation of waters of the US was recently changed to exclude ephemeral drainages.

3.1 Porter-Cologne Water Quality Control Act

The RWQCBs regulate activities affecting waters of the State according to the Porter-Cologne Water Quality Control Act and Section 401 of the federal CWA (below). The Porter-Cologne Act defines waters of the State as all surface and subsurface waters. The RWQCBs may issue permits (called Waste Discharge Requirements or WDRs) or may issue a waiver for a given application. In addition, the California State Water Resources Control Board (CSWRCB) will direct RWQCBs to implement a new regulatory program for all waters of the State, taking affect in May 2020 (CSWRCB 2019). For non-wetland waters of the State, CSWRCB procedures and guidelines recognize the OHWM as defined by federal guidelines (CSWRCB 2019, 2020; see also USACE 2008a, 2008b) as the limits of jurisdiction. However, waters of the State include isolated waters and need not have downstream surface connection to federally jurisdictional waters (compare with Federal Clean Water Act Section 404, below). The new program will use the soils, hydrology, and vegetation criteria to identify wetlands, but may define certain unvegetated sites (e.g., mud flats or playas) as wetlands based on only the soils and hydrology criteria. The Project Area is within the jurisdictional boundaries of the Colorado River RWQCB.

3.3 Federal Clean Water Act

Section 401. Section 401 of the CWA is administered by the RWQCBs (except in cases where a project overlaps two RWQCB boundaries, where it is administered by the CSWRCB). Section 401 requires that projects involving discharge to waters of the State (defined under Porter-Cologne Water Quality Control Act) must obtain State certification that the project will comply with the federal CWA to receive federal authorization. Therefore, before the USACE may issue a CWA Section 404 permit, a permittee must apply for and receive a Section 401 Water Quality Certification or waiver from the appropriate RWQCB. The RWQCB may add conditions (i.e., WDRs, above) to their certification to remove or mitigate potential impacts to water quality standards. Such conditions must ultimately be included in the federal permit.

All waterways within the Alta Mesa Wind Project area are ephemeral desert washes and may not meet current criteria for federal jurisdiction as waters of the U.S. (USACE and EPA, 2020). The USACE has not issued a jurisdictional determination for the site. If no federally jurisdictional waters of the U.S. are present, the CWA Section 401 requirement will not apply; nonetheless the RWQCB will have permitting authority for activities affecting waters of the State, including ephemeral washes, under the Porter-Cologne Water Quality Control Act (above).

Section 404. Section 404 of the CWA is administered by the USACE. Any activity that would place dredged or fill material within jurisdictional waters of the U.S. must obtain USACE authorization. USACE jurisdiction is defined by presence of an OHWM and by a nexus to interstate commerce such as downstream surface connectivity to traditional navigable waters of the US. The USACE defines wetlands according to the soils, hydrology and vegetation criteria, generally requiring presence of all three to meet the definition. USACE jurisdiction generally extends to wetlands that are adjacent to jurisdictional waters of the U.S., but not to wetlands that are distant or isolated from federally jurisdictional waters. All waterways within the Mesa Wind Project area are ephemeral washes and may not meet current or pending criteria for federal jurisdiction as waters of the U.S. (USACE and EPA, 2020). The USACE has not issued a jurisdictional determination for the site. If no federally jurisdictional waters of the U.S. are present, CWA Section 404 will not apply.

4.0 Delineation Methodology

All ephemeral washes on the site where an OHWM is present are waters of the State, as defined by RWRCB and may be waters of the US, dependent on the applicable federal definition. The field methods described here focused on locations of anticipated or potential impacts (i.e., streambed alterations or dredge or fill activity, according to the relevant regulations). Aspen biologists Justin Wood and Jacob Aragon visited the Project site on March 26, 2020 to conduct the jurisdictional delineation of the Project site. Prior to conducting the 2020 field assessment, Mr. Wood reviewed current and historic aerial photographs, detailed topographic maps, available soils information, and local and state hydric soil list information to evaluate potential jurisdictional features.

All drainages that cross through or originate within the Impact Area were visited in the field and mapped on high-resolution aerial photographs (see Figure 5). GPS points were recorded using a Trimble Juno SB GPS unit where each drainage intersects the Impact Area. The width of the OHWM at each jurisdictional drainage was recorded, based on physical and biological features, such as bank erosion, deposited vegetation or debris, and vegetation characteristics. Data for the largest features, drainage 6 which continues downstream and becomes drainage 5 was collected on the updated Arid West OHWM Datasheet. For several of the larger drainages, Mr. Wood walked the centerline of the drainage throughout the proposed disturbance area. Field maps were digitized using Global Information System (GIS) technology and the total area of jurisdictional features was calculated. No potentially jurisdictional wetlands are present within the Project site as defined by the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008b), or by new CSWRCB (2019) criteria.

5.0 Results

A total of 9 ephemeral drainages and erosional features with clearly defined OHWMs were mapped within the impact area of the Project site. These drainages exhibited field indicators of ephemeral active flow such as linear deposits of sediment and/or plant debris, bank scour, and erosion. The lengths and acreages of the ephemeral drainages are shown below in Table 2 and their locations are shown on Figure 5. These ephemeral desert washes and erosional features are likely to meet the definition of waters of the State as regulated by the RWQCB. These ephemeral drainages are not likely to be considered jurisdictional by the USACE under the most current criteria for federal jurisdiction as Waters of the U.S. (USACE and EPA, 2020). All 30 drainages within the Project site are classified as intermittent riverine according to Cowardin classification (Cowardin et al, 1979). Representative photos of several drainages within the Project site are provided in Figure 6.

Table 2. Impacts to Ephemeral Drainages within the Project Site

Drainage Number (see Figure 5)[1]	Impact Area		Approx. Depth	Square Feet	Cubic Yards	Cut/Fill	Watershed
	Area (acres)	Length (linear feet)					
1	0.00	260	1.0	56	2	Fill	Cottonwood
2	0.06	936	2.0	2,613	193.55	Fill	Whitewater
3	0.02	841	2.0	871	64.5	Fill	Whitewater
4	0.00	50	(0.5)	44	(1)	Cut	Whitewater
5	0.00	5	6.0	216	48	Fill	Whitewater
6	0.06	370	3.0	2,764	307	Fill	Whitewater
7	0.02	90	(5.0)	910	(169)	Cut	Whitewater
8	0.01	230	(4.0)	87	(13)	Cut	Whitewater
9	0.03	762	8.0	341	101	Fill	Whitewater
TOTAL	0.2	1075		7902	899.05		

The conclusions presented above represent observations made in the field and on Aspen's knowledge and experience with the USACE and RWCB, including regulatory guidance documents and manuals. The USACE and RWCB will have final authority in determining the status and presence and extent of jurisdictional waters of the State and waters of the US.

6.0 References

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page.

CSWRCB (California State Water Resources Control Board). 2019. State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. [Online]: https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf

______. 2020. Draft Guidance for the State Wetland Definition and Procedures for Discharges of dredged or Fill Material to Waters of the State. [Online]: https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/guidance_02142020.pdf

De Becker, S. 1988. Coastal scrub. Pages 108-109 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento CA.

England, A.S. 1988. Mixed chaparral. Pages 104-105 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento CA.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished report available from California Department of Fish and Game, Sacramento, California.

Laudenslayer, W.F., Jr. and J.R. Boggs. 1988. Desert scrub. Pages 114-115 in K.E. Mayer & W.F. Laudenslayer, eds., A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento, CA.

NRCS (Natural Resource Conservation Service). 2020a. Web Soil Survey 2.0. http://websoilsurvey.nrcs.usda.gov/. Website accessed July 2020.

_______. 2020b. National Hydric Soil List by State. http://soils.usda.gov/use/hydric/. Website accessed July 2020. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1316619.html. Accessed May 2020

_______. 2020c. U.S. General Soil Map (STATSGO2). http://soils.usda.gov/survey/geography/ssurgo/description_statsgo2.html Accessed July 2020.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society, Sacramento, CA. 1300 pp.

USACE (U.S. Army Corps of Engineers). 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1. January.

_____. 2008a. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States A Delineation Manual. Ed. R. W. Lichvar and S. M. McColley. ERDC/CRREL TR-08-12. Hanover, NH, U.S. Army Engineer Cold Regions Research and Engineering Laboratory.

_____. 2008b. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

_____ and EPA (US Environmental Protection Agency). 2020. The Navigable Waters Protection Rule: Definition of "Waters of the United States." Final rule, prepublication copy issued January 23, 2020 pending publication in Federal Register. https://www.epa.gov/sites/production/files/2020-01/documents/navigable_waters_protection_rule_prepbulication.pdf. Accessed March 2020.

U.S. Climate Data, 2020. U.S. Climate Data Website. https://www.usclimatedata.com/climate/palm-springs/california/united-states/usca0828. Accessed August 2020.

USGS (United States Geological Survey). 2020. Interactive Fault Map. https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf Accessed August 2020.

_______. 1955. Whitewater, California 7.5-minute Topographic Quadrangle.

Attachment 1 – Figures

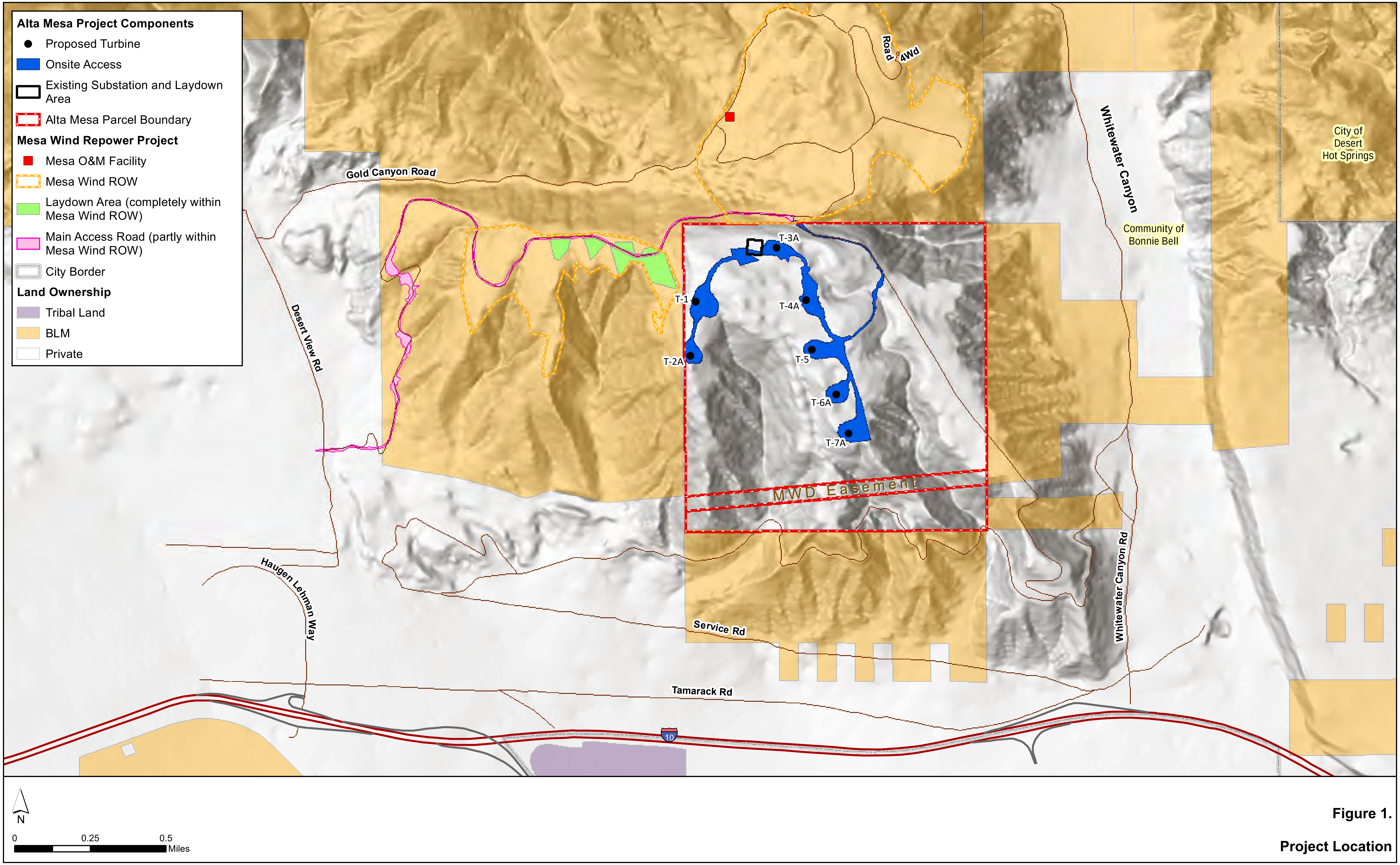


Figure 1.

Project Location

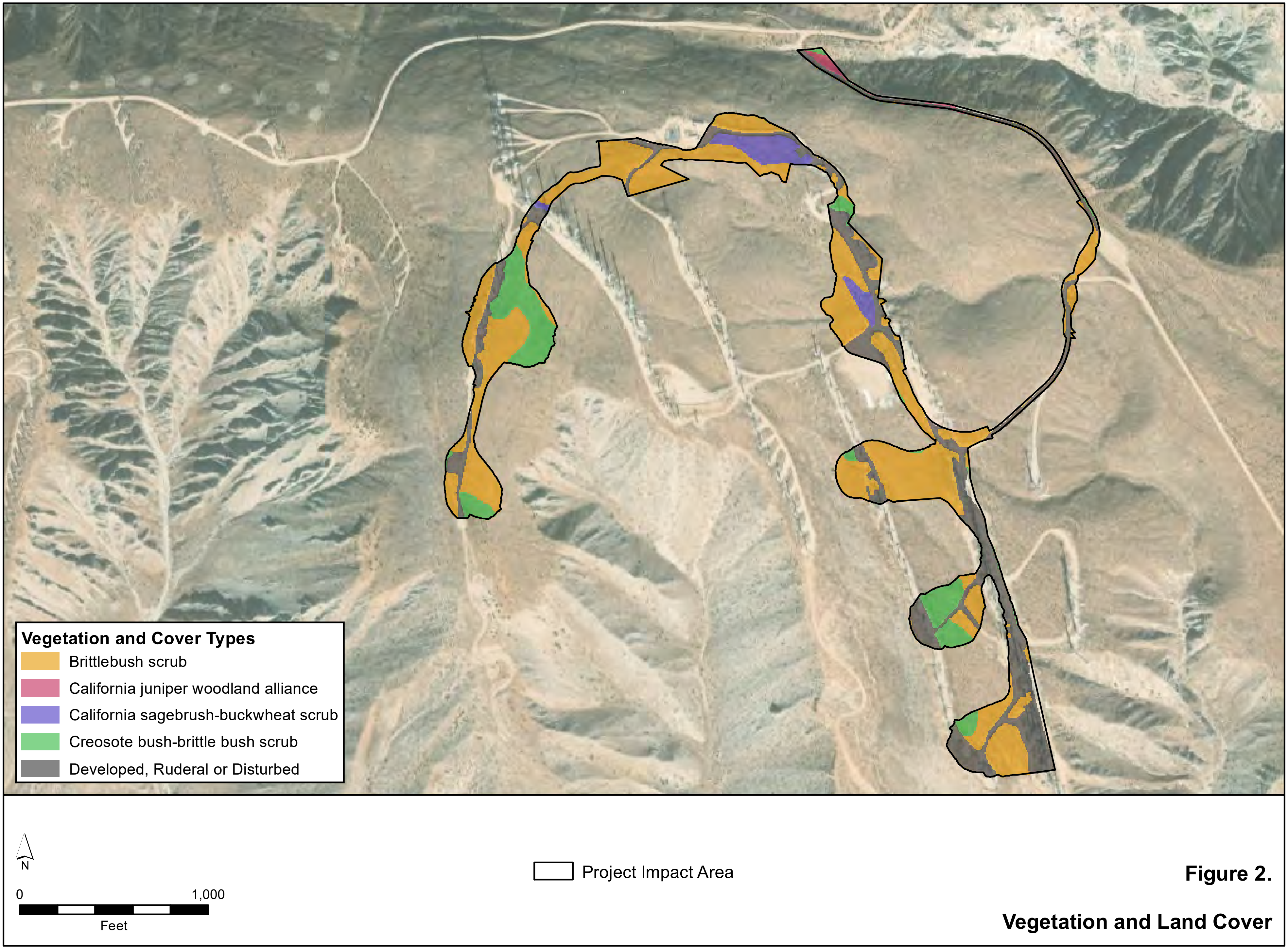


Figure 2.

Vegetation and Land Cover

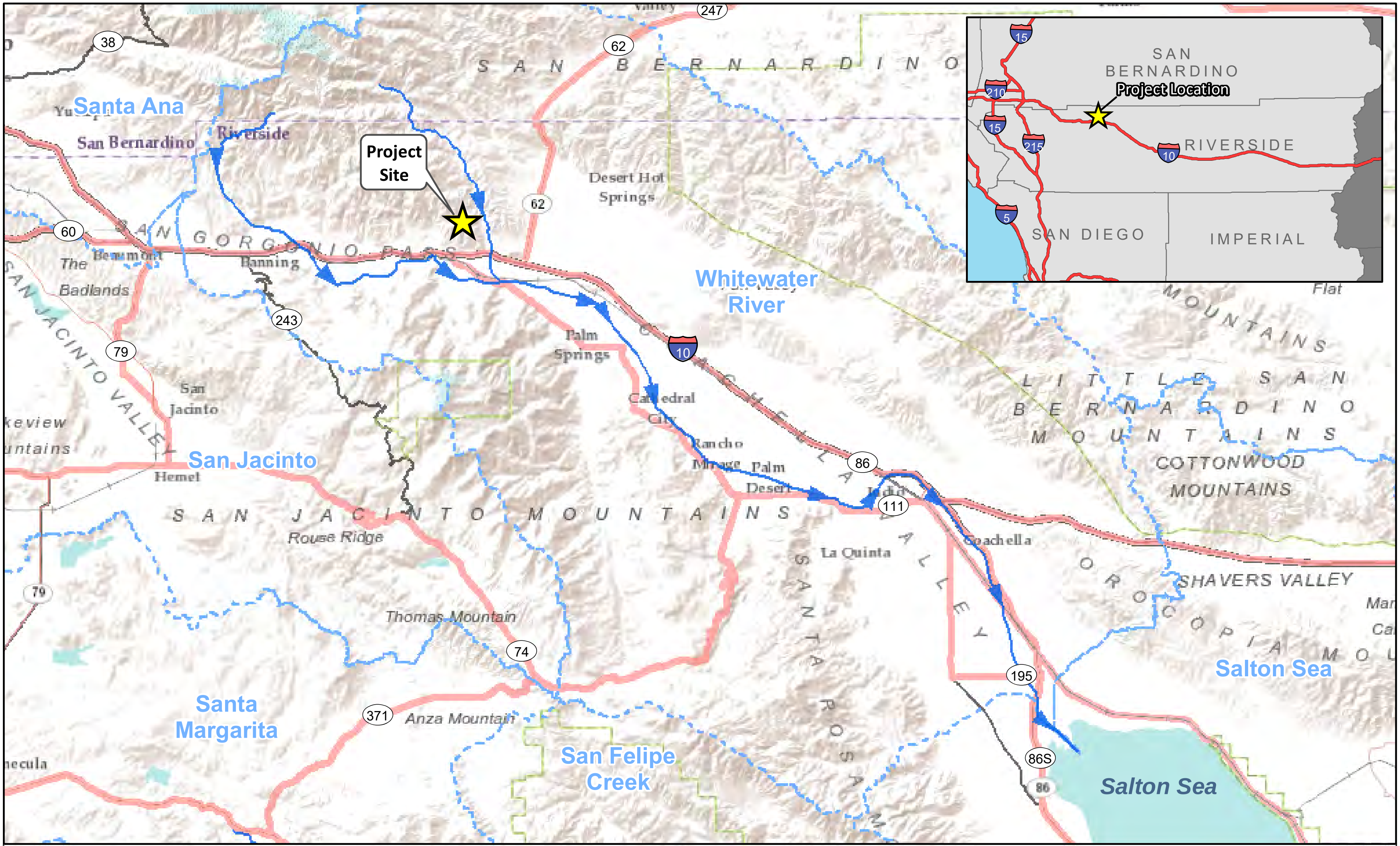
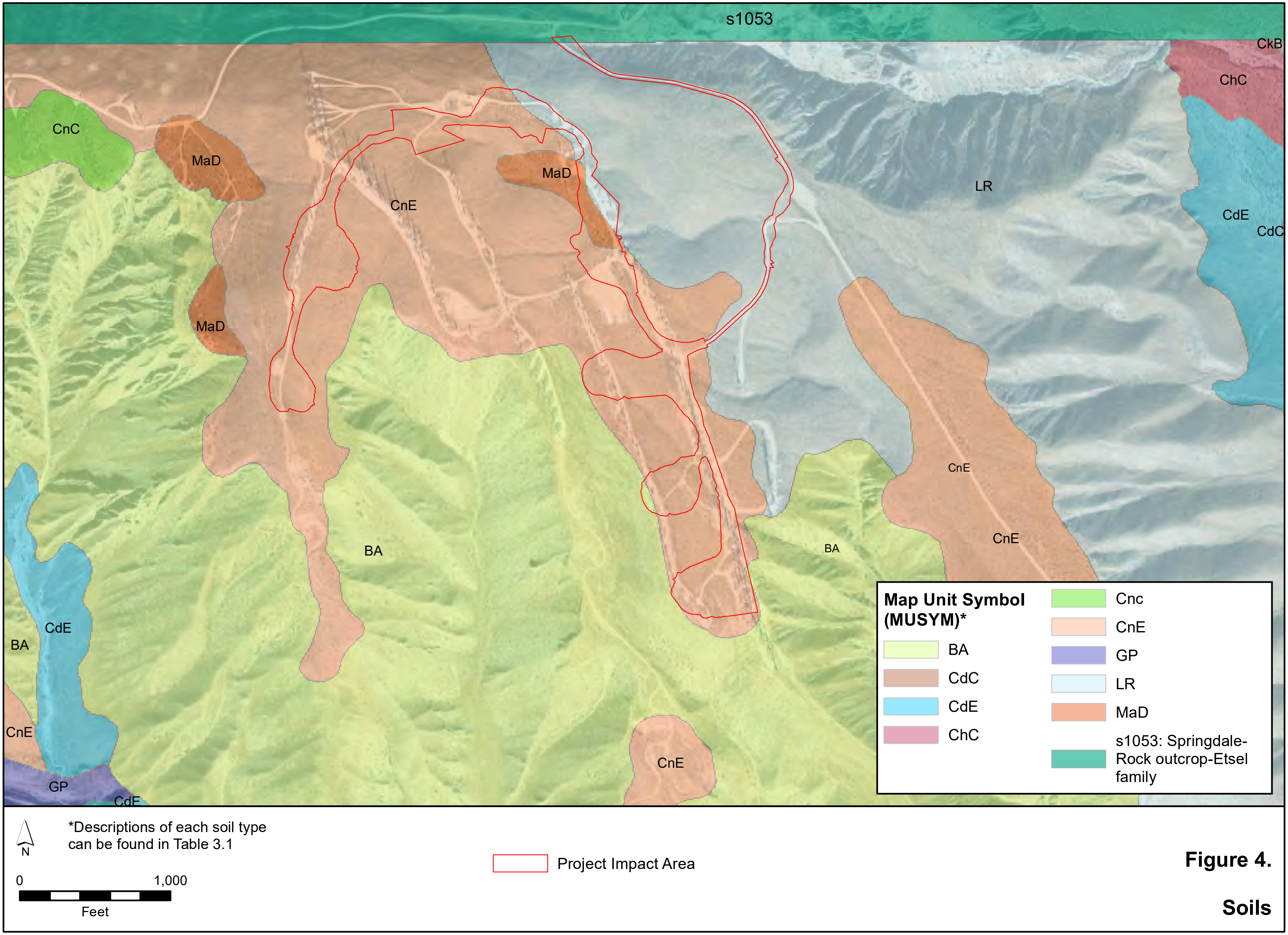


Figure 3.

Project Vicinity and

Major Hydrological Flow Patterns



*Descriptions of each soil type can be found in Table 3.1

Figure 4.

Soils

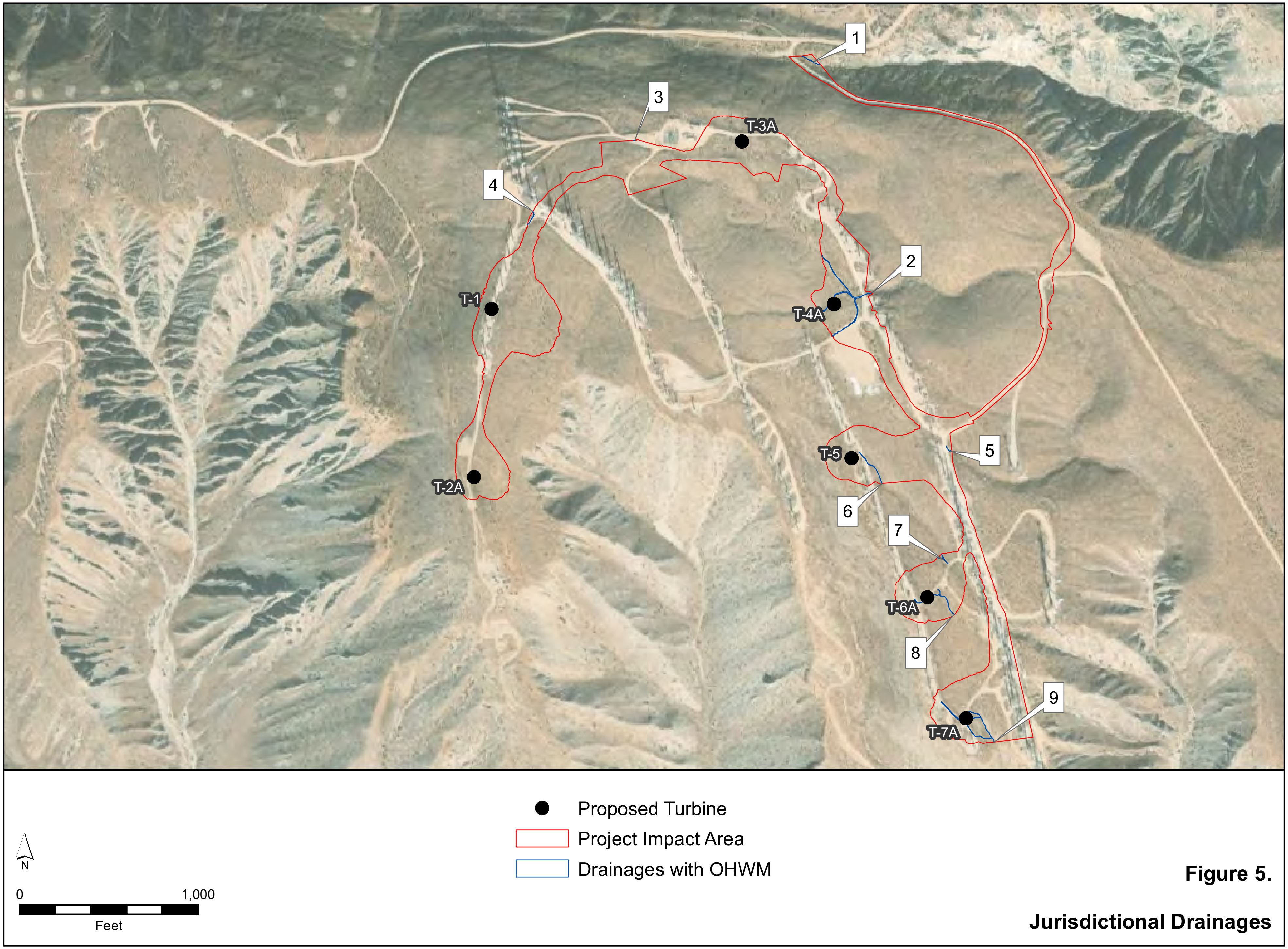


Figure 5.

Jurisdictional Drainages

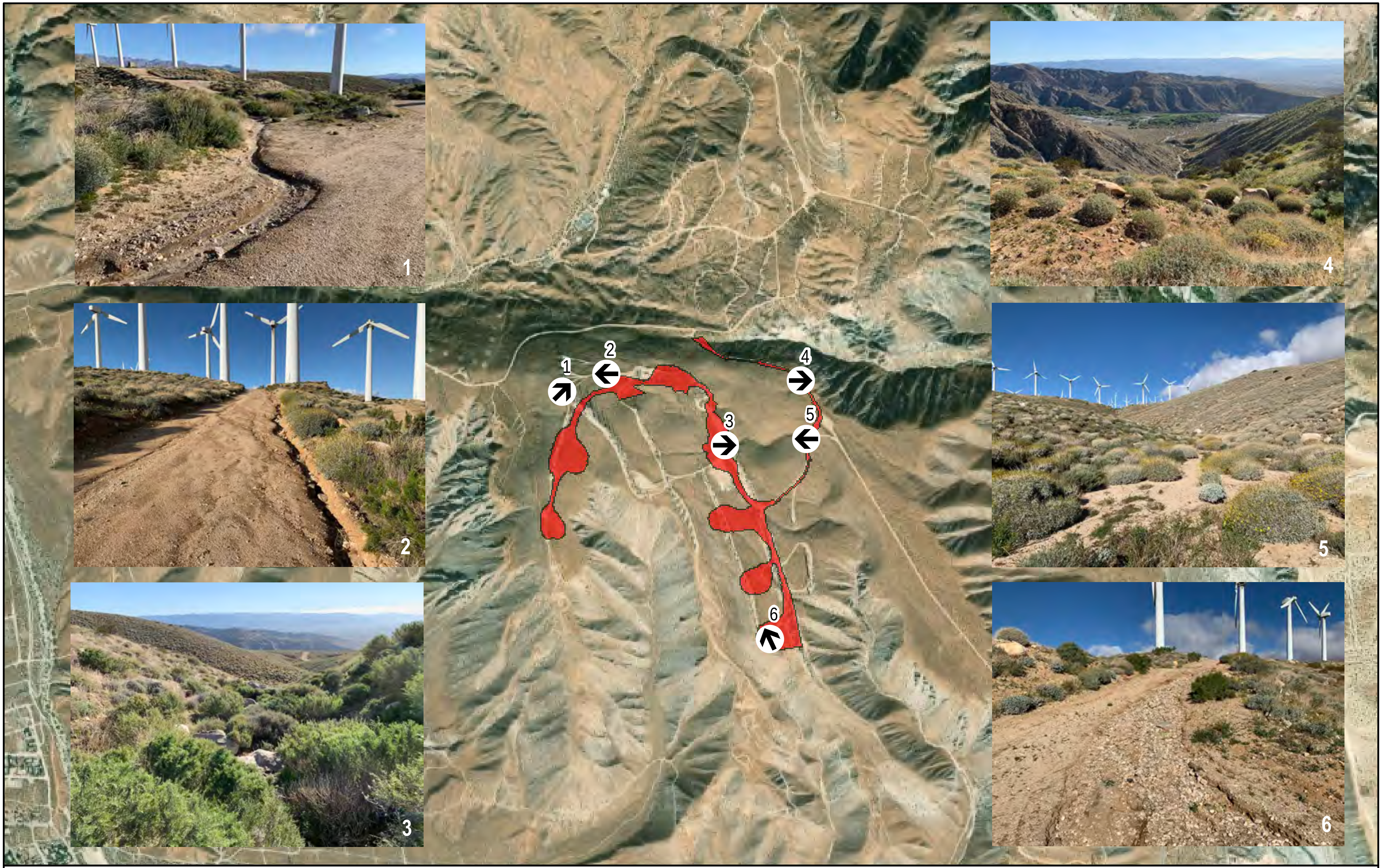


Figure 6.

Photo Exhibit

Attachment 2 – Observed Species List

Latin Name	Common Name
VASCULAR PLANTS	
Dicotyledons	
SELAGINELLACEAE	SPIKE-MOSS FAMILY
Selaginella bigelovii	Bigelow spike moss
CUPRESSACEAE	CYPRESS FAMILY
Juniperus californica	California juniper
EPHEDRACEAE	EPHEDRA FAMILY
Ephedra californica	Desert tea
ANACARDIACEAE	SUMAC or CASHEW FAMILY
Rhus ovata	Sugar bush
ASTERACEAE	ASTER FAMILY
Acamptopappus sphaerocephalus	Rayless goldenhead
Ambrosia acanthicarpa	Annual bur-sage
Ambrosia dumosa	White bur-sage, burrobush
Ambrosia salsola	Common burrobrush, cheesebush
Artemisia californica	California sagebrush
Bahiopsis parishii	Parish's goldeneye
Bebbia juncea var. *aspera*	Sweetbush
Brickellia californica	California brickellbush
Chaenactis fremontii	Fremont pincushion
Corethrogyne filaginifolia	California-aster, sand-aster
Encelia farinosa	Brittlebush
Encelia frutescens	Rayless encelia
Encelia virginensis	Virgin River encelia
Ericameria linearifolia	Interior goldenbush
Ericameria nauseosa	Common rabbitbrush
Ericameria paniculata	Black-banded rabbitbrush, punctate rabbitbrush
Ericameria pinifolia	Pine-bush, pine goldenbush
Eriophyllum wallacei	Wallace's woolly daisy
Geraea canescens	Desert-sunflower
Gutierrezia sarothre	Matchweed
Lasthenia gracilis	Goldfields
Lasthenia californica	California goldfields
* *Logfia gallica*	Daggerleaf cottonrose
Malacothrix glabrata	Desert dandelion
Rafinesquia neomexicana	Desert chicory
Stephanomeria exigua	Wreath plant
Stephanomeria pauciflora	Wire-lettuce, desert straw
Tetradymia comosa	Hairy horsebrush
Uropappus lindleyi	Silverpuffs
BORAGINACEAE	BORAGE OR WATERLEAF FAMILY
Amsinckia intermedia	Large flower rancher's fiddleneck
Amsinckia tessellata	Checker fiddleneck
Cryptantha angustifolia	Narrow-leaved cryptantha
Cryptantha barbigera	Bearded cryptantha
Cryptantha muricata	Prickly cryptantha
Emmenanthe penduliflora	Whispering bells
Eucrypta chrysanthemifolia	Spotted eucrypta
Nemophila menziesii	Baby blue eyes
Pectocarya linearis ssp. *ferocula*	Narrow-toothed pectocarya, comb-bur
Phacelia distans	Common phacelia

	Phacelia minor	Wild canterbury bells
BRASSICACEAE		MUSTARD FAMILY
*	*Brassica tournefortii*	Sahara mustard, wild turnip
*	*Hirschfeldia incana*	Shortpod mustard
	Lepidium nitidum	Shining peppergrass
*	*Sisymbrium orientale*	Hare's ear cabbage
	Streptanthella longirostris	Streptanthella
	Tropidocarpum gracile	Slender adobe-pod
CACTACEAE		CACTUS FAMILY
	Cylindropuntia echinocarpa	Silver cholla
	Cylindropuntia ramosissima	Pencil cholla
	Echinocereus engelmannii	Engelmann hedgehog cactus
	Opuntia basilaris var. *basilaris*	Beavertail cactus
CHENOPODIACEAE		GOOSEFOOT FAMILY
	Atriplex canescens	Four-wing saltbush
	Grayia spinosa	Spiny hop-sage
CLEOMACEAE		SPIDERFLOWER FAMILY
	Peritoma arborea	Bladderpod
CRASSULACEAE		STONECROP FAMILY
	Crassula connata	Pygmy-weed
	Dudleya lanceolata	Lance-leaved dudleya
	Dudleya saxosa spp. *aloides*	Desert dudleya
CUCURBITACEAE		GOURD FAMILY, CUCUMBER FAMILY
	Marah macrocarpa	Chilicothe, wild cucumber
EUPHORBIACEAE		SPURGE FAMILY
	Stillingia linearifolia	Linear-leaved stillingia
FABACEAE		LEGUME FAMILY, PEA FAMILY
	Acmispon glaber var. *glaber*	Deerweed
	Acmispon strigosus	Desert lotus
	Lupinus bicolor	Annual lupine
	Lupinus concinnus	Bajada lupine
	Lupinus sparsiflorus	Coulter's lupine
	Psorothamnus emoryi	Emory indigo-bush, dye-weed
	Senegalia greggii	Catclaw acacia
GERANIACEAE		GERANIUM FAMILY
*	*Erodium cicutarium*	Redstem filaree
LAMIACEAE		MINT FAMILY
	Salvia apiana	White sage
	Salvia columbariae	Chia
	Scutellaria mexicana	Bladder-sage, paper bag bush
LOASACEAE		LOASA FAMILY, STICK-LEAF FAMILY
	Mentzelia involucrata	Sand blazing star
MALVACEAE		MALLOW FAMILY
	Sphaeralcea ambigua var. *ambigua*	Apricot mallow, desert mallow
MONTIACEAE		MINER'S LETTUCE FAMILY, MONTIA FAMILY
	Calyptridium monandrum	Pussypaws, common calyptridium
NYCTAGINACEAE		FOUR O'CLOCK FAMILY
	Abronia villosa var. *villosa*	Sand verbena
	Mirabilis laevis var. *villosa*	Desert wishbone bush
ONAGRACEAE		EVENING-PRIMROSE FAMILY
	Camissonia campestris	Field evening-primrose
	Camissoniopsis bistorta	California sun cup

	Camissoniopsis pallida	Pale suncup
	Eremothera boothii ssp. *condensata*	Booth's evening primrose
	Eulobus californica	California false mustard
PAPAVERACEAE		POPPY FAMILY
	Eschscholzia parishii	Parish's gold poppy
PLANTAGINACEAE		PLANTAIN FAMILY
	Plantago ovata	Desert plantain
POLEMONIACEAE		PHLOX FAMILY
	Eriastrum eremicum ssp. *eremicum*	Desert woolly-star
	Gilia angelensis	Chaparral gilia, common gilia
	Gilia capitata	Blue field gilia
	Gilia ochroleuca ssp. *exilis*	Volcanic gilia
	Leptosiphon liniflorus	Flax-flowered linanthus
POLYGONACEAE		BUCKWHEAT FAMILY
	Chorizanthe brevicornu	Brittle spine flower
	Eriogonum elongatum var. *elongatum*	Long-stem wild buckwheat, wand buckwheat
	Eriogonum fasciculatum	California buckwheat
	Eriogonum inflatum	Desert trumpet
RANUNCULACEAE		BUTTERCUP FAMILY
	Delphinium parishii ssp. *parishii*	Parish's larkspur
SOLANACEAE		NIGHTSHADE FAMILY
	Lycium andersonii	Anderson box-thorn
ZYGOPHYLLACEAE		CALTROP FAMILY
	Larrea tridentata	Creosote bush
Monocotyledons		
AGAVACEAE		CENTURY PLANT FAMILY, AGAVE FAMILY
	Hesperoyucca whipplei	Chaparral yucca
	Yucca schidigera	Mojave yucca
POACEAE		GRASS FAMILY
*	*Avena barbata*	Slender wild oat
*	*Bromus berteroanus*	Chilean chess
*	*Bromus madritensis* ssp. *rubens*	Red brome
*	*Bromus tectorum*	Cheat grass
	Festuca microstachys	Small fescue
	Festuca octoflora	Sixweeks grass, slender fescue
	Hilaria rigida	Big galleta
*	*Hordeum murinum*	Wall barley, hare barley
	Poa secunda	Nevada blue grass, nodding blue grass
*	*Schismus barbatus*	Mediterranean schismus
	Stipa hymenoides	Sand rice grass, Indian rice grass
	Stipa speciosa	Desert needle grass
THEMIDACEAE		BRODIAEA FAMILY
	Dichelostemma capitatum	Blue dicks, wild hyacinth
VERTEBRATE ANIMALS		
REPTILIA		REPTILES
TESTUDINIDAE		LAND TORTOISES
**	*Gopherus agassizii*	Desert tortoise (scat and burrow)
IGUANIDAE		IGUANID LIZARDS
	Phrynosoma platyrhinos	Desert horned lizard
	Sauromalus ater	Common chuckwalla

	Sceloporus magister	Desert spiny lizard
	Uta stansburiana	Side-blotched lizard
TEIIDAE		WHIPTAILS
	Aspidoscelis tigris tigris	Great Basin whiptail
VIPERIDAE		VIPERS
**	*Crotalus ruber*	Red diamond rattlesnake
AVES		BIRDS
ACCIPITRIDAE		HAWKS, EAGLES, HARRIERS
	Buteo jamaicensis	Red-tailed hawk
FALCONIDAE		FALCONS
	Falco sparverius	American kestrel
PHASIANIDAE		GROUSE AND QUAIL
	Alectoris chukar	Chukar
COLUMBIDAE		PIGEONS AND DOVES
	Zenaida macroura	Mourning dove
CUCULIDAE		CUCKOOS
	Geococcyx californianus	Greater roadrunner
STRIGIDAE		TYPICAL OWLS
**	*Athene cunicularia*	Burrowing owl
TROCHILIDAE		HUMMINGBIRDS
	Calypte anna	Anna's hummingbird
**	*Calypte costae*	Costa's hummingbird
TYRANNIDAE		TYRANT FLYCATCHERS
	Sayornis saya	Say's phoebe
	Tyrannus vociferans	Cassin's kingbird
	Tyrannus verticalis	Western kingbird
ALAUDIDAE		LARKS
**	*Eremophila alpestris*	Horned lark
CORVIDAE		CROWS AND JAYS
	Corvus corax	Common raven
TROGLODYTIDAE		WRENS
	Salpinctes obsoletus	Rock wren
MUSCICAPIDAE		THRUSHES AND ALLIES
	Polioptila caerula	Blue-gray gnatcatcher
	Sialia mexicana	Western bluebird
MIMIDAE		MOCKINGBIRDS AND THRASHERS
	Mimus polyglottos	Northern mockingbird
	Toxostoma redivivum	California thrasher
PTILOGONATIDAE		SILKY FLYCATCHERS
	Phainopepla nitens	Phainopepla
LANIIDAE		SHRIKES
**	*Lanius ludovicianus*	Loggerhead shrike
EMBERIZIDAE		SPARROWS, WARBLERS, TANAGERS
	Vermivora celata	Orange-crowned warbler
	Vermivora ruficapilla	Nashville warbler
	Piranga ludoviciana	Western tanager
	Chondestes grammacus	Lark sparrow
	Amphispiza bilineata	Black-throated sparrow
	Artemisiospiza nevadensis	Sagebrush sparrow
	Sturnella neglecta	Western meadowlark
FRINGILLIDAE		FINCHES
	Haemorhous mexicanus	House finch
MAMMALIA		MAMMALS

LEPORIDAE		HARES AND RABBITS
	Lepus californicus deserticola	Black-tailed jackrabbit
	Sylvilagus audubonii	Desert cottontail
GEOMYIDAE		POCKET GOPHERS
	Thomomys bottae	Botta pocket gopher
CRICETIDAE		RATS AND MICE
	Neotoma lepida	Desert wood rat (middens)
CANIDAE		FOXES, WOLVES AND COYOTES
	Canis latrans	Coyote (scat and tracks)
MUSTELIDAE		WEASELS AND SKUNKS
**	*Taxidea taxus*	American badger (burrow)

Non-native species are indicated by an asterisk. Special-status species are indicated by two asterisks. Other species may have been overlooked or inactive/absent because of the season (amphibians are active during rains, reptiles during summer, some birds (and bats) migrate out of the area for summer or winter, some mammals hibernate etc.). Taxonomy and nomenclature generally follow Stebbins (2003) for amphibians and reptiles, AOU (1998) for birds, Jones et al. (1992) for mammals, and Baldwin et al. (2012) for plants.

Attachment 3 – Arid West OHWM Datasheet

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Alta Mesa
Project Number: 3210
Stream: Unnamed tributary
Investigator(s): Justin Wood

Date: 3/26/2020
Town: Whitewater
Photo begin file#:

Time: 08:15
State: CA
Photo end file#:

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details:
Drainage 6 within Wind site.

Projection:
Datum: WGS84
Coordinates: 33.943835 , -116.659996

Potential anthropogenic influences on the channel system:
Numerous dirt roads throughout wind project. Most have culverts that focus flows.

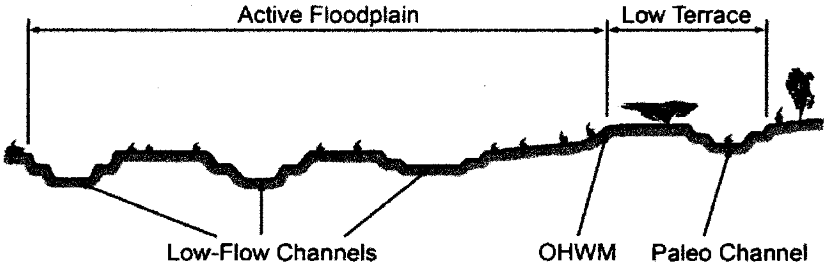
Brief site description:
Alta Mesa Wind Project. Located on mesa west of Whitewater Canyon and north of San Gorgonio Pass (Interstate 10)

Checklist of resources (if available):

☒ Aerial photography
Dates: 9/1996 - 12/2019
☒ Topographic maps
☐ Geologic maps
☒ Vegetation maps
☒ Soils maps
☐ Rainfall/precipitation maps
☐ Existing delineation(s) for site
☐ Global positioning system (GPS)
☐ Other studies

☐ Stream gage data
Gage number:
Period of record:
- ☐ History of recent effective discharges
- ☐ Results of flood frequency analysis
- ☐ Most recent shift-adjusted rating
- ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

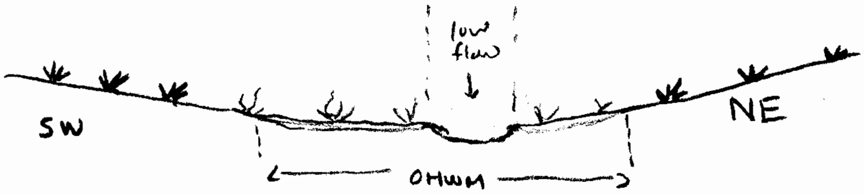
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☐ Mapping on aerial photograph
☐ Digitized on computer

☒ GPS
☐ Other:

Project ID: 3210 **Cross section ID:** 1 **Date:** 3/26/2020 **Time:** 08:15

Cross section drawing:



OHWM

GPS point: 33.943781 , -116.660034

Indicators:

☒ Change in average sediment texture
☐ Change in vegetation species
☒ Change in vegetation cover
☐ Break in bank slope
☐ Other: ______
☐ Other: ______

Comments:

OHWM is mainly delineated based on recent sediment deposition that was broad but narrowed at culvert under the road.

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: 33.943826 , -116.660012

Characteristics of the floodplain unit:

Average sediment texture: sand
Total veg cover: 25 % Tree: 0 % Shrub: 20 % Herb: 5 %
Community successional stage:

☐ NA
☐ Early (herbaceous & seedlings)
☒ Mid (herbaceous, shrubs, saplings)
☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks
☐ Ripples
☒ Drift and/or debris
☒ Presence of bed and bank
☐ Benches
☐ Soil development
☐ Surface relief
☐ Other: ______
☐ Other: ______
☐ Other: ______

Comments:

Poorly defined low flow channel within a much more well defined OHWM.

Project ID: 3210 **Cross section ID:** 1 **Date:** 3/26/2020 **Time:** 08:15

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 33.943856 , -116.659996

Characteristics of the floodplain unit:

Average sediment texture: coarse sand

Total veg cover: 55 % Tree: ____ % Shrub: 50 % Herb: 5 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____________
- ☐ Other: ____________
- ☐ Other: ____________

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____________

Characteristics of the floodplain unit:

Average sediment texture: ____________

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____________
- ☐ Other: ____________
- ☐ Other: ____________

Comments:

Appendix E

Final Joint Project Review for CVCC 20-002 Alta Mesa Wind Repower Project

COACHELLA VALLEY CONSERVATION COMMISSION CVCC

Cathedral City ◦ Coachella ◦ Desert Hot Springs ◦ Indian Wells ◦ Indio ◦ La Quinta ◦ Palm Desert
◦ Palm Springs ◦ Rancho Mirage ◦ County of Riverside ◦ Coachella Valley Water District ◦ Imperial Irrigation District

15 January 2020

Matthew Poonamallee
County of Riverside, Planning Department
Environmental Programs Division
4080 Lemon St, 12th Floor
Riverside, CA 92501
951.955.2706

RE: Final Joint Project Review for CVCC 20-002 Alta Mesa Wind Repower Project

Dear Mr. Poonamallee:

The Coachella Valley Conservation Commission (CVCC) has completed its Joint Project Review (JPR) as required by section 6.6.1.1 of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP).

The proposed Alta Mesa Wind repower project is located within the Stubbe and Cottonwood Canyons and Whitewater Canyon Conservation Areas. It proposes to decommission 159 existing wind turbine generators and replace them with 8 newer, more efficient machines. The project will impact Core Habitat for desert tortoise, as well as source areas for blowsand. The listed Conservation Areas also contains recorded burrowing owl locations.

A draft JPR was submitted to the US Fish and Wildlife Service, California Department of Fish and Wildlife, and the project applicant on 5 November 2020. Agency comments, and any applicant response, are summarized in the JPR and included in full as an Appendix.

This JPR has found the project as proposed consistent with the CVMSHCP if conditioned on the required Avoidance and Minimization Measures and applicable Land Use Adjacency guidelines as described in the Plan documents.

If you have any questions, please do not hesitate to contact me at psatin@cvag.org, or 760.346.1127.

Sincerely,

Peter Satin
Regional Planner

CC: Jacob Skaggs, CDFW
Carly Beck, CDFW

Heather Pert, CDFW
Alicia Thomas, USFWS
Janess McBride, USFWS
Jonathan Kirby, Brookfield Renewable Partners

Attachments:
JPR 20-002: Alta Mesa Wind Repower Project
Appendix A: Agency comments
Appendix B: Avoidance, Minimization, and Mitigation Measures and Land Use Adjacency Guidelines
JPR Application

Coachella Valley Conservation Commission
Joint Project Review (JPR)

Date: 5 January 2020

Project Information

Applicant/Project Name: Brookfield/Mesa Wind Power Corp.
Alta Mesa Project

CVCC ID: 20-002

Conservation Areas: Stubbe and Cottonwood Canyons Conservation Area and Whitewater Canyon Conservation Area.

Project	APN, Acreage	Conservation Areas	Acres Disturbed	Proposed Conservation
Alta Mesa Wind	516020001, 547.43 Acres	Stubbe and Cottonwood Canyons Conservation Area	19.50	0.00
		Whitewater Canyon Conservation Area	3.25	0.00
		Total for Alta Mesa	22.75	

Project Summary:

The project analyzed in this Joint Project Review is a repower project at the Alta Mesa Wind site. The project is proposed by Brookfield Renewable Energy ("Brookfield"). A description of the project follows.

Alta Mesa 640 LLC (Alta Mesa 640), a subsidiary of Brookfield Renewable Energy (Brookfield), as owner of the Alta Mesa Wind Project (Alta Mesa Wind), is planning to repower the existing wind project located on 640 acres in Riverside County, approximately 11 miles northwest of the City of Palm Springs (see Figure 3). Alta Mesa is an existing 27-megawatt (MW) wind project with 159 turbines located on land zoned Wind Energy (W-E). W-E zoning allows the development of wind energy subject to approval of a Commercial WECS application. The existing turbines heights range from 114 to 145 feet.

The project would use existing access roads to reach the site. The existing access road crosses BLM land and is being permitted as part of the adjacent Mesa Wind project. The project area is rural, open space that is sparsely populated. Local land uses include existing wind farms and off-highway vehicle trails. Rural residences in the community of Bonnie Bell are located 4,500 and 4,900 feet east of Alta Mesa Wind. The Pacific Crest Trail (PCT) runs north and west of the project.

Alta Mesa 640 proposes to construct the Alta Mesa Wind Project, which would include removal of 159 existing wind turbine generators (WTG) and constructing, operating, maintaining, and decommissioning 8 new WTGs. Alta Mesa Wind would produce 27 MW of wind energy. The new facilities would be decommissioned at the end of their useful life. Figure 1 illustrates the project location and proposed location for the 8 WTGs. Alta Mesa 640 is planning to construct the Project in tandem with the adjacent Mesa wind repowering project that is situated on federal lands and has recently been approved by BLM. Concurrent repowering of the two projects (as opposed to two separate construction projects) would provide efficiencies and minimize total ground disturbance, traffic, and temporary impacts on environmental resources.

The total estimated Project construction area would be up to 72.3 acres, including 39.9 acres of disturbance and a 32.4-acre buffer area. No vegetation removal is anticipated in the 32.4-acre buffer area but there may be some damage to vegetation due to trucks backing up or other unanticipated construction work. Under the decommissioning plan, the legacy turbines and their foundations would be removed and revegetated. Ground disturbance is associated with turbine siting, fill, and widening access roads. The project would use existing disturbed areas and would avoid steep slopes whenever possible.

Project Components

Decommissioning of Existing Wind Turbines

Decommissioning of existing turbines on the Alta Mesa Wind site involves disassembly of the towers at their bases with a shearing tool attached to an excavator. The towers would then be pushed or pulled over in a safe, controlled manner. The towers could be further disassembled by hand when on the ground and then hauled off to be recycled.

Fluids located within the turbine nacelle, including oils, fuels, solvents and process chemicals, would be drained prior to or during disassembly and disposed of offsite. Other equipment for disposal includes decommissioned gearboxes, transformers, and hydraulic systems, which would be drained of fluids, put into appropriate containers before dismantling. The transport and offsite disposal of solid waste and hazardous waste would be in accordance with state and federal regulations.

A private contractor would collect and transport solid waste to a landfill authorized to accept the material. The steel recovered from the turbines, towers, and ancillary equipment would be recycled to offset the costs of demolition and hauling. Alternate disposal or recycling methods for blades would be explored.

Underground power cables and communication lines to the existing turbines would be decommissioned in place. Underground cables would be cut off at ground surface. Transformers would be removed from the site for disposal or recycling.

The existing turbine concrete foundations will be left in place to minimize ground disturbance except those that need to be removed to build new foundations for the new turbines.

New Wind Turbines

The project involves the installation of 8 new WTGs, each of which would be mounted on a reinforced concrete foundation. The new WTGs would be approximately 3.5 MW capacity per turbine and would be up to 499 feet tall, from top of foundation to blade tip at apex. Each WTG consists of the tower, nacelle, hub, and three blades. The tower portion consists of a tubular steel monopole and connects to the nacelle, hub, and three-bladed rotor, and would include internal access ladders and man lifts for maintenance. The nacelle would be an aerodynamic steel and fiberglass structure atop the tower, which would contain the inner mechanical workings of the new WTGs, including its power generating components. The hub is the fixture for attaching the blades to the main drive shaft and is covered by a fiberglass nose cone structure to streamline the airflow and protect the equipment. The blades and rotor have a diameter of up to 433 feet (132 meters), and each rotor is equipped with a braking system.

Additional features help the turbines operate safely. The controller is a microprocessor that automatically regulates the operation of the new WTGs, including startup, shutdown, pitch control (technology used to operate and control the angle of the blades), yaw control (mechanism used to turn the wind turbine rotor against the wind) and safety monitoring. This information would be communicated to the Operations and Maintenance (O&M) facility from the controller via fiber optic cables. A central Supervisory Control and Data Acquisition (SCADA) system would monitor data input from the controller to streamline centralized O&M, in some cases, the system can even analyze the data and take corrective measures. At each turbine, there would be a transformer inside the unit to increase the output voltage to transmit the power from the turbine to the collector substation, which is already in place. Safety lighting would be installed on the outside of some of the nacelles in order to comply with the Federal Aviation Administration (FAA) rules. Project specific requirements would be developed in conjunction with the FAA based on final design and not all WTGs may need safety lighting due to spacing and proximity of turbines. Lightning protection systems would be installed on each new WTG and connected to an underground grounding arrangement. All equipment, cables, and structures that make up the new WTGs would be connected to a metallic site-wide grounding network.

Ancillary Facilities / Electrical Collection System

The new WTGs would have new underground or overhead collector lines that would connect to the existing substation. Wherever feasible, the collector lines would be located in existing roads. The existing Alta Mesa Substation would be upgraded to replace the existing 12 kV/115 kV transformer with a 34.5 kV/115 kV transformer.

Interconnection to the Electrical Grid

Currently, generated electricity feeds into the onsite Alta Mesa Wind Substation and from there into Southern California Edison's (SCE) switchyard, which is the point of interconnection with SCE's 115 kV distribution system. The repower would not change this interconnection nor require a repowered interconnection line.

Access Roads, Buildings, Parking Lots

The Project has two existing main access roads, an unnamed access road that enters from the Mesa Wind Project ROW (BLM ROW CACA-13980). This road would be improved and widened during the repower construction for the Mesa Project, including potential cut and fill. Alta Mesa would use this already improved road to deliver the turbines and other materials. A second unnamed access road enters into the site from the east off of Whitewater Canyon Road. This road would not be improved and will likely not be used for any traffic during construction. Permanent onsite roads would be 16 feet wide. Access roads would require periodic grading or replacement of gravel to maintain road quality for facility operations.

Project Construction

Construction Schedule

Construction of the Project would take approximately two years and proceed according to the timeline presented below:

- Pre-construction activity: July 2020 to March 2021
- Decommissioning of existing turbines
- Construction of repowered plant: March 2021 to December 2021
- Restoration of temporary disturbance: January 2022 to September 2022

Temporary Construction Yard

During construction, the Alta Mesa project would use a 1.25- acre temporary work area adjacent to the existing substation.

The temporary construction facility may include:
- Temporary offices
- Tool sheds and containers
- Chemical toilets
- Additional parking for construction equipment and vehicles.

Construction Workforces and Transportation

The on-site construction workforce would consist of skilled and unskilled laborers, craftsmen, supervisory personnel, safety personnel, support personnel, construction management personnel, electricians, equipment operators, ironworkers, millwrights, carpenters, general laborers, and truck drivers. The largest construction vehicle traffic would likely be associated with construction workers, followed by deliveries of new WTG components, steel, aggregate, water, electrical equipment, and other general deliveries. The construction workforce would be expected to average 150 with a peak at around 170.

A variety of construction equipment would be required during construction. This would include component trucks to transport the wind turbines and main erector crane, concrete trucks for pouring foundations, trucks used to transport aggregate and general construction and material delivery trucks. Additional construction equipment includes the main erector crane and RT cranes. An average of 180 trucks would be used per week over a 6-month period of the most active construction. Much fewer trucks would be needed throughout the rest of the construction period.

Water Use (Construction)

Construction of the repower would require an additional estimated 43 million gallons of water (67-acre feet). Water would be used primarily for earthwork compaction and for dust control and vegetation. Concrete would be obtained from permitted commercial or municipal sources or local batch plants located within the same watershed as the Project, or an onsite batch plant.

Operations and Maintenance

Operation and maintenance activities at the facility would include maintenance of new and existing WTGs, access roads and electrical equipment.

WTG

Each new WTG would be continuously monitored through the SCADA system that links the facility to Brookfield's National System Control Center. The SCADA system could also be used to remotely shut down a new WTG if necessary.

On average, each new WTG would require 40 to 50 hours of scheduled mechanical and electrical maintenance per year. O&M personnel would perform routine maintenance including replacing lubricating fluids, checking parts for wear, and downloading data from recording chips in anemometers.

Project Substation and Collector System

Similar to the WTGs, a periodic inspection and maintenance program would be established for the project substation and collector system based on Brookfield's experience operating wind farms and good utility practices. Such inspection and maintenance would be performed by a combination of project staff and subcontractors.

Access Roads

In addition to WTGs and electrical equipment, project staff would regularly inspect and maintain all access roads, pads, and trenched areas to minimize erosion. During normal operation and maintenance, travel to and on the site would create minimal traffic. It is expected that road maintenance will be required twice a year, but more frequent maintenance would be done if needed to maintain road conditions acceptable to Riverside County.

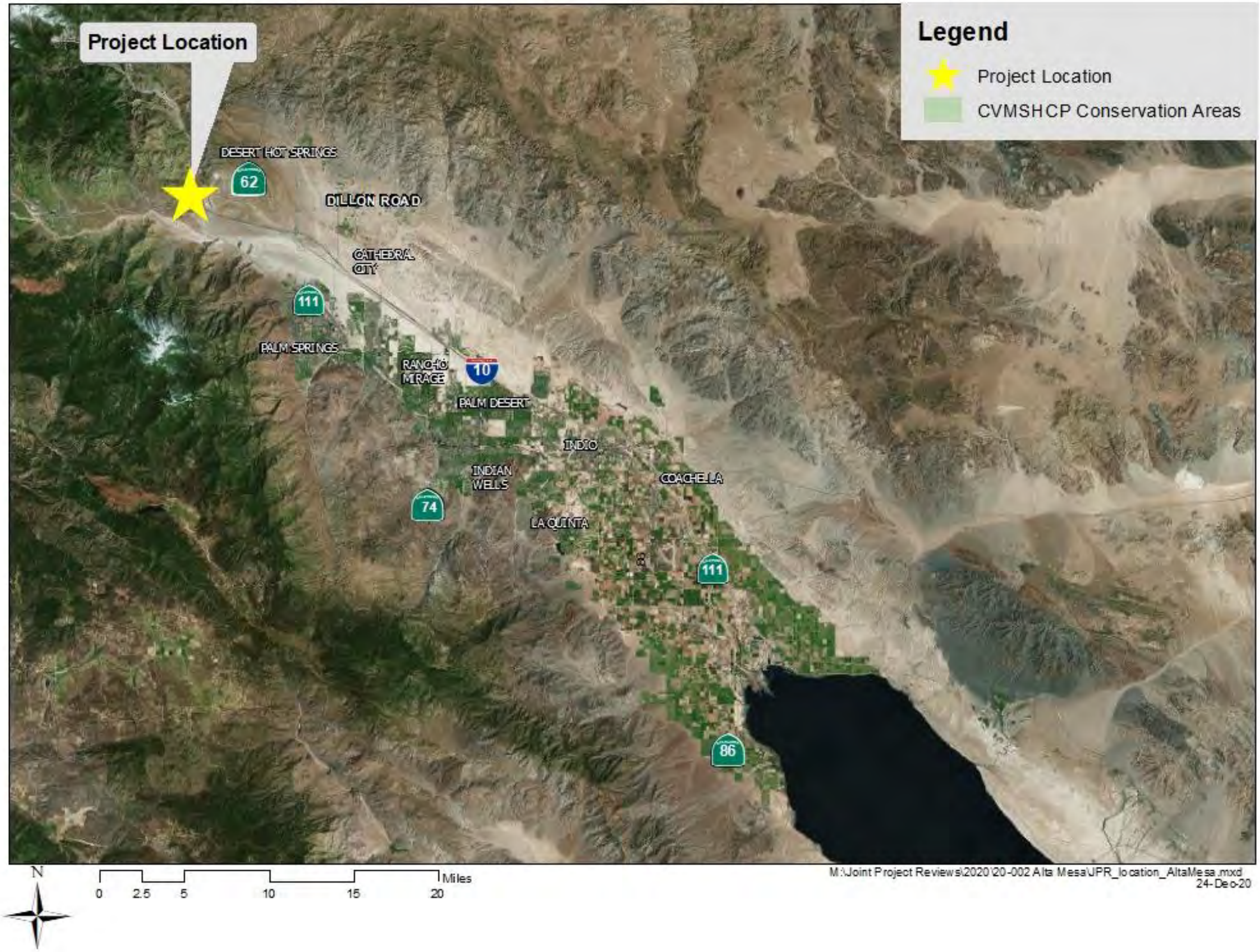
Access roads would require periodic grading or replacement of gravel to maintain road quality for facility operations. The existing O&M facility would continue to be used during ongoing operations and includes the building and graveled area for equipment, construction, storage and parking. The facility may require upgrades, dependent on ultimate decision of WTG manufacturer, but any size increase in facility would remain within the existing disturbed area.

Water Use (Operations)

Following construction, the Project would use up to 330,000 gallons per year (1-acre foot), primarily at the O&M building and for site maintenance work and dust control and for contingencies

Project Location

MAP 1: ALTA MESA WIND PROJECT



Conservation Objectives Review

The proposed project is location within the Stubbe and Cottonwood Canyons Conservation Area. A portion of the Alta Mesa Wind project occurs within the Whitewater Canyon Conservation Area. The analysis presented in the tables below evaluates the proposed project with respect to the conservation objectives listed in Section 4.3.2 of the CVMSHCP. This Conservation Area is important as the location of a desert tortoise population that is one of the densest in the CVMSHCP area. There are also recorded burrowing owl locations. Areas within the San Bernardino Mountains included in this Conservation Area provide a sand source for blowsand habitat on the valley floor. The conservation objectives focus on protecting habitat for covered species including the desert tortoise, Le Conte's thrasher, and burrowing owl. Conservation objectives also identify areas of sand source to be conserved, including within the project area.

The Alta Mesa Wind project will disturb approximately 3.25 acres of desert tortoise Core Habitat, which also coincides with an equal acreage of sand source areas within the Whitewater Canyon Conservation Area (Table 2). In the Stubbe and Cottonwood Canyons Conservation area, the project will disturb 19.60 acres of co-occurring Core Habitat for desert tortoise and sand source areas. The project applicant has not proposed any restoration activities for these disturbances. The project disturbance does not affect Other Conserved Habitat of LeConte's thrasher.

Alta Mesa Wind Project

Whitewater Canyon Conservation Area

Conservation Objective	Total Acres of Proposed Disturbance	Acres of Disturbance Authorized by Plan	Proposed Disturbance as a Percentage of Authorized Disturbance	Rough Step (***If project is approved as submitted)***	Acres Conserved by Project	Acres to be Conserved by Plan	% Required Conservation
Conserve Core Habitat for desert tortoise	*3.25*	*120*	*2.71%*	*89.01*	*0*	*1,084*	*0*
Conserve sand source areas	*3.25*	*94*	*3.46%*	*70.91*	*0*	*850*	*0*

Alta Mesa Wind Project

Stubbe and Cottonwood Canyons Conservation Area

Conservation Objective	Total Acres of Proposed Disturbance	Acres of Disturbance Authorized by Plan	Proposed Disturbance as a Percentage of Authorized Disturbance	Rough Step (***If project is approved as submitted)***	Acres Conserved by Project	Acres to be Conserved by Plan	% Required Conservation
Conserve Core Habitat for desert tortoise	*19.60*	*253*	*7.75%*	*125.34*	*0*	*2,276*	*0*
Conserve sand source areas	*19.60*	*138*	*14.25%*	*36.62*	*0*	*1,241*	*0*

Explanation of Columns

1) Total Acres of Proposed Disturbance – this is the Proposed Disturbance submitted by the applicant after subtracting existing disturbance that overlays the Proposed Disturbance.

2) Acres of Disturbance Authorized by the Plan - this is the maximum amount of disturbance allowed to be consistent with Plan requirements for the project area; see Table 4-17; 4-27b. Conservation and Take Authorization for Stubbe and Cottonwood Canyons Conservation Area; Conservation and Take Authorization for Whitewater

Canyon Conservation Area

3) Proposed Disturbance as a Percentage of Authorized Disturbance- this is column 1/column 2 x 100%.

4) Rough Step – see Plan Section 6.5 Rough Step and Rough Proportionality Analyses for a full explanation. Rough step is calculated based on all development and conservation from 1996 to today according to CVCC records.

5) Acres Conserved by Project – The Mesa Wind Project plans on conserving the land that the current road is on back to its natural state. The Alta Mesa wind project does not plan any conservation on the site.

6) Acres to be Conserved by The Plan – The Mesa Wind Project plans on conserving the land that the current road is on back to its natural state. The Alta Mesa wind project does not plan any conservation on the site.

7) % Required Conservation – this is the amount of conservation that may be required by the applicant to meet conservation objectives. The applicant is not required to conserve.

In addition, Section 4.3.2 for Stubbe and Cottonwood Canyons Conservation Area includes the following conservation objectives and required measures:

Conservation Objective 6:

> Conserve occupied burrowing owl burrows as described in Section 4.4 for burrowing owl avoidance, minimization, and mitigation measures (p 4-26).

Required Measures 3:

> The Permittees shall comply with applicable avoidance, minimization, and mitigation measures described in Section 4.4 and the Land Use Adjacency Guidelines as described in Section 4.5.

Rough Step Requirement

The Rough Step calculation is used to ensure that development in a given Conservation Area does not exceed the opportunity for conservation. It projects the remaining acres available for development, or, in the event of a negative finding, the acreage that must be conserved by the permittee to offset habitat loss.

In the case of the project currently under review, the Rough Step calculation demonstrates that the proposed development is consistent with the Conservation Objectives and Rough Step requirements of both Conservation areas.

Agency Comment

Per section 6.6.1.1 of the Plan, a draft JPR was circulated to the US Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), collectively the Agencies, for comment. Their feedback is summarized below and included in full in Appendix A.

USFWS recommends that the Project Description be updated to ensure that the timing of certain construction activities abide by the required Avoidance, Minimization and Mitigation measures (AMMs) listed in Appendix B and detailed more extensively in section 4.4 of the Plan. USFWS also recommends providing more explicit detail regarding the coordination of AMMs for desert tortoise among the various jurisdictions over which the project will take place. Finally, USFWS suggests that the Applicant assess whether existing foundations may be providing habitat for desert tortoise.

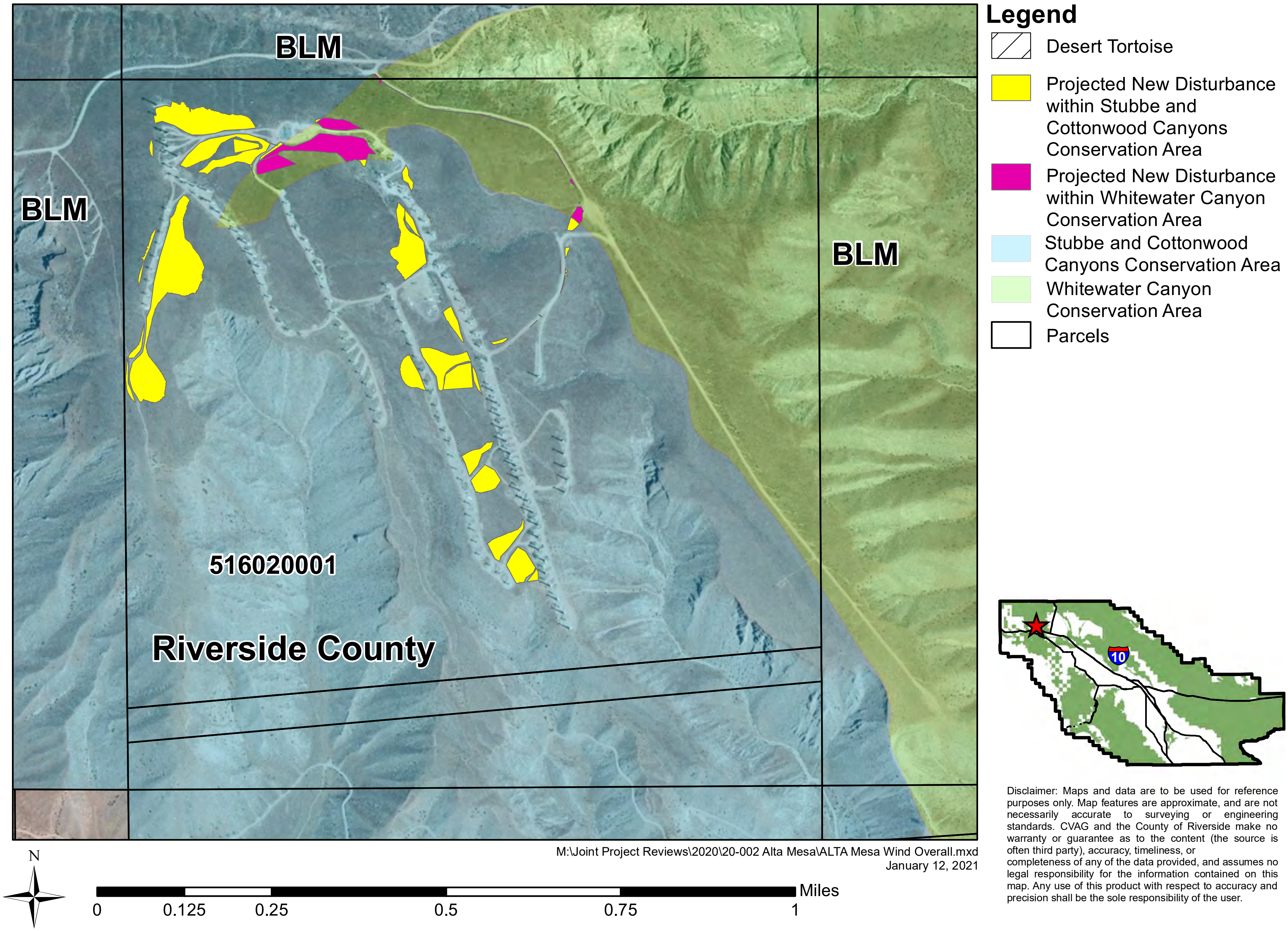
CDFW requests further specification regarding the methods used to restore temporary impacts. They also request further information on how the applicant will control the spread of invasive plants and practices pursuant to section 4.5 of the Plan, Land Use Adjacency Guidelines. Finally, CDFW recommends the formal inclusion of a Worker Environmental Awareness Plan and protections against unauthorized trespass to the Project Site.

Conclusion

This JPR has not identified any inconsistencies with the Project as described and the requirements of the Plan. All disturbances are within authorized levels and rough step is maintained. The project is consistent with CVMSHCP conservation objectives.

In keeping with agency feedback, CVCC recommends that permitting the Alta Mesa Wind Repower Project be conditioned on the applicant’s inclusion within its scope of work more explicit measures to adhere to the AMMs and Land Use Adjacency Guidelines listed in sections 4.4 and 4.5 of the Plan. Specifically, CVCC suggests that the Project be conditioned on the implementation of a Worker Environmental Awareness Plan and on-site biological monitoring for desert tortoise in keeping with the guidelines listed under AMMs specific to desert tortoise. CVCC does not distinguish between temporary and permanent impacts for the purposes of Plan compliance; all disturbance is considered permanent unless and until it is fully restored consistent with an approved restoration plan. CVCC encourages the applicant to restore any temporary disturbance to recontour the area to a more natural ground surface and control invasive species such that their spread within the Conservation Area is minimized. A condition to prevent the introduction of soil material brought in from other locations would help ensure the control of invasive species such as stinknet.

MAP 2: ALTA MESA WIND OVERALL



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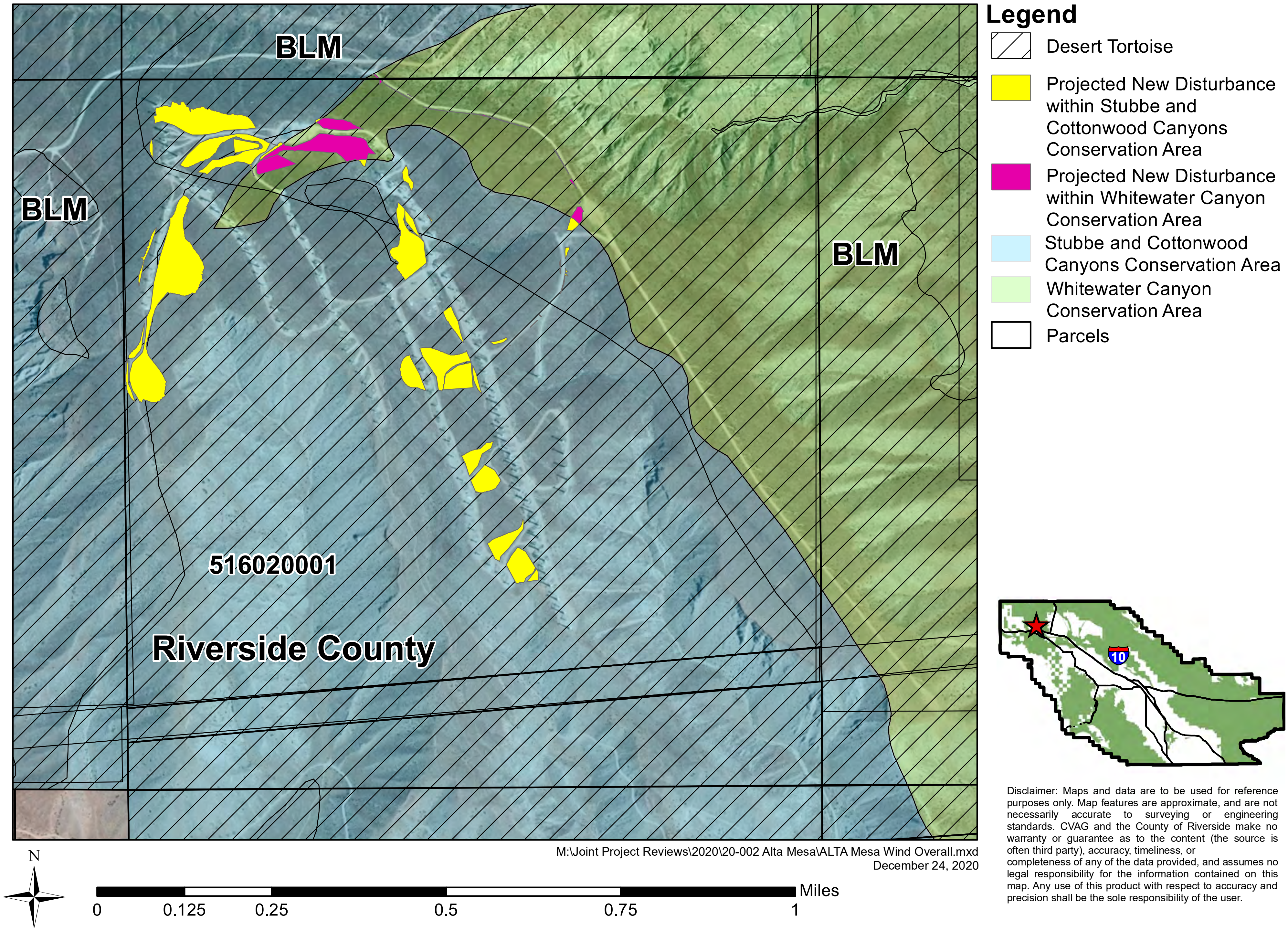
January 12, 2021

MAP 3: ALTA MESA WIND SPECIES



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December 24, 2020

Appendix A

Comments submitted by USFWS

We recommend confirming or updating the anticipated construction level in the Project Description, as the timing of activities will be relevant to some of the applicable Section 4.4. Avoidance and Minimization Measures, (e.g., LeConte's thrasher surveys and avoidance of nests during breeding season).

We also recommend including more information on the following Section 4.4 AMMs for Covered Species:

Alta Mesa Repower

Desert tortoise: The Mesa Wind and Alta Mesa repowers are anticipated to occur concurrently. Though the projects are on lands with different jurisdictions, there is some possibility that desert tortoises move between and utilize areas of the two sites. It could be efficient to coordinate conservation measures (Federal, State, CVMSHCP, etc.) as much as possible for both repowers to ensure avoidance and minimization of negative impacts to desert tortoises in the area.

General comment on leaving legacy foundations in place: Desert tortoises in the adjacent Mesa Wind site are known to occasionally utilize these features for burrows. There is a possibility that removing the Alta Mesa foundations to restore the area could help fulfill conservation objectives if restoration is successful; however, with the number of foundations that would be removed, leaving them in place may ultimately result in less disturbance than the process of removing them, particularly if desert tortoises are already present and considering that restoration of this vegetation type can take several decades to establish into suitable habitat. Legacy access roads no longer needed may provide opportunities for restoration and maintaining the area's objectives for conserved acreage with less disturbance.

Comments submitted by CDFW with applicant response included

The JPR should provide sufficient information to evaluate the proposed Project's consistency with the Stubbe and Cottonwood Canyons and Whitewater Canyon Conservation Area’s Conservation Objectives and Required Measures. In addition, the JPR should provide sufficient information to demonstrate that appropriate avoidance and minimization measures will be implemented for the Project. Insufficient detail and information were provided to complete our review to evaluate the project's consistency with the Conservation Area’s Conservation Objectives and Required Measures. To complete our review and assess how conservation area resources will be impacted by project activities, we are requesting that additional details are included in the JPR on the restoration of temporarily impacted areas, the avoidance/minimization of invasive species introductions, public access control measures, and the removal/retainment of wind turbine foundations. Specific recommendations are provided in the comments in **bold** below.

Below are CDFW’s original requests for additional information, CVCC’s responses to additional information in *italics*, and CDFW’s subsequent requests for additional information highlighted in **bold**:

Appendix A

1) Please clarify if all habitat disturbances associated with project activities will fall within the mapped footprint of the temporary or permanent disturbance areas.

   As above, the proposed disturbance area is based on the project's engineering – no additional disturbance is planned.

   Thank you for the clarification. No additional feedback is requested on this issue.

2) Will the temporary construction yard be located in an area that is already disturbed? If not, is there a plan to restore this area afterwards?

   Most of the site is undisturbed, but part of it has existing roadways or other disturbance. The project will be subject to revegetation and restoration as described above for the Alta Mesa Wind project. If needed, we suggest the JPR could include a condition to revegetate temporarily disturbed areas according to the revegetation measure in the current internal draft administrative CEQA document.

   CDFW requests that conditions are added to the JPR indicating that all areas that are temporarily disturbed during project construction activities will be restored. At minimum, CDFW requests that temporary impact areas are recontoured and controlled for invasive plant species. These measures would support Conservation Area Objectives to minimize habitat fragmentation, human caused disturbance and edge effects for the benefit of desert tortoise.

3) When old turbines are decommissioned, over which areas will they be pulled down? Will there be impacts to buffer habitat? If decommissioning involves disturbing buffer habitat, is there a plan for these areas be restored?

   Decommissioning the existing turbines is not part of the JPR Application. No new disturbance is proposed during decommissioning. Nonetheless, the project will be subject to revegetation and restoration as described above for the Alta Mesa Wind project. If needed, we suggest the JPR could include a condition to revegetate the site according to the revegetation measure in the current internal draft administrative CEQA document (will become public when the County publishes).

   As indicated in the previous comment, CDFW requests that areas temporarily impacted by project activities are restored through, at minimum, recontouring and controlling of invasive plant species.

4) If any part of the 32.4-A buffer areas around construction areas are disturbed, what are the plans for restoration? Seeding? Invasive plant and/or erosion control?

   See above regarding temporarily disturbed areas.

   As stated above, CDFW requests the restoration of all temporary impact areas through, at minimum, recontouring and controlling of invasive plant species.

5) JPR indicates old turbine foundations might either be left in place or removed (pg. 6). What surveys were completed to identify and map active and inactive burrows associated with turbines? What

information will be used to determine if desert tortoise are currently or previously using the turbine foundations, and what information is used to determine if the foundations should be left in place or removed?

Inventories of potential tortoise burrows at the foundations will be included in the County's CEQA document, and will be used to determine how to handle each foundation.

Thank you for the clarification. Building on JPR comments from the US Fish and Wildlife Service on 12/7/2020 and the information provided above, CDFW recommends that turbine foundations are removed and the areas restored to natural conditions unless they are clearly of value to desert tortoise, burrowing owl, or other species.

6) Increased vehicle activity increases the chances of introducing invasive plants. Please provide the specific project measures and plans to control the introduction/spread of invasive plants, (e.g., various mustards, stinknet, non-native grasses, etc.).

The Alta Mesa Wind CEQA document will include a weed control condition and an Integrated Weed Management Plan, which addresses this concern. If needed, we suggest the JPR could include a condition to control weeds.

CDFW requests that information is added to the JPR on how the introduction of invasive plants will be avoided or minimized, in accordance with Section 4.5 (Land Use Adjacency Guidelines) of the CVMSHCP.

7) Please provide specific project measures that will be used to address the CVMSHCP measures to avoid and minimize impacts associated with land use adjacency guidelines, including noise, lighting, toxics, drainage, etc.

The Alta Mesa Wind CEQA document will include numerous measures to protect resources, largely patterned on the Conservation Measures identified in the Alta Mesa Wind EA. We have not yet compared these with the specific MSHCP guidelines but we expect they are similar. Please let us know if there is any specific shortcoming in the Conservation Measures – we may want to revise them.

CDFW recommends that information is added to the JPR on the specific measures that will be taken to avoid or minimize the indirect effects of project activities carried out within or adjacent to the Cottonwood Canyons and Stubbe and Whitewater Conservation Areas as required in Section 4.5 (Land Use Adjacency Guidelines) of the CVMSHCP. These include measures to minimize edge effects such as drainage, toxics, lighting, noise, and invasive species. Sufficient information should be provided in the JPR to evaluate if the measures are sufficient to avoid or minimize the indirect effects.

8) Since the project area has a high concentration of desert tortoise, we recommend the development of a Worker Environmental Awareness Plan that includes on-site training of employees on tortoises and protection measures. In addition, the project should be conditioned for onsite biological monitoring during construction. Please provide information on the proposed project measures for biological monitoring and worker environmental awareness training.

A WEAP and biological monitoring will be included in the proposed Conservation Measures. If needed, we suggest the JPR could include conditions for WEAP and biological monitoring.

As suggested, CDFW recommends that the JPR include conditions for a Worker Environmental Awareness Plan and biological monitoring.

9) Conservation Objectives for the CVMSHCP include minimizing fragmentation in desert tortoise core habitat. With the number of wind turbines being removed, many of the roads are no longer needed, especially the spur roads. We recommend decommissioning, retiring, <u>restricting access</u>, and/or restoring unused roads of that are no longer required for the project to help reduce habitat fragmentation and reduce risk of new trails and further fragmentation from developing.
The project site has no public access. Consistent with the above, all roads (existing and proposed) are inaccessible to the public.

The Project site may not allow public access, however, that does not ensure that public access is prohibited and controlled. Trespass and unauthorized public access are a frequent issue in Conservation Areas. CDFW request that the JPR identifies specific measures such gates, fencing, and enforcement to control and manage public access. Further, measures to obstruct access or obscure the location of unauthorized or abandoned roads are also recommended to help facilitate the recovery of these areas.

Section 4.4: Avoidance, Minimization, and Mitigation Measures

This section describes certain avoidance, minimization, and mitigation requirements for Covered Activities within the Conservation Area, in addition to Conservation Area specific measures described in the Conservation Area subsections in Section 4.3. The City must condition the project to meet these measures.

Burrowing Owl. This measure does not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to O&M of Covered Activities other than levees, berms, dikes, and similar features that are known to contain burrowing owl burrows. O&M of roads is not subject to this requirement. For other projects that are subject to CEQA, the Permittees will require burrowing owl surveys in the Conservation Areas using an accepted protocol (as determined by the CVCC in coordination with the Permittees and the Wildlife Agencies). Prior to Development, the construction area and adjacent areas within 500 feet of the Development site, or to the edge of the property if less than 500 feet, will be surveyed by an Acceptable Biologist for burrows that could be used by burrowing owl. If a burrow is located, the biologist will determine if an owl is present in the burrow. If the burrow is determined to be occupied, the burrow will be flagged and a 160-foot buffer during the non-breeding season and a 250-foot buffer during the breeding season, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the burrow. The buffer will be staked and flagged. No Development or O&M activities will be permitted within the buffer until the young are no longer dependent on the burrow.

If the burrow is unoccupied, the burrow will be made inaccessible to owls, and the Covered Activity may proceed. If either a nesting or escape burrow is occupied, owls shall be relocated pursuant to accepted Wildlife Agency protocols. A burrow is assumed occupied if records indicate that, based on surveys conducted following protocol, at least one burrowing owl has been observed occupying a burrow on site during the past three years. If there are no records for the site, surveys must be conducted to determine, prior to construction, if burrowing owls are present. Determination of the appropriate method of relocation, such as eviction/passive relocation or active relocation, shall be based on the specific site conditions (e.g., distance to nearest suitable habitat and presence of burrows within that habitat) in coordination with the Wildlife Agencies. Active relocation and eviction/passive relocation require the preservation and maintenance of suitable burrowing owl habitat determined through coordination with the Wildlife Agencies.

Desert tortoise. This measure does not apply to single-family residences and any non-commercial accessory uses and structures, including but not limited to second units on an existing legal lot, or to O&M of Covered Activities for Permittee infrastructure facilities. Within Conservation Areas, the Permittees will require surveys for desert tortoise for Development in modeled desert tortoise Habitat. Prior to Development, an Acceptable Biologist will conduct a presence/absence survey of the Development area and adjacent areas within 200 feet of the Development area, or to the property boundary if less than 200 feet and permission from the adjacent landowner cannot be obtained, for fresh sign of desert tortoise, including live tortoises, tortoise remains, burrows, tracks, scat, or egg shells. The presence/absence survey must be conducted during the window between February 15 and October 31. Presence/absence surveys require 100% coverage of the survey area. If no sign is found, a clearance survey is not required. A presence/absence survey is valid for 90 days or indefinitely if tortoise-proof fencing is installed around the Development site.

If fresh sign is located, the Development area must be fenced with tortoise-proof fencing and a clearance survey conducted during the clearance window. Desert tortoise clearance surveys shall be conducted during the clearance window from February 15 to June 15 and September 1 to October 31 or in accordance with the most recent Wildlife Agency protocols. Clearance surveys must cover 100% of the Development area. A clearance survey must be conducted during different tortoise activity periods (morning and afternoon). All tortoises encountered will be moved from the Development site to a specified location. Prior to issuance of the Permits, CVCC will either use the *Permit Statement Pertaining to High Temperatures for Handling Desert Tortoises and Guidelines for Handling Desert Tortoises During Construction Projects*, revised July 1999, or develop a similar protocol for relocation and monitoring of desert tortoise, to be reviewed and approved by the Wildlife Agencies. Thereafter, the protocol will be revised as needed based on the results of monitoring and other information that becomes available.

For O&M activities in the Conservation Areas, the Permittees shall ensure that personnel conducting such activities are instructed to be alert for the presence of desert tortoise. If a tortoise is spotted, activities adjacent to the tortoise's location will be halted and the tortoise will be allowed to move away from the activity area. If the tortoise is not moving, it will be relocated by an Acceptable Biologist to nearby suitable Habitat and placed in the shade of a shrub. To the maximum extent Feasible, O&M activities will avoid the period from February 15 and October 31.

Utility development protocols have been developed to avoid or minimize potential adverse impacts to the desert tortoise in the Conservation Areas from utility and road right-of-way projects, such as the installation and maintenance of water, sewer, and electric lines and roadway maintenance. The objectives of these protocols are to provide reliable and consistent direction on utility development within the Conservation Areas. Two utility development protocols, inactive and active season, provide specific direction on site preparation and construction phases of utility projects in the Conservation Areas. The protocols include steps to be followed during the desert tortoise active and/or inactive season. The inactive season protocol must be used for utility maintenance or development within the November 1 to February 14 time frame; the active season protocol must be used for utility maintenance or development within the February 15 to October 31 time frame. Deviations from these time frames must be presented to the RMOC.

Inactive Season Protocol. This protocol is applicable to pre-construction and construction phases of utility Covered Activity projects occurring between November 1 and February 14. These protocols apply only to the site preparation and construction phases of projects. The project proponent must follow the eight pre-construction protocol requirements listed below.

1. A person from the entity contracting the construction shall act as the contact person with the representative of the appropriate RMUC. He/she will be responsible for overseeing compliance with the protective stipulations as stated in this protocol.

2. Prior to any construction activity within the Conservation Areas, the contact person will meet with the representative of the appropriate RMUC to review the plans for the project. The representative of the appropriate RMUC will review alignment, pole spacing, clearing limits, burrow locations, and other specific project plans which have the potential to affect the desert tortoise. He or she may recommend modifications to the contact person to further avoid or minimize potential impacts to desert tortoise.

3. The construction area shall be clearly fenced, marked, or flagged at the outer boundaries to define the limits of construction activities. The construction right-of-way shall normally not exceed 50 feet in width for standard pipeline corridors, access roads and transmission corridors, and shall be minimized to the maximum extent Feasible. Existing access roads shall be used when available, and rights-of-way for new and existing access roads shall not exceed 20 feet in width unless topographic obstacles

require greater road width. Other construction areas including well sites, storage tank sites, substation sites, turnarounds, and laydown/staging sites which require larger areas will be determined in the preconstruction phase. All construction workers shall be instructed that their activities shall be confined to locations within the fenced, flagged, or marked areas.

4. An Acceptable Biologist shall conduct pre-construction clearance surveys of all areas potentially disturbed by the proposed project. Any winter burrows discovered in the Conservation Areas during the pre-construction survey shall be avoided or mitigated. The survey shall be submitted to the representative of the appropriate RMUC as part of plan review.

5. All site mitigation criteria shall be determined in the pre-construction phase, including but not limited to seeding, barrier fences, leveling, and laydown/staging areas, and will be reviewed by the representative of the appropriate RMUC prior to implementation.

6. A worker education program shall be implemented prior to the onset of each construction project. All construction employees shall be required to read an educational brochure prepared by the representative of the appropriate RMUC and/or the RMOC and attend a tortoise education class prior to the onset of construction or site entry. The class will describe the sensitive species which may be found in the area, the purpose of the MSHCP Reserve System, and the appropriate measures to take upon discovery of a sensitive species. It will also cover construction techniques to minimize potential adverse impacts.

7. All pre-construction activities which could Take tortoises in any manner (e.g., driving off an established road, clearing vegetation, etc.) shall occur under the supervision of an Acceptable Biologist.

8. If there are unresolvable conflicts between the representative of the appropriate RMUC and the contact person, then the matter will be arbitrated by the RMOC and, if necessary, by CVCC.

The following terms are established to protect the desert tortoise during utility related construction activities in the Conservation Areas and are to be conducted by an Acceptable Biologist.

- An Acceptable Biologist shall oversee construction activities to ensure compliance with the protective stipulations for the desert tortoise.

- Desert tortoises found above ground inside the project area during construction shall be moved by an Acceptable Biologist out of harm's way and placed in a winter den (at a distance no greater than 250 feet). If a winter den cannot be located, the USFWS or CDFG shall determine appropriate action with respect to the tortoise. Tortoises found above ground shall be turned over to the Acceptable Biologist.

- No handling of tortoises will occur when the air temperature at 15 centimeters above ground exceeds 90 degrees Fahrenheit.

- Desert tortoise burrows shall be avoided to the maximum extent Feasible. An Acceptable Biologist shall excavate any burrows which cannot be avoided and will be disturbed by construction. Burrow excavation shall be conducted with the use of hand tools only, unless the Acceptable Biologist determines that the burrow is unoccupied immediately prior to burrow destruction.

- Only burrows within the limits of clearing and surface disturbance shall be excavated. Burrows outside these limits, but at risk from accidental crushing, shall be protected by the placement of deterrent barrier fencing between the burrow and the construction area. Installation and removal of such barrier fencing shall be under the direction and supervision of an Acceptable Biologist.

- For electrical transmission line and road construction projects, only burrows within the right-of-way shall be excavated. Burrows outside the right-of-way, but at risk from accidental crushing, shall be protected by the placement of deterrent barrier fencing between the burrow and the right-of-way. Installation and removal of such barrier fencing shall be under the direction and supervision of an Acceptable Biologist.

- Tortoises in the Conservation Areas are not to be removed from burrows until appropriate action is determined by USFWS or CDFG with respect to the tortoise. The response shall be carried out within 72 hours.

- Blasting is not permissible within 100 feet of an occupied tortoise burrow.

During construction, contractors will comply with the mitigation and minimization measures contained within this protocol. These measures are:

- All trenches, pits, or other excavations shall be inspected for tortoises by an Acceptable Biologist prior to filling.

- All pipes and culverts stored within desert tortoise Habitat shall have both ends capped to prevent entry by desert tortoises. During construction, all open ended pipeline segments that are welded in place shall be capped during periods of construction inactivity to prevent entry by desert tortoises.

- Topsoil removed during trenching shall be re-spread on the pipeline construction area following compaction of the backfill. The area shall be restored as determined during the environmental review.

- All test pump water will be routed to the nearest wash or natural drainage. The route will be surveyed by an Acceptable Biologist. If tortoises are found in the drainage area the Acceptable Biologist will remove the tortoises.

- Powerlines associated with water development, such as to provide power for pumps, should be buried underground adjacent to the pipe. All above ground structures deemed to be necessary shall be equipped with functional anti-perching devices that would prevent their use by ravens and other predatory birds, and shall adhere to the electrical distribution protocol which follows.

- In order to perform routine O&M of the water systems such as wells, pumps, water lines and storage tanks, etc., employees are to be trained in the area of desert tortoise education. This training will be performed on a regular basis by an Acceptable Biologist for those personnel not previously trained. The training will include at a minimum the following: identification of tortoises, burrows, and other sign; and instructions on installing tortoise barrier fencing. During the course of basic O&M, desert tortoise will be avoided. Untrained employees shall not perform maintenance operations within the reserve.

- All disturbance areas around poles or concrete pads will be reduced to a size just large enough for the construction activity.

- Areas disturbed around poles or construction pads will be restored as determined during the pre-construction process.

- Poles or other above ground structures necessary for electrical distribution development shall be minimized as much as possible. All above ground structures shall be equipped with functional anti-perching devices that would prevent their use by ravens and other predatory birds.

- In order to perform routine O&M of the electrical distribution systems such as transmission lines and poles, substations, etc., employees are to be trained in the area of desert tortoise education. This training will be performed on a regular basis by a qualified biologist for those personnel not previously trained. The training will include at a minimum the following: identification of tortoises, burrows, and other sign; and instructions on installing tortoise barrier fencing. During the course of basic O&M, desert tortoise will be avoided. Untrained employees shall not perform maintenance operations within the non-Take areas.

- All trash and food items shall be promptly contained and removed daily from the project site to reduce the attractiveness of the area to common ravens and other desert tortoise predators.

- Construction activities which occur between dusk and dawn shall be limited to areas which have already been cleared of desert tortoises by the Acceptable Biologist and graded or located in a fenced right-of-way. Construction activities shall not be permitted between dusk and dawn in areas not previously graded.

Active Season Protocol. This protocol is applicable to pre-construction and construction phases of utility development projects occurring between February 15 and November 1. It is identical to the Inactive Season Protocol with the following additions:

- Work areas shall be inspected for desert tortoises within 24 hours of the onset of construction. To facilitate implementation of this condition, burrow inspection and excavation may begin no more than seven (7) days in advance of construction activities, as long as a final check for desert tortoises is conducted at the time of construction.

- All pre-construction activities which could Take tortoises in any manner (e.g., driving off an established road, clearing vegetation, etc.) shall occur under the overall supervision of an Acceptable Biologist. Any hazards to tortoises created by this activity, such as drill holes, open trenches, pits, other excavations, or any steep sided depressions, shall be checked three times a day for desert tortoises. These hazards shall be eliminated each day prior to the work crew leaving the site, which may include installing a barrier that will preclude entry by tortoises. Open trenches, pits or other excavations will be backfilled within 72 hours, whenever possible. A 3:1 slope shall be left at the end of every open trench to allow trapped desert tortoises to escape. Trenches not backfilled within 72 hours shall have a barrier installed around them to preclude entry by desert tortoises. All trenches, pits, or other excavations shall be inspected for tortoises by a biological monitor trained and approved by the Acceptable Biologist prior to filling.

- If a desert tortoise is found, the biological monitor shall notify the Acceptable Biologist who will remove the animal as soon as possible.

- Only burrows within the limits of clearing and surface disturbance shall be excavated. Burrows outside these limits, but at risk from accidental crushing, shall be protected by the placement of deterrent barrier fencing between the burrow and the construction area. The barrier fence shall be at least 20 feet long and shall be installed to direct the tortoise leaving the burrow away from the construction area. Installation and removal of such barrier fencing shall be under the direction and supervision of the biological monitor.

- If blasting is necessary for construction, all tortoises shall be removed from burrows within 100 feet of the blast area.

Disposition of Sick, Injured, or Dead Specimens. Upon locating dead, injured, or sick desert tortoises under any utility or road project, initial notification by the contact representative or Acceptable Biologist must be made to the USFWS or CDFG within three (3) working days of its finding. Written notification must be made within five (5) calendar days with the following information: date; time; location of the carcass; photograph of the carcass; and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care. Injured animals shall be taken care of by the Acceptable Biologist or an appropriately trained veterinarian. Should any treated tortoises survive, USFWS or CDFG should be contacted regarding the final disposition of the animals.

Fluvial Sand Transport. Activities, including O&M of facilities and construction of permitted new projects, in fluvial sand transport areas in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, West Deception Canyon, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas will be conducted in a manner to maintain the fluvial sand transport capacity of the system.

Le Conte's Thrasher. This measure does not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to O&M of Covered Activities. In modeled Le Conte's thrasher Habitat in all the Conservation Areas, during the nesting season, January 15 - June 15, prior to the start of construction activities, surveys will be conducted by an Acceptable Biologist on the construction site and within 500 feet of the construction site, or to the property boundary if less than 500 feet. If nesting Le Conte's thrashers are found, a 500 foot buffer, or to the property boundary if less than 500 feet, will be established around the nest site. The buffer will be staked and flagged. No construction will be permitted within the buffer during the breeding season of January 15 - June 15 or until the young have fledged.

Section 4.5 Land Use Adjacency Guidelines

The purpose of Land Use Adjacency Guidelines is to avoid or minimize indirect effects from Development adjacent to or within the Conservation Areas. Adjacent means sharing a common boundary with any parcel in a Conservation Area. Such indirect effects are commonly referred to as edge effects, and may include noise, lighting, drainage, intrusion of people, and the introduction of non-native plants and non-native predators such as dogs and cats. Edge effects will also be addressed through reserve management activities such as fencing. The following Land Use Adjacency Guidelines shall be considered by the Permittees in their review of individual public and private Development projects adjacent to or within the Conservation Areas to minimize edge effects and shall be implemented where applicable.

4.5.1 Drainage

Proposed Development adjacent to or within a Conservation Area shall incorporate plans to ensure that the quantity and quality of runoff discharged to the adjacent Conservation Area is not altered in an adverse way when compared with existing conditions. Storm water systems shall be designed to prevent the release of toxins, chemicals, petroleum products, exotic plant materials or other elements that might degrade or harm biological resources or ecosystem processes within the adjacent Conservation Area.

4.5.2 Toxics

Land uses proposed adjacent to or within a Conservation Area that use chemicals or generate bio-products such as manure that are potentially toxic or may adversely affect wildlife and plant species, Habitat, or water quality shall incorporate measures to ensure that application of such chemicals does not result in any discharge to the adjacent Conservation Area.

4.5.3 Lighting

For proposed Development adjacent to or within a Conservation Area, lighting shall be shielded and directed toward the developed area. Landscape shielding or other appropriate methods shall be incorporated in project designs to minimize the effects of lighting adjacent to or within the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual.

4.5.4 Noise

Proposed Development adjacent to or within a Conservation Area that generates noise in excess of 75 dBA Leq hourly shall incorporate setbacks, berms, or walls, as appropriate, to minimize the effects of noise on the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual.

4.5.5 Invasives

Invasive, non-native plant species shall not be incorporated in the landscape for land uses adjacent to or within a Conservation Area. Landscape treatments within or adjacent to a Conservation Area shall incorporate native plant materials to the maximum extent Feasible; recommended native species are listed in Table 4-112. The plants listed in Table 4-113 shall not be used within or adjacent to a Conservation Area. This list may be amended from time to time through a Minor Amendment with Wildlife Agency Concurrence.

Table 4-112: Coachella Valley Native Plants Recommended for Landscaping[1]

BOTANICAL NAME	COMMON NAME
Trees	
Washingtonia filifera	California Fan Palm
Cercidium floridum	Blue Palo Verde
Chilopsis linearis	Desert Willow
Olneya tesota	Ironwood Tree
Prosopis glandulosa var. torreyana	Honey Mesquite
Shrubs	
Acacia greggii	Cat’s Claw Acacia
Ambrosia dumosa	Burro Bush
Atriplex canescens	Four Wing Saltbush
Atriplex lentiformis	Quailbush
Atriplex polycarpa	Cattle Spinach
Baccharis sergiloides	Squaw Water-weed
Bebia juncea	Sweet Bush
Cassia (Senna) covesii	Desert Senna
Condalia parryi	Crucilllo
Crossosoma bigelovii	Crossosoma
Dalea emoryi	Dye Weed
Dalea (Psorothamnus) schottii	Indigo Bush
Datura meteloides	Jimson Weed
Encelia farinosa	Brittle Bush
Ephedra aspera	Mormon Tea
Eriogonum fasciculatum	California Buckwheat
Eriogonum wrightii membranaceum	Wright’s Buckwheat
Fagonia laevis	(No Common Name)
Gutierrezia sarothrae	Matchweed
Haplopappus acradenius	Goldenbush
Hibiscus denudatus	Desert Hibiscus
Hoffmannseggia microphylla	Rush Pea
Hymenoclea salsola	Cheesebush
Hyptis emoryi	Desert Lavender
Isomeris arborea	Bladder Pod
Juniperus californica	California Juniper
Krameria grayi	Ratany
Krameria parvifolia	Little-leaved Ratany
Larrea tridentate	Creosote Bush

BOTANICAL NAME	COMMON NAME
Lotus rigidus	Desert Rock Pea
Lycium andersonii	Box Thorn
Petalonyx linearis	Long-leaved Sandpaper Plant
Petalonyx thurberi	Sandpaper Plant
Peucephyllum schottii	Pygmy Cedar
Prunus fremontii	Desert Apricot
Rhus ovata	Sugar-bush
Salazaria mexicana	Paper-bag Bush
Salvia apiana	White Sage
Salvia eremostachya	Santa Rosa Sage
Salvia vaseyi	Wand Sage
Simmondsia chinensis	Jojoba
Sphaeralcia ambigua	Globemallow (Desert Mallow)
Sphaeralcia ambigua rosacea	Apricot Mallow
Trixis californica	Trixis
Zauschneria californica	California Fuchsia
Groundcovers	
Mirabilis bigelovii	Wishbone Bush (Four O'Clock)
Mirabilis tenuiloba	White Four O'Clock (Thin-lobed)
Vines	
Vitis girdiana	Desert Grape
Accent	
Muhlenbergia rigens	Deer Grass
Herbaceous Perennials[2]	
Adiantum capillus-veneris	Maiden-hair Fern (w)
Carex alma	Sedge (w)
Dalea parryi	Parry Dalea
Eleocharis montevidensis	Spike Rush (w)
Equisetum laevigatum	Horsetail (w)
Juncus bufonis	Toad Rush (w)
Juncus effuses	Juncus (w)
Juncus macrophyllus	Juncus (w)
Juncus mexicanus	Mexican Rush (w)
Juncus xiphioides	Juncus (w)
Notholaena parryi	Parry Cloak Fern
Pallaea mucronata	Bird-foot Fern
Cacti and Succulents	
Agave deserti	Desert Agave
Asclepias albicans	Desert Milkweed (Buggy-whip)
Asclepias subulata	Ajamete
Dudleya arizonica	Live-forever
Dudleya saxosa	Rock Dudleya
Echinocereus engelmannii	Calico Hedgehog Cactus
Ferocactus acanthodes	Barrel Cactus
Fouquieria splendens	Ocotillo
Mamillaria dioica	Nipple Cactus
Mamillaria tetrancistra	Corkseed Cactus

BOTANICAL NAME	COMMON NAME
Nolina parryi	Parry Nolina
Opuntia acanthocarpa	Stag-horn or Deer-horn Cholla
Opuntia bigelovii	Teddy Bear or Jumping Cholla
Opuntia basilaris	Beavertail Cactus
Opuntia echinocarpa	Silver or Golden Cholla
Opuntia ramosissima	Pencil Cholla, Darning Needle Cholla
Yucca schidigera	Mojave Yucca, Spanish Dagger
Yucca whipplei	Our Lord’s Candle

[1] Source: “Coachella Valley Native Plants, Excluding Annuals (0 ft. to approximately 3,000 ft. elevation).” Compiled by Dave Heveron, Garden Collections Manager, and Kirk Anderson, Horticulturist, The Living Desert, May, 2000, for the Coachella Valley Mountains Conservancy. [2] Common names for herbaceous perennials that are followed by “(w)” indicate a water or riparian species.

Table 4-113: Prohibited Invasive Ornamental Plants[1]

BOTANICAL NAME	COMMON NAME
Acacia spp. (all species except A. greggii)	Acacia (all species except native catclaw acacia)
Arundo donax (✓)	Giant Reed or Arundo Grass
Atriplex semibaccata (✓)	Australian Saltbush
Avena barbata	Slender Wild Oat
Avena fatua	Wild Oat
Brassica tournefortii (✓✓)	African or Saharan Mustard
Bromus madritensis ssp. *rubens (✓)*	Red Brome
Bromus tectorum (✓✓)	Cheat Grass or Downy Brome
Cortaderia jubata [syn.*C. atacamensis*]	Jubata Grass or Andean Pampas Grass
Cortaderia dioica [syn. *C. selloana*]	Pampas Grass
Descurainia sophia	Tansy Mustard
Eichhornia crassipes	Water Hyacinth
Elaegnus angustifolia	Russian Olive
Foeniculum vulgare	Sweet Fennel
Hirschfeldia incana	Mediterranean or Short-pod Mustard
Lepidium latifolium	Perennial Pepperweed
Lolium multiflorum	Italian Ryegrass
Nerium oleander	Oleander
Nicotiana glauca (✓)	Tree Tobacco
Oenothera berlandieri (#)	Mexican Evening Primrose
Olea europea	European Olive Tree
Parkinsonia aculeata (✓)	Mexican Palo Verde
Pennisetum clandestinum	Kikuyu Grass
Pennisetum setaceum (✓✓)	Fountain Grass
Phoenix canariensis (#)	Canary Island Date Palm
Phoenix dactylifera (#)	Date Palm
Ricinus communis (✓)	Castorbean
Salsola tragus (✓)	Russian Thistle
Schinus molle	Peruvian Pepper Tree or California Pepper
Schinus terebinthifolius	Brazilian Pepper Tree
Schismus arabicus	Mediterranean Grass
Schismus barbatus (✓✓)	Saharan Grass, Abu Mashi

BOTANICAL NAME	COMMON NAME
Stipa capensis (✓✓)	No Common Name
Tamarix spp. (all species) (✓✓)	Tamarisk or Salt Cedar
Taeniatherum caput-medusae	Medusa-head
Tribulus terrestris	Puncturevine
Vinca major	Periwinkle
Washingtonia robusta	Mexican fan palm
Yucca gloriosa (#)	Spanish Dagger

[1] Sources: California Exotic Pest Plant Council, United States Department of Agriculture-Division of Plant Health and Pest Prevention Services, California Native Plant Society, Fremontia Vol. 26 No. 4, October 1998, The Jepson Manual; Higher Plants of California, and County of San Diego Department of Agriculture.

Key to Table 4-113:

\# indicates species not on CalEPPC October 1999 "Exotic Pest Plants of Greatest Ecological Concern in California" list

✓ indicates species known to be invasive in the Plan Area

✓✓ indicates particularly troublesome invasive species

4.5.6 Barriers

Land uses adjacent to or within a Conservation Area shall incorporate barriers in individual project designs to minimize unauthorized public access, domestic animal predation, illegal trespass, or dumping in a Conservation Area. Such barriers may include native landscaping, rocks/boulders, fencing, walls and/or signage.

4.5.7 Grading/Land Development

Manufactured slopes associated with site Development shall not extend into adjacent land in a Conservation Area.

CVCC

Coachella Valley Conservation Commission
Joint Project Review Application

The 30-day Joint Project Review (JPR) timeline does not start until the CVCC receives this completed application as well as the required project information from the Permittee.

Date: August 27, 2020

Permittee Name (Jurisdiction): Riverside County (unincorporated)

SECTION 1: PROJECT APPLICANT

A. Project Applicant Name(s)/Applicant's Representative: Jonathan Kirby

Mailing Address: 6703 Oak Creek Road
Street

Mojave CA 93501
City State ZIP

Daytime Phone No: (213) 212-0781 Fax No: (   )

E-Mail: Jonathan.Kirby@brookfieldrenewable.com

PROPERTY OWNER INFORMATION:

B. Assessor's Parcel Number(s) (APNs): 516020001, 516020002, 5160200

Property Owner Name(s)/Owner's Representative: Mohammed Koya

Mailing Address: 4020 Sierra College Boulevard, Suite 200
Street

Rocklin CA 95677
City State ZIP

Daytime Phone No: (916) 628-3064 Fax No: (888)317-2434

E-Mail: mfkoya@hotmail.com

SECTION 2: PROJECT DESCRIPTION

Total Acres of Project Site: 640

Total Acres Planned for Development: 39.9 acres of disturbance (9.8 of which is existing disturbance)__

Total Acres Planned for Permanent Conservation: Brookfield is interested in conserving southern portions of the property that won't be affected by WTG construction or operations.

Project Description:

Please provide as complete a description of the project as possible, including proposed development, areas of disturbance, conservation, mitigation areas, restoration, and any offsite improvements.

The Alta Mesa Wind infrastructure is located on 640 acres in Riverside County, 11 miles northwest of the City of Palm Springs in Riverside County (see Figure 1). The project would use existing access roads to reach the site. The Alta Mesa Wind Project (Project) would include removal of 159 existing wind turbine generators (WTG), ranging in 114 to 145 feet in height, and constructing, operating, maintaining, and decommissioning 8 new WTGs. The Project would produce 27 MW of wind energy. The new facilities would be decommissioned at the end of their useful life. Figure 1 illustrates the project location and new WTG locations. Attachment A includes the complete project description.

- Attach an electronic file of the area of Disturbance in CAD or ESRI Shapefile format (applications for a single-family dwelling are not required to submit electronic file)
- Attach map(s) as necessary to depict the project location.
- Attach copies of a map delineating:
  - the areas of proposed disturbance on the project site.
  - areas on the project site proposed to be left undisturbed
  - areas of proposed permanent conservation on the project site

The disturbed area is any portion of the earth's surface or natural vegetation that has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural condition pursuant to a legally issued land use, grading or building permit. This definition does not include land that has been restored to a native condition, such that the vegetative ground cover and soil characteristics are equal to surrounding conditions.

Examples of disturbance include but are not limited to: staging areas, areas of side casting, slough, stockpiling, and spillage or otherwise impacted in preparing the property for development; areas to be disturbed in installing septic tanks and leach fields including the expansion area for leach fields; and any off-site improvements such as roads or sewers required as a condition of approval.

Permanent conservation is an undeveloped portion of a parcel that is legally described and permanently protected through an appropriate Legal Instrument that allows long-term monitoring and management in perpetuity.

SECTION 3

AUTHORITY FOR THIS APPLICATION IS HEREBY GIVEN:

I certify that I am/we are the record owner(s) or authorized agent and that the information filed is true and correct to the best of my knowledge. An authorized agent must submit a letter from the owner(s) indicating authority to sign the application on the owner's behalf. As the owner of record/authorized agent, I hereby authorize the information to be released to Property Owner(s)/Owner's Representative/authorized agent.

Please submit a scanned PDF of your signed application with all project documentation.

Mohammed Koya
PRINTED NAME OF PROPERTY OWNER

SIGNATURE OF PROPERTY OWNER

PRINTED NAME OF PROPERTY OWNER REPRESENTATIVE

SIGNATURE OF PROPERTY OWNER REPRESENTATIVE

If the subject property is owned by persons who have not signed as owners above, attach a separate sheet that references the application case number and lists the printed names and signatures of all persons having an interest in the property.

Appendix F

Applicable Regulations

Appendix E
Applicable Regulations

Modern wind turbines are built to a series of established international design standards including seismic and wind loads as listed below:

Nacelle and Hub
IEC 61400-1 Edition 3
EN 50308

Tower
IEC 61400-1 Edition 3
Eurocode 3

Blades
DNV-OS-J102
IEC 1024-1
IEC 60721-2-4
IEC 61400 (Part 1, 12 and 23)
IEC WT 01 IEC
DEFU R25
ISO 2813
DS/EN ISO 12944-2

Gearbox
ISO 81400-4

Generator
IEC 60034

Transformer
IEC 60076-11,
IEC 60076-16,
CENELEC HD637 S1

Lightning Protection
IEC 62305-1: 2006
IEC 62305-3: 2006
IEC 62305-4: 2006
IEC 61400-24:2010

Rotating Electrical Machines
IEC 34

Safety of Machinery, Safety-related Parts of Control Systems
IEC 13849-1

Safety of Machinery – Electrical Equipment of Machines
IEC 60204-1

Appendix G

Geotechnical Plan

Geotechnical Engineering Report
Alta Mesa Wind Project

Brookfield Renewable Partners
Riverside County, California

Prepared for
M. A. Mortenson Company

February 2021

Geotechnical Engineering Report
Alta Mesa Wind Project

Brookfield Renewable Partners
Riverside County, California

Prepared for
M. A. Mortenson Company

February 2021

Geotechnical Engineering Report
Alta Mesa Wind Project
M. A. Mortenson Company
Riverside County, California
February 2021

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Certifications

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of California.

Jed Greenwood

JEDEDIAH DRURY GREENWOOD
C 79417
CIVIL

Exp 3/31/2022

Jed Greenwood

Jedediah D. Greenwood
PE #: 79417

February 15, 2021
Date

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly licensed Certified Engineering Geologist under the laws of the State of California.

Jed Greenwood

JEDEDIAH D. GREENWOOD
No. 2558

Exp 6/30/2021

Jed Greenwood

Jedediah D. Greenwood
CEG #: 2558

February 15, 2021
Date

Executive Summary

Barr Engineering Company (Barr), under authorization and contract with M. A. Mortenson Company (Mortenson), has completed a geotechnical investigation of the Alta Mesa Wind Project in Riverside County, California. The investigation was in support of design for proposed wind turbine foundations and foundations for other project infrastructure.

The geotechnical investigation consisted of geotechnical borings (hollow-stem auger and mud rotary), standard penetration tests (SPT), bulk soil sampling, general soil laboratory testing, geophysical testing, and a field review of the proposed wind turbine locations. This program of geotechnical investigation was selected to evaluate the strength, compressibility, stiffness, and density characteristics of the soils at the project site.

The Alta Mesa project site is located atop West Whitewater Hill. The northern boundary of the project site is a deep east-west canyon created by the Coachella Valley strand of the Banning fault. The Banning fault separates crystalline rocks to the north from the old alluvium on West Whitewater Hill to the south across the deep east-west-trending canyon. This fault is mapped in the Alquist-Priolo (A-P) Earthquake Fault Zone. One proposed turbine (AM-T3A [GEO-12]) is located just within the A-P zone on the south side of the east-west canyon atop West Whitewater Hill. The proposed wind turbine location is about 450 feet south of the mapped trace of the Banning fault.

The Garnet Hill fault has three traces in the vicinity of the site: two along the flank of the steep southern slope of West Whitewater Hill, and another in the young alluvium farther south. All three of these are mapped in the Alquist-Priolo Earthquake Fault Zone. These are branches of a single fault trace located further east than approximately the Whitewater River. Two proposed wind turbines (AM-T1 [GEO-10] and AM-T2A [GEO-11]) and the met tower (MET-02) are located just within the A-P zone on the east side of the furthest north branch of this fault. They are located atop the relatively steep slope above the fault trace. The closest proposed wind turbine location (AM-T2A [GEO-11]) is about 375 feet east of the mapped fault trace.

While a few investigation locations are within but near the edge of the A-P zone for the Banning and the Garnet Hill faults, the proposed turbine and met tower locations are considered far enough away from the relatively well-defined fault traces that surface rupture is not a significant concern.

In general, the typical stratigraphy at the project site consists of a thin veneer of topsoil overlying alluvium. The alluvium consists of layers of sand with varying amounts of silt, gravel, and cementation.

The primary findings of the geotechnical exploration and analyses indicate:

- The results of the field testing found that the soils are generally in a dense to very dense condition. They appear to be suitable for support of spread footing foundations based on an evaluation of bearing capacity and settlement.

- Groundwater was not observed in any of the geotechnical borings completed during the investigation and groundwater will not need to be considered in foundation design.

- Results of the geotechnical exploration indicate conventional excavation machines will likely be suitable at locations where a measurable amount of uncemented soil cover was present, which includes four of the seven proposed wind turbine locations assuming a foundation depth of 10 feet below existing grade. At the remaining three proposed wind turbine locations, field investigation results and other field observations indicate easy ripping excavation characteristics of the cemented soil layers encountered within the upper 10 feet below existing grade. A large excavator and bucket with reinforced teeth may be sufficient to remove weakly to moderately cemented soils. For strongly cemented soils, a heavy-duty hydraulic hammer or similar effort may be required for foundation excavation.

- Soils considered to have shrink-swell potential generally consist of plastic clays subject to changes in moisture content. The results of the investigation indicate the soils encountered on site are granular and do not have appreciable shrink-swell potential.

- Alluvium soils are mapped throughout the project site and were encountered within each geotechnical boring completed during the investigation. These types of soils are potentially susceptible to risk of soil collapse.

    - Based on the results of the geotechnical investigation, the proposed wind turbine locations are at low risk of soil collapse.

    - The results of the geotechnical investigation indicate that the proposed site ancillary structures included in the investigation are at low risk of collapse, provided the excavation subgrade soils are leveled and compacted to achieve at least 98 percent of the laboratory maximum dry density measured according to the standard Proctor method.

- Results of chemical testing on select soil samples indicate that the soils at the site exhibit relatively low soluble sulfate levels. Based on the laboratory test results, cement with an S0 exposure class should be suitable for use in foundations.

- Support structures, including the met tower and substation, may generally be designed using typical best practice methods. A breakdown of recommended geotechnical design parameters for ancillary structures is included in this report.

This geotechnical investigation was based on project layout and proposed structure coordinates provided to Barr on September 3, 2020 (proposed substation and met tower locations were provided on August 31, 2020). The geotechnical engineer should be notified of any final changes to proposed structure locations for further evaluation and investigation (if needed).

1.0 Introduction

The Alta Mesa Wind Project is a proposed wind project consisting of seven proposed wind turbines. While a turbine has not yet been formally selected, the following turbines are being considered for the project.

- Vestas V117-4.2MW
- Vestas V117-3.6MW

This report describes the investigation and testing performed, presents the results of this work, and provides geotechnical analyses and conclusions for foundations to be constructed on the proposed wind project site.

1.1 Site Location

The Alta Mesa Wind Project is located in western Riverside County, California, northwest of the town of Palm Springs, as shown in Figure 1. Figure 2 shows the currently proposed layout for the project. The coordinates of the geotechnical field test locations are included in Table 1. All geotechnical field work was completed within 15 feet of the surveyed and staked coordinates unless otherwise noted.

1.2 Previous Investigations

Earth Systems Pacific completed a limited geologic hazard study in support of the proposed wind power development and issued a report in July of 2020 under contract with Brookfield Power US Assessment Management, LLC (Earth Systems Pacific, 2020).

Several geologic and geotechnical engineering reports were completed for the existing Alta Mesa Wind Project site, including a preliminary geotechnical investigation report issued by Leighton and Associates, Inc. in 1983, a geologic review report issued by Leighton and Associates, Inc. in 1989, a geologic inspection and mapping report issued by NMG Geotechnical Inc. in 1995, an engineering geology and geotechnical engineering report issued by Earth Systems Consultants in 1999, a revised geologic map as an update to the engineering geology and geotechnical engineering report issued by Earth Systems Southwest in 2001, and a supplemental letter report for substantial conformance issued by Earth Systems Southwest in 2005 (Leighton and Associates, Inc., 1983; Leighton and Associates, Inc., 1989; NMG Geotechnical Inc., 1995; Earth System Consultants, 1999; Earth Systems Southwest, 2001; Earth Systems Southwest, 2005).

1.3 Wind Turbine Nomenclature

In this report (including all tables, figures, and appendices), all proposed wind turbine and ancillary structure locations are referenced based on the coordinates provided to Barr on September 3, 2020 (Westwood, 2020; included in Table 1). The substation and met tower coordinates were provided on August 31, 2020 (Westwood, 2020).

Table 1 provides a summary of the geotechnical field test locations and corresponding wind turbine IDs, including the associated geotechnical field test identification number. In this report, the geotechnical field test IDs are noted in brackets (for example: AM-T1 [GEO-10] – 'AM-T1' is the wind turbine location and 'GEO-10' is the geotechnical field test ID).

2.0 Geology

The regional and site geology are discussed in more detail below, including seismicity and geologic hazards.

2.1 Regional Physiography

The project site is located in the San Gorgonio Pass area at the far west end of the Coachella Valley, about 9 miles northwest of downtown Palm Springs. The San Bernardino Mountains are present to the north of the pass, while the steep north face of Mt. San Jacinto is located to the south. The site is located atop West Whitewater Hill and the adjacent low mountains to the north of this hill, which rise about 1,500 feet above the valley floor. The project area is bounded on the south by I-10, on the west by Cottonwood Canyon, and on the east by Whitewater Canyon.

The Alta Mesa project site is located atop West Whitewater Hill. The high point of this topographic feature is near its eastern end; the canyon then steeply descends eastward to the valley floor and more gently descends westward to the valley floor along the site access road. The northern boundary of the project site is a deep east-west canyon created by the Coachella Valley strand of the Banning fault. Topography at the project site is shown in Figure 3.

2.2 Geologic History

The project site is located at the junction of three physiographic provinces in southern California, the Transverse Ranges to the north, the Peninsular Ranges to the southwest, and the Colorado Desert to the southeast.

In this part of California, volcanic and marine sedimentary rocks ranging in age from Paleozoic to Mesozoic were intruded by granitic rocks in late Mesozoic to Cenozoic time. These rocks primarily comprise the Transverse Ranges and Peninsular Ranges physiographic provinces. There were many granite intrusions to the extent that the aggregate is classified as what is known as a batholith. These intrusions distorted and metamorphosed the earlier sedimentary rocks, and later intrusions deformed earlier intrusions. The intrusions and deformation were driven by the subduction to the west, where oceanic crust was thrust under the North American plate. Eventually, this subduction ended, and the relative motion of the Pacific plate and the North American plate transitioned into the San Andreas fault zone, of which the Coachella Valley strand of the Banning fault is a part. Rocks in the Transverse Ranges physiographic province underwent and continue to experience clockwise rotation during right-lateral strike-slip motion along the plate boundary. This relative motion introduced new stress and deformation to the region. As a result of the intrusions and deformation, many of the rocks at the site have undergone metamorphism and exhibit internal fabrics and foliations.

The entire Coachella Valley is in the Colorado Desert physiographic province, which is a low-lying barren desert basin consisting primarily of alluvial sediments. The province is a depressed block associated with the San Andreas Fault and located between the Peninsular Ranges province to the west and the Mojave Desert province to the east.

Based on Bedrossian, et al. (2012), the project site and West Whitewater Hill are underlain by a very old alluvial fan (Qvof) (Figures 4 and 5). To the north of the project site and the Banning fault, the geology is mapped primarily as Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin (pKm) and granitic and other intrusive crystalline rocks of all ages (Gr).

Alluvial fans are the accumulation of sediments washed off rising mountain ranges. In cross section, they are wedge-shaped, thin near the mountains and thick in the valleys, where the fan deposits inter-finger with the valley deposits (typically aeolian sand dunes and dry lake deposits). Alluvial fans are composed largely of debris flow deposits, sheet flow deposits, and colluvium (loose weathered rock moved down-slope by gravity). The top of the alluvial fan is close to the source of sediment—the eroding mountains—so the sediment is coarse and angular. The sediments tend to get finer toward the distal end of the fan. The nature of the deposits also changes over time as the fan builds up higher on the mountain and further out into the valley, generally becoming finer (USGS, 2006).

2.3 Seismicity

The San Andreas fault zone is the predominant seismic source in the region. This fault zone accommodates the relative deformation of the Pacific plate and the North American plate in the form of right-lateral strike-slip motion. Three sub-parallel faults trending east-southeast take up the majority of this motion in this area. From north to south, these are the Mission Creek fault, the Banning fault, and the Garnet Hill fault. Note that the Mission Creek fault is also called the North Branch of the San Andreas fault (Coachella strand) while the Banning fault is also called the South Branch of the San Andreas fault (Banning strand). More detail about each fault is included in the following sections. Faults near the project site are shown in Figures 4, 5, and 6.

2.3.1 Mission Creek Fault

The Mission Creek fault is located along the base of the mountains at the northeast edge of the Coachella Valley, extending through the town of Desert Hot Springs. This fault is also called the North Branch of the San Andreas fault (Coachella strand). Given that it is a branch of the San Andreas fault, its relative motion is right-lateral strike-slip. The fault creates a significant barrier to southwestward groundwater flow such that the fault trace is marked sporadically by oases and vegetation and is associated with hot springs and hot water wells. This seepage barrier results in the groundwater depth being greater on the southwest side of the fault trace (Drenth *et al*., 2003).

2.3.2 Banning Fault

The Banning fault is also referred to as the South Branch of the San Andreas fault, which is a right-lateral strike-slip fault. The fault trace is located just north of West Whitewater Hill and extends in an east-southeast direction just south of Painted Hill and then across the valley floor in alluvial fan deposits. After extending just south of the town of North Palm Springs, the fault trace runs to the north of Edom Hill and then continues southeast along the east edge of the Coachella Valley. At Cottonwood Canyon, which is a north-south canyon just west of the project site, a major change in the style of active faulting can be observed. East of the canyon, where the project site is located, strike-slip motions dominate. To the west, thrust faults dominate the pattern of active deformation.

As noted, the Banning fault separates crystalline rocks to the north from the old alluvium on West Whitewater Hill to the south across the deep east-west-trending canyon. The linearity of the fault trace suggests that slip on the fault is primarily right-lateral. Additional support for the dominance of right-lateral strike-slip is the source of the alluvial fan gravels, which originated north of the Mission Creek fault, by way of an ancestral Whitewater River. The position of these Whitewater-derived alluvial gravels at Cottonwood Canyon west of the site requires about 4 km of right-lateral slip, which is equivalent to the distance from Whitewater Canyon to Cottonwood Canyons on the Banning fault, assuming that deposition occurred in front of the present Whitewater Canyon. (Yule and Sieh, 2003)

Some evidence can be observed suggesting that the Banning fault is dipping north at the east end of the deep east-west-trending canyon. The contact between the crystalline rocks to the north and the alluvium to the south is exposed on the south-facing canyon wall just west of the Whitewater River. This contact appears to dip north at about 45 degrees.

This fault is mapped in the Alquist-Priolo Earthquake Fault Zone. One proposed wind turbine (AM-T3A [GEO-12]) is located just within the A-P zone on the south side of the east-west canyon atop West Whitewater Hill, as shown in Figure 5. The proposed wind turbine location is about 450 feet south of the mapped trace of the Banning fault. While this proposed wind turbine is located within but near the edge of the A-P zone for the Banning fault, it is considered far enough away from the relatively well-defined fault trace that surface rupture is not a significant concern.

2.3.3 Garnet Hill Fault

The Garnet Hill fault is generally coincident with Interstate 10 and is located just south of West Whitewater Hill, which is made up of an anticlinal feature.

According to Yule and Sieh (2003):

> The "Garnet Hill fault" consists of a series of left-stepping, northwest-trending right-lateral faults with active folds at each stepover. Amplitudes and axial trends define two types of folds. Those at the eastern and western ends of the fault, marked by Edom Hill and West Whitewater Hill, show about 400 m of relief and north- to northwest-trending axes. These larger folds at the end of the fault are manifestations of the transfer of slip from the Coachella Valley strand of the Banning fault onto the Garnet Hill fault. Folds at stepovers along the fault, marked by Garnet Hill, "Hugo" Hill, and East Whitewater Hill are much smaller. They show only 30–200 m of relief and east-trending axes. These smaller folds result from contractional, en echelon stepovers in the fault trace. The discontinuous geometry of the Garnet Hill fault and the small size of these folds

suggest that cumulative slip is too low to have led yet to integration of the fault into a single strand.

The Garnet Hill fault has three traces in the area of the site: two along the flank of the steep southern slope of the anticline, and another in the young alluvium farther south. All three of these are mapped in the Alquist-Priolo Earthquake Fault Zone, as shown in Figure 5. These are branches of a single fault trace located further east than approximately the Whitewater River.

The furthest south of the three traces exhibits a subtle scarp in the young alluvium about a meter high. Its orientation, about N75°W, suggests that the scarp is the result of oblique motion on a dextral thrust fault, north over south. (Yule and Sieh, 2003)

There is strong geomorphic evidence that slip on the further south of the two other traces, at the base of the anticline, is a combination of dextral and reverse. Most of the large drainages crossed by this structure have distinct, large shutter ridges at their mouths. The stream channels deflect right-laterally around these ridges. By the Rule of V's, the trace geometry of the fault indicates a steep to moderate dip northward, under the anticline. (Yule and Sieh, 2003)

The furthest north of the three traces creates the western boundary of the project site, between the upper portion of West Whitewater Hill and the lower elevations of the hilltop further west. As mentioned above, this fault trace is mapped in the Alquist-Priolo Earthquake Fault Zone. Two proposed wind turbines (AM-T1 [GEO-10] and AM-T2A [GEO-02]) and the met tower (MET-02) are located just within the A-P zone on the east side as shown in Figure 5. They are located atop the relatively steep slope above the fault trace. The closest proposed wind turbine location (AM-T2A [GEO-11]) is about 375 feet east of the mapped fault trace. While these proposed wind turbines and met tower are located within but near the edge of the A-P zone for the Garnet Hill fault, they are considered far enough away from the relatively well-defined fault trace that surface rupture is not a significant concern.

2.3.4 Past Earthquakes

Several notable historic earthquakes have occurred in proximity to the project site. Those with magnitudes equal to or greater than 5.9, especially those that have resulted in historic surface rupture in the region, include:

- North Palm Springs Earthquake; July 8, 1986; magnitude M_L 5.9; attributed to the Mission Creek Fault; surface rupture along the Banning Fault centered on Highway 62, with the west end of the rupture extending to about ½ mile east of the Whitewater River (reaching to about 1.5 miles east of the easternmost proposed Alta Mesa wind turbines)
- Landers Earthquake; June 28, 1992; magnitude M_w 7.3; observed surface ruptures on the Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock Faults; surface rupture was documented just south of the town of Yucca Valley, about 16 miles northeast of the project site
- Big Bear Earthquake; June 28, 1992; magnitude M_w 6.4; no surface rupture; no significant structural damage occurred in the Coachella Valley

- Hector Mine Earthquake; October 16, 1999; magnitude M_w 7.1; associated with the Lavic Lake and Bullion Faults; surface ruptures approximately 39 miles northeast of the site; no significant structural damage documented in the Coachella Valley
- Earthquake on Superstition Hills Fault; November 1987; magnitude M 6.5; approximately 56 miles southeast of the site
- Joshua Tree Earthquake; April 22, 1992; magnitude M_w 6.1; no surface rupture; structural damage and minor injuries in Palm Springs area

2.3.5 Surface Rupture

The closest historic surface rupture to the project site was about 1.5 miles east of the easternmost proposed wind turbines at Alta Mesa, as described above. This rupture resulted from the North Palm Springs Earthquake on July 8, 1986, with a magnitude M_L of 5.9. While this earthquake was attributed to the Mission Creek Fault, surface rupture was observed along the Banning fault starting about 2 miles west of Highway 62 and about ½ mile east of the Whitewater River. The rupture zone extended east from this location along the Banning fault to about 2 miles east of Highway 62.

If a similar or stronger earthquake were to occur on the Mission Creek fault, on the Banning or Garnet Hill faults, or even on another fault, there is a reasonable possibility of surface rupture at the site. However, the likelihood of surface rupture at a given location decreases as one moves away from the documented fault trace (Jennings and Bryant, 2010). It should be noted that, with the exception of the historic rupture from the North Palm Springs Earthquake, the Banning and Garnet Hill faults within the site and within about 2 miles of the site are classified as “latest Quaternary” (Bryant and Lundberg, 2002).

Surface fault rupture near the project site is most likely to occur on the Banning fault because it is the south branch of the San Andreas fault. If surface rupture along this fault trace within the project site were to occur, it is most likely to be confined within the deep east-west canyon separating West Whitewater Hill (Alta Mesa site) from the low mountains to the north. Thus, this surface rupture is less likely to impact the wind turbines, none of which will be constructed within the canyon, but would more likely impact access roads and electrical collection systems crossing the canyon. As stated above, the proposed wind turbine closest to the fault trace (AM-T3A [GEO-12]) is located on the south side of the east-west canyon atop West Whitewater Hill, as shown in Figures 5 and 6. This proposed wind turbine is about 450 feet south of the mapped trace of the Banning fault.

Though less likely, if surface rupture were to occur on the northernmost branch of the Garnet Hill fault, the closest proposed wind turbine location (AM-T2A [GEO-11]) is about 375 feet east of the mapped fault trace as shown in Figures 5 and 6. It should be noted that some uncertainty exists in the location of the fault trace, as Jennings and Bryant (2010) list this branch of the Garnet Hill fault as “approximately located” in the vicinity of proposed wind turbine locations AM-T1 [GEO-10] and AM-T2A [GEO-11] in addition to the Alta Mesa met tower MET-02.

2.3.6 Ridgetop Shattering

As stated previously, West Whitewater Hill is the geomorphic manifestation of an active anticline in very old alluvial fan deposits. Atop this hill is a depositional surface comprising a deep red soil, which indicates ≥100,000 years of exposure due to its extreme development (Yule and Sieh, 2003). This surficial soil was observed during Barr's site reconnaissance in September 2020. However, during this reconnaissance exercise and subsequent analysis of aerial images of the site, no evidence of ridgetop shattering was noted. It can be assumed that many large earthquakes have occurred in the last 100,000 years at the site and if associated ridgetop shattering were to have occurred, some remnant evidence of this shattering, especially significant shattering, should be observable. Given that no evidence of ridgetop shattering was noted in this surface estimated to have been exposed for ≥100,000 years, the likelihood of ridgetop shattering during the design life of the project is expected to be low.

2.3.7 Ground Shaking

Earthquake predictions are difficult to make, but various agencies have performed statistical analysis. The California Geological Survey (CGS) and the United States Geological Survey (USGS) completed a 2002 generation of probabilistic seismic hazard maps, which were used to evaluate site seismic risk. The Working Group of California Earthquake Probabilities (WGCEP, 1995) estimated a 22 percent conditional probability that a magnitude 7 or greater earthquake could occur between 1994 and 2024 along the Coachella segment of the San Andreas fault.

The main seismic risk for the site is the occurrence of an earthquake along the San Andreas fault and characteristic earthquakes that result from rupture of each fault segment. For the southern segment of the fault, the estimated characteristic earthquake magnitude is 7.7 (USGS, 2002) with this segment having the longest elapsed time since rupture of any part of the San Andreas fault. The last rupture of the Southern Segment occurred about 1690 AD, based on dating by the USGS near Indio (WGCEP, 1995). This segment also ruptured in about 1020, 1300, and 1450 AD, with an average recurrence interval of about 220 years. The San Andreas fault may rupture in multiple segments, producing high magnitude earthquakes. Paleoseismic studies suggest that the San Bernardino Mountain segment to the north and the Coachella Segment may have ruptured at the same time in 1450 and 1690 AD (WGCEP, 1995).

2.4 Geologic Hazards

Table 2 provides a summary and discussion of geologic and geotechnical hazards for the site. Seismicity is the greatest risk at the site. Slope stability represents another site risk. Design considerations for selected risks are provided in Sections 6 and 7.

3.0 Geotechnical Exploration Methods

The geotechnical investigation consisted of geotechnical borings (hollow-stem auger and mud rotary), standard penetration tests (SPT), bulk soil sampling, general soil laboratory testing, geophysical testing, and a field review of the proposed wind turbine locations. This program of geotechnical investigation was selected to evaluate the strength, compressibility, stiffness, and density characteristics of the soils at the project site.

Figure 2 shows the project site layout. Figures 11 through 13 show the plan location of all field work completed for the project. The site investigation was conducted in September and October of 2020. Laboratory testing was completed in October of 2020. A summary of the field investigation and test locations is included in Table 1.

In addition to the geotechnical investigation, laboratory thermal resistivity tests and field electrical resistivity tests were conducted in support of the project electrical design (to be completed by others).

3.1 Field Work

3.1.1 Geotechnical Borings

One geotechnical boring was performed at each of the seven proposed wind turbine locations. In addition, one geotechnical boring was performed at a formerly proposed wind turbine location (GEO-17). Borings at the wind turbine locations were extended to a target depth ranging from approximately 35 to 60 feet depending on the subsurface conditions encountered and the anticipated cut/fill based on preliminary information provided by the civil designer (Figure 11; Westwood, 2020a). Several of the borings were terminated prior to reaching their target depths due to auger refusal.

A total of three borings were completed for site ancillary structures, including two borings at the proposed substation (SUB-02 and SUB-03) and one boring at the proposed met tower (MET-02). Geotechnical borings completed within the substation footprint were extended to a target depth of approximately 30 feet. The geotechnical boring completed at the proposed met tower (MET-02) was extended to a depth of approximately 25 feet.

The geotechnical borings were performed by Cascade Drilling (Cascade) of Upland, California. One truck-mounted drill rig was used to conduct the borings using hollow-stem auger and mud rotary drilling techniques. Soil sampling and classification was performed at 5-foot intervals, with 2.5-foot sampling intervals performed at depths shallower than 15 feet for all borings. All split-spoon sampling and standard penetration testing was performed in accordance with ASTM D1586.

All samples were sealed in the field in order to preserve the in-situ moisture content. Samples were delivered to Soil Engineering Testing Inc. (SET) in Bloomington, Minnesota, for laboratory testing. The geotechnical boring logs are included in Appendix A. Table 1 includes a summary of the coordinates of each geotechnical boring location.

3.1.2 Bulk Soil Sampling

Bulk samples of representative material from the site were collected for the purpose of laboratory testing. One bulk soil sample (5-gallon bucket) was collected at the project site in support of thermal resistivity testing (Figure 12). In addition, one bulk soil sample was collected at the project site in support of California Bearing Ratio (CBR) testing (Figure 13) to evaluate the strength of the road subgrade.

3.2 Laboratory Testing

The following tests were performed by SET:

- Moisture content tests in accordance with ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass"
- Sieve analysis in accordance with ASTM D422, "Standard Test Method for Particle-Size Analysis of Soils"
- Direct shear testing in accordance with ASTM D3080, "Standard Test Method for Direct Shear Test of Soil Under Consolidated Drained Conditions"
- Standard Proctor Density tests in accordance with ASTM D698, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))"
- California Bearing Ratio tests in accordance with ASTM D1883, "Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils"
- Soil pH tests in accordance with ASTM D4972 "Standard Test Method for pH of Soils"
- Determination of chloride and sulfate content of soils in accordance with EPA Method 9056A "Determination of Inorganic Anions by Ion Chromatography"

All laboratory test results are provided in Appendix B.

3.3 Review of Wind Turbine Locations

A Barr geotechnical engineer with experience with wind power development performed site reconnaissance to review the proposed wind turbine locations for potential geological and geotechnical and concerns. In particular, the review focused on slope stability at wind turbine locations adjacent to steep slopes. Not all proposed wind turbine locations were reviewed, but locations with the most significant topography were individually evaluated in the field.

No evidence of slope failure as it relates to important infrastructure was noted during site reconnaissance. It should be noted that a large natural slope failure and associated headscarp was noted approximately one mile north of the project site. Several of the old wind turbines on the existing wind project to the north of the Alta Mesa site were removed and relocated in 1997 due to rainfall-induced slope movement.

3.4 Electrical Resistivity Testing

Electrical resistivity testing was completed by Barr in accordance with ASTM method G57 "Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method" (equivalent to IEEE Std. 81) (Figure 12). The electrical resistivity testing was completed in October of 2020. Co-linear arrays of four electrodes were placed in the ground for each measurement. Testing was performed at one location within the proposed Alta Mesa substation footprint (SUB-03). During testing, measurements were taken to determine average soil resistivity in two perpendicular arrays. The array orientation was then rotated 90 degrees with measurements taken at the same "a" spacings. At the proposed substation location (SUB-03), measurements were performed at "a" spacings of 2, 5, 10, 20, 30, 40, 50, 70, 100, 150, and 200 feet.

The equipment used to collect the data consisted of a resistivity meter (a Mini-Res Ultra resistivity meter manufactured by L & R Instruments, Inc.), four metal electrodes, and connecting wire. The resistivity meter read in resistance (Ω) directly and did not require the conversion of electrical potential (V) and inductance (I) to calculate resistance (V/I in Ω). Before and after each array was completed, the resistivity meter was connected to a resistor of known resistance, and the resulting values were compared to the known resistance value for quality assurance and quality control purposes. The meter was properly calibrated for all test locations and no instrument adjustments had to be made.

Co-linear arrays of four electrodes were placed in the ground for each measurement. Electrical current was input to the ground through the two outer electrodes of the array. The voltage drop produced by the resulting electrical field was measured across the two inner electrodes. The "a" spacing was increased with each measurement, expanding the array about a common center. Increasing the electrode separation increases the depth of investigation and indicates vertical variation in resistivity.

Apparent resistivity (ρ_a) was calculated for each measurement and corresponding electrode spacing (a) using the resistance measurement (Ω) and the geometric factor (K) as follows:

$$\rho_a = K(V/I)$$

where:

$$K = 2\pi a$$

The soil electrical resistivity test results are included as Appendix C.

3.5 Thermal Resistivity Testing

One bulk soil sample was collected at the proposed substation location (SUB-03) by Barr personnel for thermal resistivity testing (Figure 12). The sample was collected with the use of a drill rig from a depth of 3 to 5 feet. The sample was sealed in the field in order to preserve the in-situ moisture content. The sample was transported to SET, where testing was completed in accordance with ASTM D5334, "Standard Test Method for Determination of Thermal Conductivity of Soil and Soft Rock by Thermal Needle Probe

Procedure." Laboratory tests include measurement of the soil's moisture content, standard Proctor dry density, optimum moisture content, and thermal dryout characteristics (a function of moisture content). The thermal resistivity test results are included as Appendix D.

3.6 Geophysical Investigation

Collier Geophysics LLC (Collier) of Lakewood, Colorado, completed a surface geophysical survey for the project. Field work was performed in September of 2020 at one proposed wind turbine location (AM-T4A [GEO-13]). Multi-Channel Analysis of Surface Waves (MASW) was used to measure the shear wave velocities, and seismic refraction was used to measure compression wave velocities. Both of these methods are non-intrusive surface geophysical methods. A summary of the scope of the geophysical investigation is included in Table 1 and shown on Figure 13. The geophysical survey report is included as Appendix E.

4.0 Results

Section 3 describes the field and laboratory investigation procedures. Section 4 presents the data from testing and investigation and provides further analysis of these results.

4.1 Subsurface Stratigraphy

The results of the geotechnical borings (Appendix A) and laboratory tests (Appendix B) were compiled to obtain an understanding of the stratigraphy of the study areas.

The typical stratigraphy of the site consists of a thin veneer of topsoil overlying alluvium. The alluvium consists of layers of sand with varying amounts of silt, gravel, and cementation.

Fill was encountered in several geotechnical borings. Where encountered, the fill appeared to be associated with existing infrastructure including road subgrades and existing wind turbine backfill.

4.1.1 Topsoil

The topsoil at the site consists primarily of fine- to medium-grained silty sand and due to the lack of moisture associated with soil horizon development, its thickness is governed by the depth of the primary root system as no distinct variation in soil type between the topsoil and underlying soil can be observed. Due to the sparseness of vegetation in the area, topsoil can generally be considered not present over much of the site. Where observed, the primary root zone varied from approximately 1 to 4 inches.

4.1.2 Alluvium

The formation of alluvial fans includes the rapid loss of energy as water leaves a steep canyon with a saturated sediment load resulting in a poorly sorted deposit of clay- to boulder-sized particles. Gravels and cobbles are commonly suspended in the clay/silt/sand matrix because of the poor sorting associated with this quick deposition of the alluvium. The alluvial soils at the project site were predominantly comprised of sand-sized particles.

Layers of alluvium were encountered at each proposed wind turbine location included in the investigation. The alluvium consisted of sands with varying gravel content and cementation. The sands had varying fines content, with typical classifications including silty sand, poorly graded sand with silt, and poorly graded sand. The thickness of the alluvium layers ranged from less than 2 feet to greater than 50 feet.

Standard penetration tests conducted in the alluvium typically ranged from 20 to greater than 50 bpf, with an overall average greater than 50 bpf. These results indicate that the sands generally have a medium dense to very dense relative density. In isolated cases, layers of loose sand were encountered. It should be noted that the relative density indicated from SPT results may be influenced by cementation or large gravel in the soil.

4.1.3 Fill Material

Layers of granular fill were encountered at three boring locations (AM-T5 [GEO-14], AM-T6A [GEO-15], and AM-T7A [GEO-16]). The fill was identified as native soils placed for existing access road subgrades and foundation backfill. The fill was classified as poorly graded sand with silt.

The borings completed on existing access roads (AM-T6A [GEO-15] and AM-T7A [GEO-16]) encountered approximately a 1-foot-thick layer of fill associated with the road subgrade. The boring completed at proposed wind turbine AM-T5 [GEO-14] encountered approximately 8 feet of compacted fill associated with the existing wind turbine foundation backfill.

4.2 Groundwater Conditions

Groundwater was not observed in any of the geotechnical borings completed during the investigation. Based upon these observations, groundwater is not anticipated to be a factor in the design and construction of shallow foundations at the project site.

4.3 Chemical Testing

Chemical tests, consisting of soil pH, soluble sulfates, and soluble chlorides were performed at two locations, including proposed wind turbine AM-T2A [GEO-11] and one location within the proposed substation footprint (SUB-03). Chemical tests indicate that the soils have pH ranging from 5.8 to 7.6. The soils contain less than 20 mg/kg (detection limit) of soluble chloride (dry weight) and less than 50 mg/kg (detection limit) of soluble sulfates (dry weight). Discussion on the associated design considerations can be found in Sections 6.10 and 7.16. Chemical test results are summarized in Table 3 and included in Appendix B.

4.4 General Soil Laboratory Testing

All general soil laboratory test results are included in Appendix B and Table 4.

4.4.1 Moisture Content

A total of seven moisture content tests were conducted on soil samples collected from the geotechnical borings performed as part of the geotechnical investigation. The samples tested included silty sand and poorly graded sand with silt.

The soils exhibited moisture contents ranging from 1 to 3 percent, indicating dry to moist conditions.

4.4.2 Grain Size Analysis

Grain size analyses were performed on six soil samples collected at various depths from the geotechnical borings. The percent fines (percent by weight passing the number 200 sieve) for all tests results ranged from approximately 9 to 26 percent. Based on the results of the grain size analyses, the samples were classified as silty sand (SM) and poorly graded sand with silt (SP-SM).

4.5 Shear Strength

4.5.1 Drained Shear Strength

Granular soils were encountered within each of the geotechnical borings completed at proposed wind turbine locations. Shear strength parameters for these soils were measured through a laboratory direct shear test and estimated from correlations to SPT results collected at 2.5- and 5-foot intervals during sampling in the borings.

The SPT results are summarized in Table 5. In general, typical SPT results below a depth of 7.5 feet exceeded 25 bpf, though in some cases individual SPT values were as low as 18 bpf (e.g., proposed wind turbine AM-T2A [GEO-11]). The SPT value can be correlated to the soil friction angle (Das, 2007). An SPT value of 18 bpf in poorly graded sand with silt correlates to a friction angle of approximately 32 degrees.

One direct shear test was performed on a reconstituted soil sample from proposed wind turbine location AM-T2A [GEO-11]. The test results indicated a peak friction angle of approximately 41 degrees with a cohesion of 500 psf (Appendix B and Table 4).

Based on an analysis of the results presented above and accounting for isolated lower strength zones as encountered in select borings, the recommended design value for drained friction angle for granular soils is 32 degrees. The results of the investigation indicate that many of the results are well in excess of the recommended design value, but it is generally understood that the bearing capacity of the subgrade soils does not govern the foundation design at the recommended strength level.

4.6 Standard Proctor Density Testing

A total of three standard Proctor density tests were conducted on bulk soil samples collected from the near surface soils across the site. Standard Proctor density testing indicated the soil maximum dry density ranges from 125 to 128 pcf, with an average of 127 pcf. The corresponding optimum moisture content was approximately 9 percent for each sample tested. The results of the standard Proctor density tests can be found in Table 6.

4.7 California Bearing Ratio Testing

Design for roads and general working areas is based in part on the strength of the subgrade that can be reasonably achieved. California Bearing Ratio (CBR) testing was completed on one soil sample collected at proposed wind turbine location AM-T1 [GEO-10] to determine the anticipated field strength of the subgrade (Figure 13).

The bulk sample was collected from soil immediately below the existing topsoil, which corresponded to a depth of approximately 6 to 24 inches below the surface. The soil sample was prepared to approximate 95 percent of the maximum standard Proctor density at the optimum moisture content. The results of the CBR testing are presented in Table 7.

Results from the testing conducted on the subgrade sample collected at proposed wind turbine location AM-T1 [GEO-10] indicate a CBR value at 0.1 inch under a surcharge of 50 psf of 5.9 percent when compacted to 95 percent of the standard Proctor density at optimum moisture.

4.8 Soil Electrical Resistivity Testing

Soil resistivity testing was completed by Barr personnel during the geotechnical investigation in October of 2020 within the proposed substation footprint (SUB-03). The electrical resistivity testing location is shown in Figure 12 and coordinates are included in Table 1. The test location was selected by Barr and approved by Mortenson. At the testing location, measurements were performed at "a" spacings of 2, 5, 10, 20, 30, 40, 50, 70, 100, 150, and 200 feet in two perpendicular arrays.

The apparent resistivity measurements for the tested location ranged from 13,371 to 60,342 ohm-centimeters (Ω-cm), with an average apparent resistivity of approximately 37,540 Ω-cm. Soil resistivity variations are likely associated with differences in soil type, layer thicknesses, and degree of saturation in the near-surface soils. Higher moisture contents and higher clay contents generally reduce the electrical resistivity of a soil. Soil resistivity variations between the perpendicular arrays are likely related to topographic differences between the arrays. The results of the soil electrical resistivity testing are included in Appendix C.

4.9 Thermal Resistivity Testing

One bulk soil sample was collected for thermal resistivity testing from a depth of 3 to 5 feet below ground surface within the proposed substation footprint (SUB-03). The thermal resistivity sample location is shown in Figure 12 and the coordinates of the sample location are included in Table 1. The sample was reconstituted to a density equivalent to approximately 85 percent of the standard Proctor maximum dry density at the as-received and optimum moisture contents (two total tests). Laboratory tests included measurement of the soil's in-situ moisture content, standard Proctor density, optimum moisture content, and thermal dryout characteristics (a function of moisture content). The results from testing on the sample reconstituted to approximately 85 percent of the standard Proctor maximum dry density near the as-received moisture content indicate the thermal resistivity of the soil is 293 °C-cm/W near the as-received moisture content and 374 °C-cm/W in the fully dried condition. The results from testing on the sample reconstituted to approximately 85 percent of the standard Proctor maximum dry density near the optimum moisture content indicate the thermal resistivity of the soil is 79 °C-cm/W near the optimum moisture content and 181 °C-cm/W in the fully dried condition. The results of the thermal resistivity tests are included in Appendix D.

4.10 Geophysical Testing

The shear and compression wave velocities were measured and analyzed at proposed wind turbine location AM-T4A [GEO-13] (Figure 13) using seismic refraction and multi-channel analysis of surface waves (MASW) methods (Appendix E). Table 8 summarizes the shear and compression wave velocity results. Results were tabulated with respect to an assumed embedment depth of the foundation at approximately 10 feet below the ground surface; therefore, geophysical results at depths shallower than the assumed foundation embedment depth were not included in the analysis. The weighted average shear wave velocity (V_s) was approximately 1,555 ft/s. The weighted average compression wave velocity (V_p) was approximately 3,314 ft/s. An estimate of the Poisson's ratio (ν) was obtained from measurements of compression and shear wave velocities according to the following equation:

$$\nu = \left(\frac{V_p^{\,2}}{2V_s^{\,2}} - 1 \right) \Big/ \left(\frac{V_p^{\,2}}{V_s^{\,2}} - 1 \right)$$

(Bowles, 1996)

The Poisson's ratio value was calculated as 0.40 (Table 8). Note that the Poisson's ratio value was computed over a depth range where both shear and compression wave velocities were measured.

The recommended shear wave velocity value for design is 1,500 ft/s. The recommended Poisson's ratio value for design is 0.34 based on the results of the geophysical testing and Barr's previous experience in the general project region.

5.0 Road Section Design Recommendations

Results of the field and laboratory investigation have been presented in Section 4. Based on these results, Section 5 provides analysis, conclusions and recommendations for the design and construction of roads. For roads, the primary factors addressed include gravel thickness and subgrade preparation.

5.1 Surface Preparation

Site preparation for roadways should be initiated by removing all surface vegetation, root zones, organic topsoil (if present), and loose, soft or otherwise unsuitable materials. Due to the sparseness of vegetation in the area, topsoil can generally be considered not present over much of the site, and site clearing or stripping will generally be limited to removal of brush. Actual stripping depths (if required) will likely vary and should be evaluated at the time of construction. Topsoil and organic material removed during site stripping should be graded into existing site topography. Incorporation of topsoil and organic material in compacted fill sections is not recommended.

5.2 Subgrade Preparation

After stripping or excavating to rough grade is complete, the exposed subsurface along the entire roadway should be compacted with a minimum of one pass of a sheepsfoot or pad-foot compactor on cohesive material (clay) or smooth drum rollers for granular materials (sand). Vibratory versions of these compactors may be used but could draw moisture to the surface depending on the initial moisture content of the soil and the time of year construction occurs (weather).

After completion of the first subgrade compaction pass, but prior to placement and compaction of granular fill, the entire roadway length should be proof-rolled. Proof-rolling should be performed with a fully loaded tandem axle dump truck having a minimum gross weight of 25 tons. Proof-rolling should be performed in the presence of a geotechnical engineer or person under direct supervision of this engineer. Typical standards for proof-rolling should include no rutting greater than 1 to 1 ½ inches, and no "pumping" of the soil behind the wheels. Proof-rolling is not an indication that the subgrade strength is adequate or that it meets design requirements, but simply highlights potentially unsuitable subgrade conditions.

Areas which fail proof-rolling tests should be sub-cut and replaced with suitable fill. Immediately following periods of rain or snow, the subgrade may become unstable during proof-rolling and/or subsequent construction operations and some means of subgrade stabilization may be required to facilitate construction. Alternatives for subgrade stabilization include the following:

- **Crushed Stone** – The use of crushed stone could be used to improve subgrade stability. Typically, sub-cut depths in this locale range from ½ foot to 1 ½ feet below finished subgrade elevation. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. The maximum particle size of crushed rock placed over geotextile fabric or geogrid should be selected in accordance with the manufacturer's directions. Equipment should not be operated directly on top of the fabric or geogrid, except in accordance with manufacturer's directions.

- **Scarification and Re-compaction** – It may be feasible to scarify, dry, and re-compact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Even with adequate time and weather, however, stable subgrades may not be achievable if the thickness of the soft soil is greater than 1 to 1 ½ feet.
- **Chemical Stabilization** – The use of Class C fly ash, hydrated lime, or cement could also be considered for the clayey soils on this site. The use of fly ash, lime, or cement should be further evaluated if it is considered for stabilization.

Placed fill for subgrade stabilization shall be compacted with a sheepsfoot or pad-foot compactor for cohesive material and a smooth drum roller for granular and gravel fill material. The number of passes required will vary depending upon the equipment used, fill material type, and moisture condition of the fill.

Imported fill material may consist of sand, silty sand, clayey sand, sandy lean clay or lean clay, although it is recommended the liquid limit of these materials not exceed 45 and the plasticity index should not exceed 15. More plastic clays may be used but may be difficult to place and compact if wet. Note that existing and imported fine-grained fill soils may be particularly difficult to compact if wet or allowed to become wet, or if spread and compacted over wet or marginally stable subgrades. Most of the on-site materials should be suitable for use as road embankment fill.

All subgrade compaction, including the initial pass of exposed in-situ soils and any subsequent subgrade fill materials, should be performed so as to meet or exceed 95 percent of the standard Proctor maximum dry density, in accordance with the results presented in Section 4.6. It is recommended that compaction testing be performed by an independent contractor on the order of one test per 2,500 to 5,000 square feet of compacted subgrade or per lift of fill. Compaction of aggregate base is discussed later in Section 5.3.2.

The roadway surfaces should be crowned or sloped to prevent water ponding on or around the roadway surfaces. The roadway crowns and slopes should have a 2 percent slope to promote drainage. Culverts should be used where needed to allow drainage underneath the roadways and to prevent ponding either over or on the side of the roadways.

If rain occurs during roadway construction, the subgrade should be allowed to dry prior to continuing work.

5.3 Road Base Design Considerations

The design thickness of placed granular fill was determined using the CBR value from laboratory testing (Section 4.7) and Barr's experience in the general project region. A design CBR value of 4.0 percent is recommended for road section design at a subgrade compaction value of 95 percent of the standard

Proctor maximum dry density. These zones should be identified as described in Section 5.2. Areas near creeks and ephemeral streams, and some areas of fields will likely exhibit weaker soils (especially during periods of heavy or sustained precipitation) and may require additional aggregate and/or reinforcement.

Typically, roadways for wind power developments are reinforced by either geogrids or geotextiles. The following section describes the required aggregate thicknesses for various reinforcement options.

5.3.1 Road Section Design

The required aggregate thickness required to support the design loads, assuming the use of geogrid reinforcement, was determined utilizing the Giroud-Han iterative equation (Giroud and Han, 2004):

$$h = \frac{0.868 + \left(0.661 - 1.006 J^{2}\right)\left(\frac{r}{h}\right)^{1.5} \log N}{\left[1 + 0.204\left(\frac{3.48 CBR_{bc}^{0.3}}{CBR_{sg}} - 1\right)\right]} \left(\sqrt{\frac{\frac{P}{\pi r^{2}}}{\frac{s}{f_s}\left[1 - 0.9 e^{-\left\{\frac{r}{h}\right\}^{2}}\right] N_c f_c CBR_{sg}}} - 1 \right) r$$

where:

h = recommended thickness (meters)

J = aperture stability modulus (m-N/degree)

P = wheel load = axle load/2

r = radius of tire print

N = number of axle passes

CBR_{sg} = Subgrade CBR

CBR_{bc} = Aggregate Base CBR

f_s = rut depth factor = 75 mm

s = maximum rut depth

N_c = bearing capacity factor (3.14 for unreinforced roads, 5.14 for geotextile reinforced roads, and 5.71 for geogrid reinforced roads)

f_c = factor relating CBR of subgrade to equivalent c_u value = 30 kPa

Two traffic conditions were evaluated and analyzed for use of the road: (1) conditions during construction of the project and (2) long term maintenance traffic consisting of light duty trucks during operation. Design parameters and recommended aggregate base thickness values are presented below for both cases.

The construction condition assumes the parameters noted below. The recommended aggregate thickness for the construction condition is shown in Table 9.

- Subgrade CBR value of 4.0 percent
- Aggregate base CBR value of approximately 20 percent
- Maximum axle load of 25 kips
- Tire pressure of 100 psi
- 6,900 axle passes (Table 10)
- Maximum allowable rut depth of 1.5 and 3.0 inches.

The maintenance condition assumes the parameters noted below. The recommended aggregate thickness for the maintenance condition is shown in Table 9.

- Subgrade CBR value of 4.0 percent
- Aggregate base CBR value of approximately 20 percent
- Maximum axle load of 3.5 kips
- Tire pressure of 65 psi
- 25,000 axle passes
- Maximum allowable rut depth of 1.5 inches.

In general, stronger reinforcement correlates to a thinner road section. It is the responsibility of the Civil Engineer of Record to determine the most economical combination of aggregate base and reinforcement. Table 9, included at the end of this report, provides further details and information regarding the recommendations for road design using varying degrees of reinforcement.

It should be noted that at times during construction, particularly following significant rain, some maintenance of the road will likely be necessary to maintain a road if designed based on a 3-inch rut depth. If this regular maintenance is undesirable during construction, the road can be designed based on a 1.5-inch target rut depth. The design values based on a 1.5-inch rut depth are provided as recommendations to avoid complications with roads during construction and particularly in times of heavy precipitation.

The use of geosynthetics in the roadway section is an acceptable practice provided the contractor understands the process by which the geotextile acts as a reinforcement layer as opposed to as a separating layer. Geotextiles gain their reinforcement properties through the tension membrane effect. Therefore, a significant amount of strain (deformation), typically several inches of rutting, is required to mobilize the strength of the geotextile. Higher modulus geotextiles may require less rutting to mobilize the required strength. As a result, the process of placing the geotextile for reinforcement has three parts:

1. The subgrade must be graded such that there are no areas of significant unevenness, exposed boulders, or other items that impede the tensioning of the geotextile or geogrid. Additionally, the surface should be graded to promote effective drainage of the subsequently placed roadway section.
2. The geotextile must be pulled tight and anchored or, if possible, pre-stretched and anchored. Lack of proper anchoring may result in slippage of the geotextile and an accompanying loss of reinforcement resulting in greater rutting of the road surface.
3. Once pulled tight or stretched and anchored, the geotextile should be covered with the specified gravel thickness. Upon placement of gravel, the roadway should then be loaded to create strain in the geotextile until adequate reinforcement is reached, provided the anchoring is adequate. Following the creation of ruts, they must be filled with additional gravel and the roadway prepared to the specified degree of compaction. Re-leveling of the roadway surface without the use of additional aggregate to fill in the ruts is not acceptable.

Following the placement of the geosynthetic reinforcing, initial rutting, and filling of the ruts, additional rutting during the construction period should be limited to the design allowable rut depth. Increased rutting may occur in areas underlain by weaker subgrade soils where additional strain is required to mobilize the necessary strength for adequate reinforcement. These ruts are considered normal and should be filled and compacted as detailed above.

At a minimum, the final road section should be of sufficient thickness to compensate for topsoil stripping and promote positive drainage away from the road. Please note that axle loads and/or axle passes in excess of the design values noted above may decrease the overall life of the road because of premature road deterioration. Following construction of the project, it is recommended that 2 inches of aggregate base be added to the existing roads and re-graded to reestablish the road surface. Additionally, in the event of heavy traffic or significant rain leading to excessive rutting or surface deterioration during the course of construction, it is recommended that a minimum of 2 inches of gravel be added and re-graded to reestablish the road surface. If excessive ponding occurs along localized sections of the road, subgrade drains are recommended along the sides of site roads to minimize standing water.

If localized areas require significant cuts during the subgrade preparation phase, greater aggregate base thicknesses may be needed in to allow for proper drainage of the road surface.

5.3.2 Aggregate Recommendation

It is recommended that the roadways be constructed of aggregate base material, combined with reinforcement (optional). The granular roadway surface should consist of crushed rock. It is recommended that the material comply with the requirements of Caltrans Specification 26-1.02 materials, with ¾-inch maximum and fewer than 10 percent fines or similar. If geogrid reinforcement is used, modifications to the gradation requirements may be necessary in order to comply with the geogrid manufacturer's recommendations. Alternative road surface materials may be used depending upon availability and approval. As mentioned above, a smooth drum vibratory compactor should be used to compact the gravel roadway. This material should be compacted in loose lifts not to exceed 9 inches in thickness. The gravel roadway should be compacted to 98 percent of maximum standard proctor dry density, determined by ASTM D698. Testing should be performed on the order of one test per 2,500 to 5,000 square feet of roadway per lift.

6.0 Wind Turbine Foundation Analysis and Recommendations

Results of the field and laboratory investigation have been presented in Section 4. Based on these results, Section 6 provides analysis, conclusions and recommendations for the design and construction of wind turbine foundations, as well as general construction considerations.

For foundations, the design factors addressed include bearing capacity, footing stiffness, foundation settlement, and sliding friction.

6.1 General Excavation and Fill

The following sub-sections present general recommendations for site clearing, grading, and compaction for construction wind turbine foundations and laydown areas.

6.1.1 Clearing and Grubbing

The project site predominantly consists of undeveloped arid land and clearing and grubbing will generally be restricted to the removal of brush and the primary root zone. Based on the results of the field investigation, topsoil is generally not present, and vegetation is sparse with root zone thickness on the order of approximately 1 to 4 inches. This material should not be used for structural fill and should be placed separately to avoid contamination with other excavated soils. This material could be used in grading non-structural fill such as fields or service areas in which compressibility of the material does not have an impact on structures.

6.1.2 Site Excavations and Grading

6.1.2.1 Standard Cuts

Results of the geotechnical exploration indicate conventional excavation machines will likely be suitable at locations where a measurable amount of uncemented soil cover was present. Recommendations for excavations at proposed turbine locations with well-formed cemented layers in the shallow subsurface are provided in Section 6.1.3.

6.1.2.2 Standard Fills

Based on conditions encountered on site, foundations will typically be placed on natural ground and the use of compacted fill is not anticipated, except where excavation of unsuitable material below the foundation embedment depth is performed. If large fill areas are required (not below foundations), all lifts should be placed as close to horizontal as possible, with lift thickness not to exceed 12 inches in a loose condition. Wind turbine foundations should not be placed on any fill other than engineered fill or lean concrete placed in accordance with Section 6.1.6.

6.1.3 Potentially Difficult Excavations

Results of the field investigations indicate well-formed cemented soil layers within a few feet of the ground surface at three of the seven proposed wind turbine locations as follows:

- AM-T1 [GEO-10]
- AM-T5 [GEO-14]
- AM-T6A [GEO-15]

Where well-formed cemented soils were encountered within the upper 10 feet, the results of the field investigation (drilling, laboratory testing, and geophysics) and other field observations indicate much of the cemented soil is considered to have easy ripping excavation characteristics (Bell, 1994). For weakly to moderately cemented soils, a bulldozer-mounted ripper may be sufficient for the excavations. In general, the results did not indicate the need for a heavy-duty hydraulic rock hammer, but it is possible that these methods may provide for a more effective means of excavation during construction at isolated locations with strongly cemented soils.

6.1.4 Excavation, Backfill, and Compaction for Foundations

The soils in the upper 10 feet can generally be classified as Type C from OSHA soil classifications (29 CFR 1926 Subpart P-Excavations) and vary across the site. It is the responsibility of the competent field personnel (OSHA) to verify the in-situ soil classification at each excavation and ensure that the benching or slopes are adequate during construction.

6.1.5 Foundations on Soil

Based on the results of the geotechnical investigation, each of the wind turbine foundations are anticipated to bear on soil. In general, for foundations supported on soil, the exposed subgrade should be surface compacted to consolidate loose soils present from the excavation. The subgrade should be visually inspected for uniformity. If surface soils in the base of the excavation are disturbed, these soils should be surface compacted using a vibratory compactor (in sands and non-saturated silts) or a smooth drum roller (saturated silts and clays). If the base of the excavation lies partially on soil and rock (not anticipated), the soil should be removed to the rock surface and replaced with lean concrete to create a uniform bearing surface for the foundation. Alternatively, compacted engineered fill could be placed on top of the bedrock surface, provided it meets the requirements established in Section 6.1.6.

6.1.5.1 General Commentary

Upon excavation to the proposed bearing surface, the excavation base should be inspected by the construction phase geotechnical engineer of record or authorized representative. If the excavation base surface is deemed unsuitable for construction in the opinion of the geotechnical engineer of record or authorized representative, the conditions shall be noted and communicated to the foundation designer for appropriate foundation modifications.

Compaction of in situ soils intended for support of the foundation base is not required at wind turbine locations where clayey soils are present in the excavation base. At wind turbine locations where sands are encountered at the foundation base elevation, surface compaction should be performed with a minimum of one pass with a smooth drum vibratory compactor. Moisture conditioning of soils may be required for surface compaction of the sandy subgrades.

If, in the course of excavating the foundation, the base of the excavation becomes rutted, damaged or is otherwise determined to be of inadequate character, the following actions should be performed:

1. If the subgrade soils consist of silts or clays, the excavation should be subcut a minimum of 6 inches beyond the depth of the rutted soils and backfilled with engineered fill in accordance with Section 6.1.6.

2. If the subgrade soils consist of primarily granular soils, the excavation base surface should be leveled and surface compacted. Compaction of this material is required to achieve at least 98 percent of the laboratory maximum dry density measured according to the standard Proctor method.

In all cases of foundation excavation, the soil base should be protected against damage by use of a flowable concrete mud mat. Prior to placement of the mud mat, the exposed subgrade should be protected from vehicle traffic and foot traffic should be kept to a minimum, whenever possible.

Based on the results presented in Section 4.6, the native material can be used as backfill for the foundation in accordance with the following recommendations:

- Material should be placed in maximum 12-inch loose lifts.

- Based on the results of laboratory standard Proctor testing, 95 percent of the maximum dry density at the as-received moisture content ranged (minimum, average, and maximum) between 121, 123, and 125 pcf. Furthermore, a reasonable long-term moisture content to assume for these soils is approximately 2 percent. Using these values, the foundation engineer of record should select appropriate values for the moist design unit weight of the backfill.

- The backfill surface should be graded such that water is directed away from the foundation to prevent moisture infiltration (¼ inch per foot).

- Density should be checked in the field periodically to provide adequate compaction (typically one test per 2,500 square feet of fill for each 1-foot lift).

6.1.6 Engineered Fill below Foundations

Any fill placed below foundations should consist of approved Engineered Fill. Engineered fill should comply with Caltrans Specification 26-1.02. Materials, with ¾-inch maximum and fewer than 10 percent fines. Alternative engineered fill materials may be used depending upon availability and approval by the foundation engineer. Loose lifts should not exceed 9 inches. The engineered fill should be compacted to at least 98 percent of the standard Proctor maximum dry density. The excavations and subsequent placement of engineered fill should be oversized by 1 foot on all sides for each foot of excavation below the foundation embedment depth. For example, a 1-foot excavation below the foundation depth will require a bottom of foundation excavation width (and length) 2 feet wider than a standard foundation excavation width (1-foot on each side of the footing). The base of every excavation should be inspected by a representative of the geotechnical engineer to evaluate the soil conditions at the base of the over excavation prior to fill placement.

6.2 Dewatering and Buoyancy

Based on the discussion presented in Section 4.2, shallow groundwater was not encountered at boring locations during the investigation within the foundation embedment depth. In the event of heavy rainfall, the low permeability nature of the cemented soils at some locations could limit water outflow from the excavation and typical dewatering can be achieved by use of a sump pit and small pump. Excavations should be allowed to dry before continuing with construction. Water should not be allowed to pond on the base of the excavations as it may lead to softening of the subgrade soils. The contractor should be prepared to remove infiltrating water in all excavations at all times during construction (i.e., on a continuous basis). At no time should an excavation be allowed to fill with water as this practice may lead to damage or weakening of the subgrade soils.

6.3 Wind Turbine Foundation

Investigation and testing of the proposed wind turbine locations found the presence of granular soils. The results of the geotechnical investigation indicate that the site is suitable for a spread footing foundation system.

Analysis and recommendations herein are based on the anticipated foundation designs parameters for the Vestas V117-4.2MW and Vestas V136-4.3MW wind turbines. Geotechnical analyses herein utilize an embedment depth of 10 feet below existing grade, assuming up to approximately 6 to 12 inches of grading to allow for drainage around the foundation and cut/fill balance.

6.3.1 Frost Depth

The estimated frost penetration for the wind turbine locations is approximately 2 inches (NAVFAC, 1986).

6.4 Bearing Capacity

Based on the results of the field investigation, the spread footings are anticipated to bear on granular soils. The following sections discuss, in detail, the determination of the allowable bearing capacity for the wind turbine foundations. The discussion below evaluates the bearing capacity for granular soils.

Allowable soil bearing pressure for a spread footing is based on the shear strength obtained from testing and investigation. A discussion of the soil shear strength was provided in Section 4.5. The following is a more detailed description of the procedure used to determine the allowable bearing capacity.

The ultimate bearing capacity of the soil supporting a spread footing can be determined using the Terzaghi-Meyerhoff equation as follows:

$$q_{ult} = {}^{1}/_{2}\,\gamma B_{eff} N_{\gamma} F_{\gamma s} F_{\gamma i} + q N_q F_{qs} F_{qi} + s_u N_c F_{cs} F_{Ci} \qquad \text{(Riso, 2002)}$$

where:

q_{ult} = ultimate bearing pressure

γ = unit weight of the soil

B = average footing width over the length in bearing

N_{γ} = bearing capacity factor

q = surcharge at foundation level

N_q = bearing capacity factor

s_u = design undrained shear strength of the soil

N_c = bearing capacity factor

F = shape (subscript "s") and inclination (subscript "i") factors

The first term of the above equation is associated with granular soils which typically exhibit drained modes of failure (except under earthquake loading) and where excess pore pressures cannot build up in the soil when sheared. This term represents the ultimate drained bearing capacity.

The third term of the equation is associated with fine-grained/clayey soils which typically exhibit an undrained mode of failure and where excess pore pressures can build up in the soil when sheared. This term represents the ultimate undrained bearing capacity.

Fine-grained/clayey soils were not encountered within the geotechnical borings completed during the investigation; therefore, calculation of the ultimate bearing capacity for the proposed wind turbines was completed based on drained conditions.

6.4.1.1 Bearing Capacity during Drained Conditions

During drained conditions, the third term is dropped from the Terzaghi equation and the ultimate drained bearing capacity is estimated as follows:

$$q_{ult} = {}^{1}/_{2}\,\gamma B_{eff} N_{\gamma} F_{\gamma s} F_{\gamma i} + q N_q F_{qs} F_{qi}$$ (Riso, 2002)

where:

q_{ult} = ultimate bearing pressure

γ = unit weight of the soil

B_{eff} = average effective footing width in bearing

L_{eff} = average effective footing length in bearing

N_q, N_{γ} = bearing capacity factors

q = surcharge at foundation level

F = shape (subscript "s") and inclination (subscript "i") factors

The following are formulas for the dimensionless factors, N_{γ} and N_q, and shape ($F_{\gamma s}$, F_{qs}) and inclination ($F_{\gamma i}$, F_{qi}) factors above (Riso, 2002):

$$N_q = e^{\pi \tan\varphi} \frac{1 + \sin\varphi}{1 - \sin\varphi}$$

$$N_{\gamma} = \tfrac{1}{4}\left(\left(N_q - 1\right) \cos\varphi\right)^{3/2}$$

$$F_{\gamma s} = 1 - 0.4 \frac{B_{eff}}{L_{eff}}$$

$$F_{qs} = 1 + 0.2 \frac{B_{eff}}{L_{eff}}$$

$$F_{qi} = \left(1 - \tfrac{H_d}{V_d}\right)^2$$

$$F_{\gamma i} = F_{qi}^2$$

The allowable soil bearing capacity is then obtained by dividing the ultimate bearing capacity by an appropriate factor of safety. With the exception of the safety factor for the abnormal extreme wind load, the following factors of safety are taken from Bowles, 1996:

1.84 for abnormal extreme wind loads

Factor of safety = 2.26 for extreme wind loads

3.00 for normal operation loads

The safety factor for abnormal extreme wind loads was adjusted by the ratio of the load factors for the abnormal extreme (1.1) and the extreme (1.35) wind loads. Based on the anticipated foundation design parameters for the Vestas V117-4.2MW and Vestas V136-4.3MW wind turbines and the design friction angle of 32 degrees for granular soils, the gross allowable soil bearing capacity is estimated to be over 10,000 psf under normal operation loads, normal extreme, and abnormal extreme loads. The foundation designer should perform a complete bearing capacity check to verify these recommendations once final design information is available.

6.5 Foundation Stiffness

Elastic theory relates shear wave velocity with the shear modulus at small strain using the following equation:

$$G_o = \rho V_s{}^2 \qquad \text{(Kramer, 1996)}$$

where:

G_o = shear modulus at small strain

V_s = shear wave velocity

ρ = mass density of the soil. The mass density is the ratio of the unit weight (γ) and the acceleration of gravity (g) (32.2 ft/s^2 or 9.81 m/s^2).

In order to estimate the small strain shear modulus, a minimum average shear wave velocity of approximately 1,500 ft/s was selected as the design value (Section 4.10). For an in-situ soil unit weight of approximately 115 pcf (estimated based on previous experience in the project region), the small-strain shear modulus G_o is computed to be 8,030 kips per square foot (ksf).

For foundation design, the structural engineer will need to reduce the shear modulus based upon the stress placed on the soil by the foundation. To approximate the shear modulus at a strain level similar to that expected from the foundation loading, the following equation is recommended (Fahey, 1999):

$$G/_{G_{max}} = 1 - f\left(q/_{q_{ult}}\right)^g$$

where:

G/G_{max} = shear modulus reduction factor

f = empirical parameter = 1.0

q = bearing stress applied by foundation

q_{ult} = ultimate bearing capacity of soil

g = empirical parameter = 0.3

Based on the anticipated foundation design parameters for the Vestas V117-4.2MW and Vestas V136-4.3MW wind turbines, the shear strain reduction factor is estimated to be 0.4. The resulting shear modulus, *G*, is 3,210 ksf.

In following, the small strain Young's modulus is computed from:

$$E_o = 2G_o\,(1 + \nu)$$

Assuming a Poisson's ratio of 0.34 (Section 4.10), the resulting design small-strain Young's modulus, E_o, is approximately 21,530 ksf. The small strain Young's modulus should be similarly adjusted by the reduction factor to estimate the soil behavior at strain levels similar to those anticipated for foundation settlement. The resulting Young's modulus, *E*, is approximately 8,610 ksf.

6.6 Foundation Settlement

The subsurface conditions encountered during the geotechnical investigation indicated that the material encountered at the foundation bearing depth of approximately 10 feet below grade consists of sandy soils. Therefore, the settlement can be estimated with elastic parameters.

The immediate or elastic settlement of a soil can be computed based on the application of the abnormal extreme wind load, using the following equation based on elastic theory:

$$S = \frac{B_{eff} q_o}{E}(1 - \nu^2)I \qquad \text{(Das, 2007)}$$

where:

S = elastic settlement

B_{eff} = effective foundation width

q_o = contact pressure applied from foundation

E = elastic soil modulus (Section 6.5)

ν = Poisson's ratio (Section 4.10)

I = shape factor = 1.12 (Day, 2006)

Using this formula, the foundation design engineer can compute the immediate (elastic) settlements induced by the footing under the abnormal extreme load. Based on an applied bearing stress increase of approximately 780 psf (assuming a foundation embedment depth of 10 feet) and an assumed effective foundation width of approximately 67 feet (abnormal extreme load condition), the total immediate settlement is estimated to be less than ¼ inch. Once final design information is available, the foundation designer should calculate the settlement using the approach described above.

6.7 Sliding Friction

The friction coefficient between the site soils and foundation concrete should be taken as 0.40 in accordance with recommendations provided by Potyondy (1961), assuming a plain concrete surface.

6.8 Seismic Design Parameters

The project site is located in an active seismic region. Site Class C is recommended for use in foundation design for the overall site. Table 11 provides the recommended seismic design values for each proposed wind turbine location based on ASCE 7-16 (ATC, 2020). Note that the parameters in Table 11 are based on Site Class B and should be revised accordingly by the foundation engineer to account for Site Class C conditions.

6.9 Foundation Design Parameters

A summary of the recommended geotechnical parameters for use in wind turbine foundation design is provided in Table 12.

6.10 Cement Type

Based on the results of soil chemical testing presented in Section 4.3 and Table 3, cement with an S0 exposure class appears suitable for use in wind turbine foundation design (ACI, 2014). The foundation engineer of record has final responsibility for selection of the appropriate cement mixture based on the results provided in this report.

6.11 Collapse Potential

As noted in Section 2.2, the project site is located on an alluvial fan in a region of semi-arid to arid climate. In arid climates, it is common for flash floods to mobilize coarse unsorted sediments in debris flows, relatively low moisture-high solids mixes that move very quickly due to the slope of the terrain. These debris flows come to rest and dry out quickly. If there is a binder of plastic clays, these debris flow deposits can retain a soil matrix that has the potential to be collapsible. Soil collapse is generally triggered by two factors: increased moisture levels and the application of load.

The alluvium soils identified at the boring locations consisted of granular alluvium identified as silty sand and poorly graded sand with silt.

While soils commonly known to be collapsible, such as clayey alluvium, can be tested in the laboratory to determine collapse potential, it is not typically possible to follow this approach on granular alluvial deposits. Due to the general soil composition, collection of undisturbed samples is not feasible utilizing a drill rig. While undisturbed bulk samples can be collected in shallow test pits, the corresponding results do not provide an indication of the collapse potential of deeper soil layers not accessible to the reach of a backhoe (specifically those below the anticipated foundation depth). Therefore, laboratory testing to determine the collapse potential of granular alluvial fan soils is not typically performed.

As a result, other means of evaluation of collapse potential in alluvial soils are typically performed. A review of the relative density inferred from the SPT data collected from below the assumed foundation depth (10 feet) to 60 feet indicates that the alluvial sands generally have a high relative density. This data indicates the sands are in a dense to very dense condition. In general, sands with a medium dense to dense relative density have a low potential for soil collapse. It should be noted that the relative density indicated from SPT results may be influenced by cementation in the soil.

While the proposed wind development will not introduce increased moisture to the general project area, periodic precipitation events may be a source of increased moisture. With the occasional potential for increased moisture levels in the soil, the relative density values determined from SPT values generally indicate there is low potential for soil collapse. Therefore, no special mitigation of soil collapse is recommended for the project.

6.12 Shrink-Swell Potential

Soils considered to have shrink-swell potential generally consist of plastic clays subject to changes in moisture content. The results of the investigation indicate the soils encountered on site are granular and do not have appreciable shrink-swell potential.

Further discussion on the topic of soil swell at ancillary structure locations is provided in Section 7.11.

6.13 Potential for Unsuitable Sites

Based on the results of the geotechnical investigation, none of the proposed wind turbine locations exhibit zones of lower strength material at or below the assumed foundation bearing depth of approximately 10 feet below existing grade.

Due to natural variations in the subsurface soil profile, it is possible that unsuitable soils may be encountered at any wind turbine location during the foundation excavation. A geotechnical engineer or person under direct supervision of this engineer should inspect all excavations for unsuitable soils prior to placement of the mud mat. If unsuitable soils are encountered during the course of the foundation excavation, the foundation designer should be notified and methods for soil remediation should be implemented.

6.14 Soil Remediation

The following sections address the recommended approaches to remediating the undesirable subgrade soils, should it be deemed necessary during construction. None of the proposed wind turbine locations exhibit zones of lower strength material at or below the assumed foundation bearing depth of approximately 10 feet below existing grade. However, if poor subgrade conditions are observed in the base of other foundation excavations, soil remediation may be warranted.

6.14.1 Engineered Fill

The most common option for subgrade remediation is removal of the weak material (over-excavation) and replacement with engineered fill. Remediation by engineered fill includes the removal of weak material (over-excavation) and replacement with compacted engineered fill. An engineered fill approach is typically performed where improvement depths are no greater than 4 feet below the foundation embedment depth. At depths beyond 4 feet, the excavations generally become too large and expensive as a result of the need for oversizing, equipment limitations, and haul prices for fill. To account for foundation stiffness requirements, it is recommended that engineered fill used to replace shallow soft soils at proposed wind turbine sites should consist of granular material. Engineered fill material and placement should meet the requirements of Section 6.1.6.

The use of engineered fill is not recommended for any locations at this site but may be considered if poor subgrade conditions are observed in the base of foundation excavations during construction.

6.14.2 Aggregate Piers

Where deeper subsurface remediation is necessary, an economical option for ground improvement is construction of aggregate piers, commonly referred to as stone columns or Geopiers®. Stone columns are constructed by drilling or using jetting water to open a hole, then placing aggregate, and using deep vibratory methods to densify the aggregate and surrounding native soils to increase the strength and stiffness of the aggregate and surrounding soil. Geopiers® (or rammed aggregate piers) are constructed by drilling a hole through soft soils and subsequently compacting or ramming aggregate in lifts in the hole to create stiff elements in the soil matrix to help transfer the load through the soft soil and into the stiff soils at depth. Aggregate piers are generally used when the depth of improvement extends up to approximately 30 to 35 feet below the ground surface. It is important that load tests be conducted by the contractor to verify adequate bearing capacity of the improved soil stratum. Aggregate piers are typically installed on a design-build basis and are designed to meet a specific bearing capacity requirement and settlement tolerance selected by the foundation engineer.

The use of aggregate piers is not recommended for any locations at this site but may be considered if poor subgrade conditions are observed in the base of foundation excavations during construction.

7.0 Ancillary Structure Recommendations

7.1 Soil Stratigraphy

The location of the borings completed for the ancillary structures is shown in Figure 11. The results of the geotechnical borings can be found in Appendix A.

7.1.1 Proposed Substation

Two geotechnical borings were completed at the proposed substation location (SUB-02 and SUB-03). Geotechnical borings SUB-02 and SUB-03 indicated the presence of a thin veneer of topsoil underlain by silty sand that extended to depths ranging from approximately 7.5 to 14.5 feet below existing grade. Poorly graded sand with silt was encountered underlying the silty sand and extending to the termination depth of the borings at approximately 30 feet below existing grade.

7.1.2 Proposed Met Tower MET-02

Geotechnical boring MET-02 was completed at the proposed met tower location. The boring indicated approximately 5 inches of brown silty sand at the ground surface underlain by poorly graded sand with silt extending to a depth of approximately 5 feet below existing grade. Silty sand was encountered between approximately 5 and 15 feet below existing grade and was underlain by layers of poorly graded sand with silt extending to the termination depth of the boring at approximately 25.8 feet below existing grade.

7.2 Groundwater and Dewatering

Based on the information collected in this geotechnical investigation, groundwater was not encountered in the boreholes and dewatering of groundwater from these excavations is not anticipated. Tables 13 and 14 provide a full summary of the recommended groundwater levels to be used for design of each structure. Additional discussion regarding dewatering can be found in Section 7.14.3.

7.3 Field and Laboratory Testing

The field SPT results are included on the geotechnical boring logs provided in Appendix A. Laboratory test results are summarized in Table 4 and copies of the laboratory test results can be found in Appendix B.

7.3.1 Proposed Substation

The SPT results from the borings completed at the proposed Alta Mesa substation (SUB-02 and SUB-03) ranged from 10 bpf to greater than 50 blows for 6 inches of penetration, indicating a loose to very dense relative density.

Four moisture content tests were performed on soil samples collected from the borings at the proposed Alta Mesa substation location. The soils tested exhibited an average moisture content of approximately 2 percent, indicating the soils are generally in a dry to moist condition.

One grain size analysis was performed on select soil sample. Based on the results of the test, the sample was classified as a silty sand (SM) with 13 percent fines.

7.3.2 Proposed Met Tower MET-02

The SPT results from the geotechnical boring completed at the proposed Alta Mesa met tower location (MET-02) ranged from 26 to greater than 50 blows for 6 inches of penetration, corresponding to a medium dense to very dense relative density.

One grain size analysis was performed on a select soil sample. Based on the results of the test, the sample was classified as a silty sand (SM) with 26 percent fines.

7.4 Recommended Foundation Design Parameters

Recommended soil parameters for use in foundation design of the substation and met tower locations including density and strength, are included in Tables 13 and 14.

7.5 Foundation Type

The following sections describe the anticipated foundation systems for use in the project ancillary structures. Sections 7.6 and 7.7 provide a discussion on allowable load capacity of the anticipated foundation systems based on the available geotechnical data.

7.5.1 Proposed Substation

It is assumed that spread footings or drilled piers will be utilized for support of critical substation structures. Other lightweight equipment associated with the substation is assumed to be supported on slabs-on-grade.

7.5.2 Proposed Met Tower MET-02

It is assumed that a spread footing foundation system, a drilled shaft foundation system, or guy wires and anchors will be utilized for support of the met tower.

7.6 Bearing Capacity – Spread Footings

The ultimate bearing capacity of the soil supporting a spread footing can be determined using the Terzaghi-Meyerhoff equation as follows:

$$q_{ult} = {}^{1}/_{2}\,\gamma B N_{\gamma} + q N_{q} + s_{u} N_{c} \qquad \text{(Das, 2007)}$$

where:

γ = soil unit weight (accounting for buoyancy)

B = foundation width

N_{γ} = bearing capacity factor

q = effective stress at foundation embedment depth

N_q = bearing capacity factor

s_u = undrained shear strength

N_c = bearing capacity factor

For structures bearing on clay soils, the first term of the general bearing capacity equation is associated with granular soils which typically exhibit drained modes of failure (except under earthquake loading) and where excess pore pressures cannot build up in the soil when sheared. This term represents a portion of the ultimate drained bearing capacity.

The second and third terms of the equation are associated with fine-grained/clayey soils which typically exhibit an undrained mode of failure and where excess pore pressures can build up in the soil when sheared.

For structure locations exhibiting primarily granular (sands and silts) soils, the ultimate bearing capacity of the soil supporting a spread footing can be determined using the equation discussed above. For granular soils, the third term of the bearing capacity equation drops off, as the cohesion for these types of soils is typically taken as zero. The first and second terms remain, along with an additional term to calculate the net ultimate bearing capacity, resulting in the following equation:

$$q_{ult} = {}^{1}\!/_{2}\,\gamma B N_\gamma + q N_q - q$$

where:

γ = soil unit weight

B = footing width

q = surcharge at foundation level

$N_q = tan^2\left(45 + {}^{\phi}\!/_{2}\right) e^{\pi tan\phi}$ (Das, 2007)

$N_\gamma = 2\left(N_q + 1\right) tan\phi$ (Das, 2007)

A summary of the recommended soil strength values and allowable bearing capacities for spread footing foundation design is provided in Tables 13 and 14. It should be noted that the allowable bearing capacity values provided in Tables 13 and 14 assumed a minimum foundation embedment depth of 1 foot below existing grade. The allowable bearing capacities provided in the tables incorporate a factor of safety of 3. Once final foundation design information is available, the foundation designer should use this equation to calculate the allowable bearing capacity.

7.7 Drilled Shafts and Direct Embedment Foundation Systems

7.7.1 Axial Capacity

In the absence of foundation design information, specific recommendations for bearing capacity and lateral load capacity cannot be calculated. The foundation designer should calculate the design capacity once final design information is available. The design values established in Tables 13 and 14 are recommended for use in design.

Calculation of the allowable end bearing capacity in granular soils (sands) may be performed through the use of the following equation.

$$q_{p(all)} = \frac{q'(N_q\text{-}1)}{FS} < \frac{0.5 p_a N_q^* tan\phi}{FS}$$ (Das, 2007)

where:

q' = vertical effective stress at drilled shaft bearing elevation

N_q = bearing capacity factor = $tan^2\left(45 + {\phi'}/{2}\right) e^{\pi tan\emptyset}$

ϕ' = soil friction angle

p_a = atmospheric pressure

N_q^* = bearing capacity factor (Das, 2007)

FS = factor of safety = 3

Calculation of the skin friction in granular soils (sands) may be performed through the use of the following equation.

$$q_{s(all)} = \pi d(1 - sin\emptyset') \int_0^{L_i} \sigma'_0 tan\delta' dz \Big/ FS$$ (Das, 2007)

where:

d = pier diameter

σ_o' = vertical effective stress

ϕ' = soil friction angle

δ' = soil-drilled shaft friction angle = ¾*ϕ' (NAVFAC, 1986)

L_i = soil layer thickness

FS = factor of safety = 3

Final axial design capacity will depend on the depth of the shaft, diameter of the shaft, and installation methods. If the depth/diameter ratio is less than 4, a reduction in the end bearing capacity factor (N_{cs}) will be required, as the foundation will act more as a column footing than a deep foundation.

A summary of the recommended skin friction and end bearing values for drilled shaft and direct embedment foundation design is provided in Tables 13 and 14. Please note that these values are presented as the ultimate skin friction and ultimate end bearing values and an appropriate factor of safety must be applied for design purposes.

7.7.2 Resistance to Uplift

Design of drilled piers and piles for uplift should be based on a combination of the skin friction and the weight of the pier/pile. As is standard, skin friction should not be assumed to contribute to uplift resistance throughout the frost zone and the weight of the pier/pile should be taken as the buoyant weight at depths below the water table. Skin friction contributing to uplift resistance in cohesive and cohesionless soils should be taken as the skin friction used in compression less a 10 percent reduction (FHWA, 2010) applied to account for the potential loss of lateral earth pressure in uplift.

7.7.3 Lateral Resistance

It is assumed that the computer program LPILE will be used for the design of drilled shaft foundations to evaluate the lateral capacity of the soil system supporting the foundations. A summary of the recommended values for lateral resistance related to foundation design, including soil density, soil shear strength, and LPILE design parameters is provided in Tables 13 and 14. Design of laterally-loaded piers can incorporate lateral soil resistance below the frost zone thickness of 2 inches.

7.8 Lateral Earth Pressures

Rankine's active and passive pressure coefficients can be determined for both drained and undrained conditions. For sands, cohesion is assumed to be zero and the angle of friction varies as noted in Tables 13 and 14. Rankine's theory assumes vertical walls and that backfill slopes and wall friction angles are equal to zero. The coefficients are as follows:

$$K_a = tan^2\left(45 - {}^{\phi}/_{2}\right) \qquad K_p = tan^2\left(45 + {}^{\phi}/_{2}\right)$$ (Das, 2007)

where:

ϕ = angle of friction for material

K_a = coefficient of Rankine's active earth pressure

K_p = coefficient of Rankine's passive earth pressure

7.9 Settlement

Settlement is an important factor in the design of foundations. Due to the fact that loads and specific details regarding these foundation systems are not available at this time, it is recommended that the foundation designers evaluate the settlement of the soils under foundation loading at some point in the future when these details are known For settlement it is recommended that the foundation designer follow the methods discussed in Section 6.6 of this report. Values of the allowable bearing capacity provided in Tables 13 and 14 assume that a maximum settlement of 1 inch is acceptable for foundation design.

7.10 Collapse Potential

Each of the proposed site ancillary structure locations included in the investigation are located in areas mapped as alluvial deposits (Figure 5). In arid climates, it is common for flash floods to mobilize coarse unsorted sediments in debris flows, relatively low moisture-high solids mixes that move very quickly due to the slope of the terrain. These debris flows come to rest and dry out quickly. If there is a binder of plastic clays, these debris flow deposits can retain a soil matrix that has the potential to be collapsible. Soil collapse is generally triggered by two factors: increased moisture levels and the application of load.

The alluvium soils identified at the proposed site ancillary boring locations consisted of granular alluvium identified as silty sand and poorly graded sand with silt. As discussed in Section 6.11, laboratory collapse testing on granular soils is not typically possible since undisturbed soil sample collection in granular soils is not generally feasible using a drill rig. While undisturbed bulk samples can be collected in shallow test pits, the corresponding results do not provide an indication of the collapse potential of deeper soil layers not accessible to the reach of a backhoe. Therefore, laboratory testing to determine the collapse potential of granular alluvial fan soils is not typically performed.

As a result, other means of evaluation of collapse potential in alluvial soils are typically performed. A review of the relative density inferred from the SPT data indicates that the alluvial sands are generally in a medium dense to very dense condition, with isolated layers of loose granular material in the shallow surficial soils. It should be noted that the relative density indicated from SPT results may be influenced by cementation in the soil. In general, sands with a medium dense to dense relative density have a low potential for soil collapse. In addition, it is recommended in Section 7.15 that the excavation base for granular soils should be leveled and surface compacted. Compaction of this material is required to achieve at least 98 percent of the laboratory maximum dry density measured according to the standard Proctor method, further reducing the risk of soil collapse within the near surface soils.

Based on the results of the geotechnical investigation, the risk of soil collapse at the site ancillary structures included in the investigation is low, provided the recommendations in Section 7.15 are followed.

7.11 Shrink-Swell Potential

Soils considered to have shrink-swell potential generally consist of plastic clays subject to changes in moisture content. The results of the investigation indicate the soils encountered at the proposed site ancillary structures are granular and do not have appreciable shrink-swell potential.

7.12 Frost Depth

The extreme frost penetration depth for this project location is approximately 2 inches (NAVFAC, 1986).

7.13 Sliding Friction

The friction coefficient between the site soils and foundation concrete should be taken as 0.40 in accordance with recommendations provided by Potyondy (1961), assuming a plain concrete surface.

7.14 Excavations

7.14.1 Clearing and Grubbing

The project site is predominantly undeveloped arid land and clearing and grubbing will generally be restricted to the removal of brush and the primary root zone. Based on the results of the field investigation, topsoil is generally not present, and vegetation is sparse with root zone thickness on the order of approximately 1 to 4 inches.

Any topsoil or organic material should not be used for structural fill and shall be placed separately to avoid contamination with other excavated soils. This material could be used in grading non-structural fill such as fields or service areas in which compressibility of the material does not have an impact on structures.

7.14.2 Shallow Excavations

Based on the results of the geotechnical borings and laboratory testing, the soil anticipated at shallow excavation depths associated with spread footing foundations can generally be classified as Type C from OSHA soil classifications (29 CFR 1926 Subpart P-Excavations). It is the responsibility of the competent field personnel (OSHA) to verify the in-situ soil classification at each excavation and ensure that the benching or slopes are adequate during construction.

All existing fill material should be removed from the building pad area during initial site grade and no foundations should bear on previously placed fill material. Based on the limited fill observed in the boring, the material may be suitable for reuse as engineered fill (if needed below foundations) and backfill, provided it is free of organics, debris, and other deleterious material.

7.14.3 Drilled Shaft Excavations

The base of the drilled shaft or direct embedment excavations should be firm and free of loose or disturbed soils. If necessary, any loose or disturbed soils should be removed from the excavation with a clean-out bucket. Rebar cages should be installed immediately prior to concrete placement to facilitate cleaning of the bottom of the excavation.

Granular soils may be prone to sidewall collapse and temporary casing and/or drilling fluid will likely be required to maintain stability of the excavation at some locations. All excavations should be adequately supported to prevent sloughing of the soil into the hole. Sloughing soil can lead to a loss of strength in the soils surrounding the foundation system, which would require a redesign of the foundation to properly account for the strength reduction. All temporary casing should be removed from the excavation during concrete placement. If temporary casing will remain in-place the foundation designer should be consulted to determine if additional foundation capacity is required. The presence of groundwater is not anticipated during construction of the drilled shafts or caissons.

7.15 Subgrade Preparation

Compaction of in situ soils intended for support of the foundation base is not required in excavations where clayey soils are present in the excavation base. In excavations where sands are encountered at the foundation base elevation, surface compaction should be performed with a minimum of one pass with a smooth drum vibratory compactor.

Upon excavation to the proposed bearing surface, the excavation base should be inspected by the construction phase geotechnical engineer of record or authorized representative. If, in the course of excavating the foundation, the base of the excavation becomes rutted, damaged or is otherwise determined to be of inadequate character, the following actions should be performed:

1. If the subgrade soils consist of silts or clays, the excavation should be subcut a minimum of 6 inches beyond the depth of the rutted soils and backfilled with engineered fill. Granular fill placed for subgrade stabilization below foundations should comply with Caltrans Specification 26-1.02. materials ¾-inch maximum and fewer than 10 percent fines or similar, if approved by the engineer. Loose lifts should not exceed 9 inches. The backfill should be compacted to a density of at least 98 percent of standard Proctor.

2. If the subgrade soils consist of primarily granular soils, the excavation base surface should be leveled and surface compacted. Compaction of this material is required to achieve at least 98 percent of the laboratory maximum dry density measured according to the standard Proctor method.

The native material can be used as backfill for the foundation if it meets the following conditions:

- Material shall be placed in maximum 12-inch loose lifts.
- The material is placed to a minimum of 95 percent of standard Proctor maximum dry density (or higher, as defined by Section 7.15.1).

- The backfill surface is graded such that water is directed away from the foundation to prevent moisture infiltration (¼ inch per foot).

- Density is checked in the field periodically to provide adequate compaction (typically one test per 2,500 square feet of fill for each lift).

7.15.1 Backfill Materials

On-site backfill may consist of sand or clays, although is it recommended the liquid limit of these materials should not exceed 45 and the plasticity index should not exceed 15 when used in a non-structural application. All material in consideration for use as fill should be tested and compared with this recommendation prior to use. Fine-grained fill soils (silt or clay) may be particularly difficult to compact if wet or allowed to become wet, or if spread and compacted over wet or marginally stable subgrades. The backfill material should be debris-free and free of any organic matter.

7.16 Cement Type

Soil chemical testing was performed at the proposed substation location (SUB-03). Testing was also performed at proposed wind turbine AM-T2A [GEO-11]. Depending on the sulfate content, the American Concrete Institute (ACI) recommends specific types of cement for use in design to prevent against sulfate attack (ACI, 2014). Based on the testing completed, cement with a sulfate exposure category of S0 appears suitable for the proposed substation and met tower locations. The foundation engineer of record has final responsibility for selection or approval of an appropriate concrete mix design based on the results provided in this report.

7.17 Seismic Design Parameters

The project site is located in an active seismic region. Site Class C is recommended for use in foundation design for the overall site. Table 11 provides the recommended seismic design values for each proposed ancillary structure location based on ASCE 7-16 (ATC, 2020). Note that the parameters in Table 11 are based on Site Class B and should be revised accordingly by the foundation engineer to account for Site Class C conditions.

8.0 Collection System Design

The presence of shallow cemented soils were encountered within upper 4 feet at approximately half of the borings completed at wind turbine locations and will be influential in the design of the collection system. Trenching machinery and methods should be evaluated by the contractor based on the anticipated site conditions, including potential rock trenching (or similar hard excavating) for removal of cemented soils.

Furthermore, many of the site soils are alluvial in origin (Section 2.2), with varying sand and gravel content and varying cementation. Variable subsurface conditions should be anticipated both laterally and by depth. Screening of gravel and weathered rock should be anticipated if native materials are utilized as cable bedding.

Thermal resistivity testing was completed on one bulk soil sample collected at the project site. Laboratory thermal resistivity testing was completed at both the optimum and as-received moisture content at approximately 85 percent of the standard Proctor density (two total tests). Based on the results of the thermal resistivity testing, the soils at the site exhibit significantly lower thermal resistivity values when at the optimum moisture content when compared to test results at the as-received moisture content.

9.0 Limitations of Analysis

The analysis and conclusions provided are based on the results of fieldwork from recent investigations. Using generally accepted engineering methods and practices, the investigations performed have made every reasonable effort to characterize the site. However, the likelihood that conditions may vary from any specific location tested is still possible, and careful attention to soil conditions should be undertaken during the time of construction by qualified personnel.

Barr Engineering Co.'s services for this project were performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

10.0References

American Concrete Institute (ACI) Standard, Building Code Requirements for Structural Concrete and Commentary. ACI 318-14. American Concrete Institute, 2014.

Applied Technology Council (ATC), Hazards by Location, Seismic https://hazards.atcouncil.org , Accessed November 2020.

Bedrossian, T. L., et al., Special Report 217: Geologic Compilation of Quaternary Surficial Deposits in Southern California (2012 Revision), California Geological Survey, 2012.

Bell, F.G. (1994) *Engineering in Rock Mass*, Butterworth-Heinemann Ltd.

Bowles, J. E., 1996. Foundation Analysis and Design, 5th Edition.

Bryant, W.A., and Lundberg, M., compilers, 2002, Fault number 1i, San Andreas fault zone, San Bernardino Mountains section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 10/05/2020 11:33 AM.

Das, B. M., Principles of Foundation Engineering, Thomson Canada Limited, 2007.

Day, Robert W., Foundation Engineering Handbook, The McGraw-Hill Companies, Inc., 2006.

Drenth, Benjamin J., Moore, Douglas, Young, Charles. T., 2003. "Geophysical Response of the Mission Creek Fault Near Desert Hot Springs, California," Michigan Technological University, Houghton, Michigan, USA.

Earth Systems Consultants. Engineering Geology and Geotechnical Engineering Report. Proposed Wind Machines, Alta Mesa Project – Phase IV, Whitewater Area of Riverside County, California. File No. SS-7055-PI, 99-02-710. March 2, 1999. Prepared for Mark Technologies Corporation.

Earth Systems Pacific. Limited Geologic Hazards Study, Alta Mesa Repower – Eight New Turbine Locations, T-1, T-2A, T-3A, T-4A, T-5, T-6A, T-7A & T13A, Whitewater Area of San Gorgonio Pass, Riverside County, California, Brookfield PO No. U1414117-Rev. 0. July 31, 2020. Completed for Brookfield Power US Asset Management, LLC.

Earth Systems Southwest. Revised Geologic Map for the Update to Engineering Geology and Geotechnical Engineering Report and Supplement. WECS 71 Revised Permit, Alta Mesa Project, Whitewater area of Riverside County, California. File No. 07055-03, 01-02-734. February 12, 2001. Prepared for Mark Technologies Corporation.

Earth Systems Southwest. Update and Substantial Conformance to Engineering Geology and Geotechnical Engineering Report and Supplemental with Revised Site Plan Review. WECS 71, Alta Mesa Project – Phase IV, Whitewater area of Riverside County, California. File No.: 07055-07, 05-07-818. July 28, 2005. Prepared for The Keith Companies.

Fahey M., 1999. Soil stiffness values for foundation settlement analysis. Proc. 2nd Int. Conf. on Pre-Failure Deformation Characteristics of Geomaterials. Torino, Vol. 2, pp. 1325-1332.

Frankel, A.D., *et al*., 2002, Documentation for the 2002 Update of the National Seismic Hazard Maps, USGS Open-File Report 02-420.

Giroud, J.P. and Jie Han, Design Method for Geogrid-Reinforced Unpaved Roads, I. Development of Design Method, Journal of Geotechnical and Geoenvironmental Engineering. American Society of Civil Engineers, pg. 775-786. 2004.

Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010.

Kramer, S. L., 1996. Geotechnical Earthquake Engineering, Prentice-Hall, Inc.

Leighton and Associates, Inc. Preliminary Geotechnical Investigation, Alta Mesa, Section 3, T3S, R3E. Whitewater, Riverside County, California. Project No. 6830028-03. February 15, 1983. Prepared for Alternate Energy Investments Company, Inc.

Leighton and Associates, Inc. Geologic Review of (Alta Mesa, Section 3, T3S, R3E, Whitewater) Riverside County, California. Project No. 6890971-01. May 30, 1989. Prepared for Mark Technologies Corporation.

NAVFAC (1986). Naval Facilities and Engineering Command Design Manual 7.1: Soil Mechanics, Unites States Navy.

NMG Geotechnical Inc. Geologic inspection/Mapping of Proposed Wind Turbine Sites in Row E (12 & 13) and Row B (3, 13, 14, & 15), Section 3 T35, R3E, Alta Mesa, Riverside County, California. Project NO. 94092-2. June 15, 1995. Prepared for Vestas-American Wind Technology, Inc.

Potyondy, J., 1961. “Skin Friction Between Various Soils and Construction Materials”, Geotechnique, Volume XI, Number 4.

Risø National Laboratory, Guidelines for Design of Wind Turbines, 2nd Edition, Det Norske Veritas, Copenhagen, 2002.

Stone, Paul. 2006. Geologic Map of the West Half of the Blythe 30’ by 60’ Quadrangle, Riverside County, California and La Paz County, Arizona, United States Geologic Society (USGS), 2006.

Weldon, R.J., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the earthquake cycle: What a long recurrence record tells us about how faults work: GSA Today, v. 14, no. 9, doi: 10.1130/1052-5173(2004)014 2.0.CO;2.

Westwood. Personal Communication to Ben Borree and Rob Osburn. Electronic correspondence on August 31 and September 3, 2020.

Working Group on California Earthquake Probabilities, 1995, Seismic Hazards in Southern California: Probably Earthquakes, 1994-2024: Bulletin of the Seismological Society of America, Vol. 85, No. 2, pp. 379-430.

Yule, D., and Sieh, K., 2003, Complexities of the San Andreas fault near San Gorgonio Pass: Implications for large earthquakes: Journal of Geophysical Research, v. 108, no. B11, ETG 9-1–9-23, doi: 10.1029/2001JB000451.

Yule, D., 2009, The enigmatic San Gorgonio Pass, Geology, v. 37, p. 191-192.

Tables

Table 1
Summary of Geotechnical Investigation

Structure Type	Structure ID (09/03/2020)	Investigation ID	Geographic NAD83		Elevation* [feet]	Geotechnical Boring			Electrical Resistivity	Thermal Resistivity	CBR	Geophysics
			Longitude	Latitude		35-60 ft	30 ft	25 ft				
Turbine	AM-T1	GEO-10	-116.66653	33.94358	2793	X					X	
Turbine	AM-T2A	GEO-11	-116.66694	33.94098	2738	X						
Turbine	AM-T3A	GEO-12	-116.66194	33.94616	2724	X						
Turbine	AM-T4A	GEO-13	-116.66027	33.94365	2649	X						X
Turbine	AM-T5	GEO-14	-116.65993	33.94127	2636	X						
Turbine	AM-T6A	GEO-15	-116.65853	33.93914	2556	X						
Turbine	AM-T7A	GEO-16	-116.65784	33.93725	2488	X						
Former Turbine		GEO-17	-116.66625	33.94608	2761	X						
MET Tower	Alta Mesa Met	MET-02	-116.66673	33.94242	2667			X				
Substation	Alta Mesa Sub 1	SUB-02	-116.66325	33.94631	2628		X					
Substation	Alta Mesa Sub 2	SUB-03	-116.66326	33.94611	2628		X		X	X		

*Elevation data provided by Westwood on September 3, 2020.

Table 2
Summary of Site Geologic and Geotechnical Hazards

Hazard	Present at Site?	Comment
High groundwater	No	Groundwater was not observed in any of the geotechnical borings completed during the investigation and groundwater will not need to be considered in foundation design.
Flash Flooding or Debris Flow	Unlikely	While the Alta Mesa site atop West Whitewater Hill is located on alluvial fan deposits, these are very old, elevated deposits such that flash flooding and debris flows typical of younger alluvial fans are not expected.
Scour	Unlikely	As stated above, flash flooding and assocated scour are not likely given the topography of the site.
Wind erosion	Unlikely	Alluvial fans can be subject to wind erosion, especially when surficial materials are not stabilized with vegetation. However, the alluvial surface on West Whitewater Hill is estimated to be >100,000 years old, indicating that very little if any of this material has been removed over that period of time due to wind erosion.
Slope failure	Possible	No evidence of slope failure as it relates to important infrastructure was noted during site reconnaissance. It should be noted that a large natural slope failure and associated headscarp was noted approximately one mile north of the project site. Several of the old wind turbines on the existing wind project to the north of the Alta Mesa site were removed and relocated in 1997 due to rainfall-induced slope movement.
Subsidence – Pumping	Unlikely	The project site is not an area of oil and gas development. The groundwater aquifer in the Coachella Valley has experienced significant drawdown in its history but subsidence at the project site has been minimal.
Subsidence – Mining	No	No underground mining has occurred or is occurring in the project area.
Subsidence - Caves/Karst	No	No known caves or karst geology exist in the project area.
Earthquake/Seismicity	Yes	Seismic Design Category C is recommended for the project based on mapped spectral response acceleration parameters (USGS, 2018). This indicates a high probability of experiencing severe ground shaking. The Banning fault runs approximately east-west just to the north of the project site, the Garnet Hill fault extends just west of the project site, and other active faults are also present in the region.
Earthquakes – Ground Rupture	Yes	Surface fault rupture near and within the project site is most likely to occur on the Banning fault because it is the south branch of the San Andreas fault. If surface rupture along this fault trace were to occur, it is most likely to be confined within the deep east-west canyon just to the north of the project site, north of West Whitewater Hill. Thus, this surface rupture is less likely to impact the wind turbines, none of which will be constructed within the canyon, but would more likely impact access roads and electrical collection systems crossing the canyon. The proposed wind turbine closest to the fault trace (AM-T3A [GEO-12]) is located on the south side of the east-west canyon atop West Whitewater Hill, as shown in Figures 5 and 6. This proposed turbine is about 450 feet south of the mapped trace of the Banning fault. Though less likely, if surface rupture were to occur on the northernmost branch of the Garnet Hill fault, the closest proposed wind turbine location (AM-T2A [GEO-11]) is about 375 feet east of the mapped fault trace as shown in Figures 5 and 6. It should be noted that some uncertainty exists in the location of the fault trace, as Jennings and Bryant (2010) list this branch of the Garnet Hill fault as “approximately located” in the vicinity of proposed wind turbine locations AM-T1 [GEO-10] and AM-T2A [GEO-11] in addition to the Alta Mesa met tower. It should be noted, however, that the fault trace appears to extend north-south along the base of the steeper slope upon which the proposed wind turbines are located as shown in Figure 6. See Section 2.3.5.
Earthquakes - Liquefaction	Unlikely	The soils in the upper approximately 50 feet or greater are unsaturated and not susceptible to liquefaction. They are also dense and cemented to various degrees.

Hazard	Present at Site?	Comment
Earthquakes – Ridgetop Shattering	Unlikely	West Whitewater Hill is the geomorphic manifestation of an active anticline in very old alluvial fan deposits. Atop this hill is a depositional surface comprising a deep red soil, which indicates ≥100,000 years of exposure due to its extreme development (Yule and Sieh, 2003). This surficial soil was observed during Barr's site reconnaissance in September 2020. However, during this reconnaissance exercise and subsequent analysis of aerial images of the site, no evidence of ridgetop shattering was noted relating to proposed project infrastructure such as turbines. It can be assumed that many large earthquakes have occurred in the last 100,000 years at the site and if associated ridgetop shattering were to have occurred, some remnant evidence of this shattering, especially significant shattering, should be observable. Given that no evidence of ridgetop shattering was noted in this surface estimated to have been exposed for ≥100,000 years, the likelihood of ridgetop shattering during the design life of the project is expected to be low. See Section 2.3.6.
Swelling/shrinking soil	No	Soils considered to have shrink-swell potential generally consist of plastic clays subject to changes in moisture content. The results of the investigation indicate the soils encountered on site are granular and do not have appreciable shrink-swell potential.
Corrosive soil	Unlikely	Figures 10a and 10b indicate that surficial soils at the site generally pose a low to moderate risk for concrete and steel corrosion. Project-specific soil testing indicates that cement with a sulfate exposure category of S0 is recommended for all proposed wind turbine and ancillary structures given the sulfate levels in the soils at the project site.
Made ground	Unlikely	The site has been used as a wind power development. Consequently, some grade change has occurred. However, there is low probability of significant made ground. One boring (AM-T5 [GEO-14]) exhibited 8 feet of granular fill at the surface while several other borings encountered about 1 foot of fill at the surface.
Collapsible soil	Unlikely	The Alta Mesa project site is located on alluvial deposits in a region of arid climate. Alluvial fan soils are potentially collapsible but this assessment has determined that potential for soil collapse is low.

Table 3
Summary of Chemical Test Results

Investigation ID	Depth [ft]	pH	Soil Sample	
			Soluble Chloride	Soluble Sulfate
			[mg/kg]	[mg/kg]
GEO-11	2.5-9	5.8	<20	<50
SUB-03	3-5	7.6	<20	<50
	Mean	6.7	<20	<50
	Standard Deviation	1.3	--	--
	Minimum	5.8	<20	<50
	Maximum	7.6	<20	<50

Detection limit for chlorides = 20 mg/kg, sulfates = 50 mg/kg.

Table 4
Summary of General Laboratory Test Results

Investigation ID	Depth [ft]	USCS Classification	Moisture Content [%]	Percent Passing #200 Sieve [%]	Direct Shear Test - Friction Angle [deg.]
GEO-11	10-16.5	SP-SM		9.5	40.9
GEO-12	10-11.5	SP-SM/SM		11.8	
GEO-13	10-11.5	SM/SP-SM	2.8	12.9	
	20-21.5	SP-SM/SP	1.2		
GEO-14	15-16.5	SP-SM		8.7	
GEO-16	7.5-9	SM/SP-SM	1.8		
MET-02	7.5-9	SM		25.5	
SUB-02	5-6.5	SM/SP-SM		12.7	
	15-16.5	SP-SM	2.5		
SUB-03	2.5-4	SM/SP-SM	2.4		
	7.5-9	SP-SM	2.3		
	15-16.5	SP-SM	1.2		

Total Number of Tests	7	6	1
Mean	2.0	13.5	40.9
Standard Deviation	0.6	6.1	--
Minimum	1.2	8.7	40.9
Maximum	2.8	25.5	40.9

Table 5
Summary of Standard Penetration Test Results

Structure Type	Investigation ID	SPT Blow Counts [blows/ft]																			
		Test Depth [ft]																		Average	
		0	2.5	5	7.5	10	12.5	15	20	25	30	35	40	45	50	55	60	65	70	Full Depth	≥ 10 ft
Turbine	GEO-10	--	23	66	100	100	100	100	100	100	100	100	100	100	100	100	100	--	--	93	100
Turbine	GEO-11	--	28	12	18	100	18	23	87	100	60	100	100	--	--	--	--	--	--	59	74
Turbine	GEO-12	--	82	32	27	26	26	100	38	67	100	76	100	100	100	--	--	--	--	67	73
Turbine	GEO-13	--	19	15	34	28	33	64	21	100	100	100	100	100	100	--	--	--	--	63	75
Turbine	GEO-14	--	66	100	100	100	100	75	100	100	100	100	--	--	--	--	--	--	--	94	96
Turbine	GEO-15	--	100	76	62	100	100	100	100	100	100	100	100	100	100	--	--	--	--	95	100
Turbine	GEO-16	--	61	56	72	100	100	100	100	100	100	100	100	100	100	100	--	--	--	92	100
Former Turbine	GEO-17	--	19	77	100	100	52	25	100	100	100	100	100	100	100	--	--	--	--	83	88
MET Tower	MET-02	--	26	63	70	100	34	100	100	100	--	--	--	--	--	--	--	--	--	74	87
Substation	SUB-02	--	23	24	23	23	27	42	100	77	85	--	--	--	--	--	--	--	--	47	59
Substation	SUB-03	17	10	19	15	41	37	20	100	80	100	--	--	--	--	--	--	--	--	44	63

*Tests in which refusal was encountered (i.e., 50/XX") were given a result of 100.

-- Indicates no SPT test performed.

Table 6
Summary of Standard Proctor Test Results

Investigation ID	Depth [ft]	USCS Classification	Maximum Dry Density [pcf]	Optimum Moisture Content [%]
GEO-10	0.5-2	SM	127.4	8.7
GEO-14	3-5	SM	127.7	9.4
SUB-03	3-5	SM	124.5	9.2
		Mean	126.5	9.1
		Standard Deviation	1.8	0.4
		Minimum	124.5	8.7
		Maximum	127.7	9.4

Table 7
Summary of California Bearing Ratio Test Result

Investigation ID	Depth [ft]	California Bearing Ratio Value (Optimum Moisture Content - 95% Compaction) [%]
GEO-10	0.5-2	5.9
	Mean	5.9
	Standard Deviation	--
	Minimum	5.9
	Maximum	5.9

Table 8
Summary of Geophysical Test Results

Investigation ID	Average Wavespeed [ft/s][1]		Poisson's Ratio
	Shear	Compression	
GEO-13	1,555	3,314	0.40

[1] Average wavespeeds calculated from below the minimum anticipated foundation embedment depth of 10 feet.

Table 9
Recommended Aggregate Base Thickness for Road Section Design

Traffic Condition	Max Rut Depth [in.]	Percent Compaction [%][1]	Recommended Aggregate Thickness [inches][2]					
			Unreinforced	Geotextile	Geogrid Reinforced Road, Aperture Stability Modulus [m*N/deg.]			
					0	**0.25**	**0.5**	**0.75**
Maintenance	1.5	95	9	6	6	6	6	6
Construction	1.5	95	24	17	15	14	11	6
	3.0	95	14	6	6	6	6	6

*Note that road cross section should be of adequate thickness to compensate for topsoil stripping and promote positive drainage away from the road. This table is intended to provide the recommended values for use in the road section design. It is the responsibility of the civil designer to determine final road cross section.

[1] Percent compaction of standard Proctor maximum dry density (ASTM D698).

[2] A minimum of six inches is recommended for road section design.

Table 10
Axle Pass Calculation

Item	Quantity	Notes
No. of Turbines on Road	5	Estimated based on turbine layout
Concrete per Turbine [yd^3]	1,188	Assumed
Lineal Feet of Roadway	5,300	Estimated based on turbine layout
Gravel [tons]	5,300	Assumed 1 ton per lineal foot roadway
Tons per Gravel Truck	10	Assumed
Cubic Yards per Concrete Truck	8	Assumed
Gravel Loads	530	One Way Traffic
Concrete Loads	743	One Way Traffic
Dust Control (Water) Loads	53	Assumed 10% of gravel loads
Turbine Deliveries	40	Assumed 8 per turbine - One Way Traffic
Tandem Axles per Gravel Truck	2	Assumed
Tandem Axles per Concrete Truck	2	Assumed
Tandem Axles per Water Truck	2	Assumed
Tandem Axles per Turbine Delivery	4	Assumed
Axle Load	25,000	Assumed
Single Axle Eq Factor (SN=1 pt=2.5)	4.51	AASHTO 1993
Tandem Axle Eq Factor (SN=1 pt=2.5)	0.28	AASHTO 1993
ESAL	6,900	Estimated for One Way Traffic

Table 11
Summary of Seismic Design Values

Structure Type	Structure ID (09/03/2020)	Investigation ID	S_S[1]	S_1[1]
Turbine	AM-T1	GEO-10	2.433	1.014
Turbine	AM-T2A	GEO-11	2.414	1.005
Turbine	AM-T3A	GEO-12	2.458	1.025
Turbine	AM-T4A	GEO-13	2.441	1.017
Turbine	AM-T5	GEO-14	2.424	1.009
Turbine	AM-T6A	GEO-15	2.417	1.002
Turbine	AM-T7A	GEO-16	2.411	0.996
MET Tower	Alta Mesa Met	MET-02	2.424	1.010
Substation	Alta Mesa Sub 1	SUB-02	2.457	1.025
Substation	Alta Mesa Sub 2	SUB-03		

[1] Seismic parameters provided are g for Site Class B from ASCE 7-16 (ATC, 2020). Site Class C is recommended. Values should be converted to Site Class C for foundation design.

Table 12
Summary of Geotechnical Parameters for Foundation Design of Wind Turbines

Parameter	Value	Units
Drained Shear Strength (sands and gravels)	32	degrees
Gross Allowable Bearing Capacity, Normal Operating Load	>10,000	lb/ft^2
Gross Allowable Bearing Capacity, Extreme Load	>10,000	lb/ft^2
Gross Allowable Bearing Capacity, Abnormal Extreme Load	>10,000	lb/ft^2
Recommended Design Shear Wave Velocity	1,500	ft/s
Recommended Design Small Strain Shear Modulus	8,030	kips/ft^2
Recommended Design Poisson's Ratio	0.34	
Minimum Foundation/Soil Friction Factor	0.4	
Frost Depth	2	inches

*The structural engineer will need to reduce the shear modulus based upon the stress imparted on the soil by the foundation. See Section 6.5.

Table 13
Summary of Geotechnical Parameters for Substation Foundation Design

Structure Type	Investigation ID	Depth to Top of Layer [ft]	Depth to Bottom of Layer [ft]	Soil Type	Effective Unit Weight [pcf]	Saturated Unit Weight [pcf]	Depth to Groundwater [ft]	Friction Angle [deg.] [2,4]	Soil Elastic Modulus [ksf][2]	Pressure meter Modulus, E_{pmt} [ksi] [2,5]	Drilled Shafts			Active Earth Pressure Coefficient, K_a [2]	Passive Earth Pressure Coefficient, K_p [2]	Drilled Shafts		Spread Footing Allowable Bearing Capacity (4 ft by 4 ft typ.) [psf] [2]
											p-y Modulus, *k* (Static Loading) [lb/in^3] [3,4]	p-y Modulus, *k* (Cyclic Loading) [lb/in^3] [3,4]	Strain Factor, e50 [3,4]			Ultimate Skin Friction [$kips/ft^2$] [2]	Ultimate End Bearing [$kips/ft^2$] [2]	
Alta Mesa Substation	SUB-02 SUB-03	0	5	sand	110	N/A	>31.5	30	300	0.4	50	50	N/A	0.33	3.00	0.06	4.8	2,000
		5	10	sand	110	N/A	>31.5	31	450	0.5	70	70	N/A	0.32	3.12	0.17	16.2	N/A
		10	20	sand	115	N/A	>31.5	33	600	0.7	90	90	N/A	0.29	3.39	0.35	26.0	
		20	31.5	sand	120	N/A	>31.5	36	1500	1.3	300	300	N/A	0.26	3.85	0.62	29.1	

Note 1: Soil strength values for lateral resistance of drilled piers should be reduced in the frost zone or zones that may be effected by erosion or scour.

Note 2: Das, B. M., Principles of Foundation Engineering, Thomson Canada Limited, 2007 (pages 79-80, 126, 240, 324, 327, 599-604).

Note 3: LPILE Reference Manual, Ensoft, 2013.

Note 4: Parameter determined from SPT correlations and in conjunction with testing results from the previous geotechnical investigation.

Note 5: Field standard penetration test value conservatively taken as N_{60} in the absence of drill rig hammer calibration certificate.

Table 14
Summary of Geotechnical Parameters for Met Tower Foundation Design

Structure Type	Investigation ID	Depth to Top of Layer [ft]	Depth to Bottom of Layer [ft]	Soil Type	Effective Unit Weight [pcf]	Saturated Unit Weight [pcf]	Depth to Groundwater [ft]	Friction Angle [deg.] ^{2,4}	Soil Elastic Modulus [ksf]^{2}	Pressure meter Modulus, E_{pmt} [ksi] ^{2,5}	Drilled Shafts			Active Earth Pressure Coefficient, K_a ^{2}	Passive Earth Pressure Coefficient, K_p ^{2}	Drilled Shafts		Spread Footing Allowable Bearing Capacity (4 ft by 4 ft typ.) [psf] ^{2}
											p-y Modulus, *k* (Static Loading) [lb/in^{3}] ^{3,4}	p-y Modulus, *k* (Cyclic Loading) [lb/in^{3}] ^{3,4}	Strain Factor, e50 ^{3,4}			Ultimate Skin Friction [kips/ft^{2}] ^{2}	Ultimate End Bearing [kips/ft^{2}] ^{2}	
Alta Mesa MET	MET-02	0	2.5	sand	110	N/A	>25.5	30	300	0.4	50	50	N/A	0.33	3.00	0.03	2.4	2,000
		2.5	5	sand	110	N/A	>25.5	34	780	0.8	130	130	N/A	0.28	3.54	0.09	11.7	4,000
		5	15	sand	115	N/A	>25.5	35	1020	1.0	170	170	N/A	0.27	3.69	0.24	28.0	N/A
		15	25.5	sand	120	N/A	>25.5	36	1500	1.3	300	300	N/A	0.21	4.76	0.49	29.1	

Note 1: Soil strength values for lateral resistance of drilled piers should be reduced in the frost zone or zones that may be effected by erosion or scour.

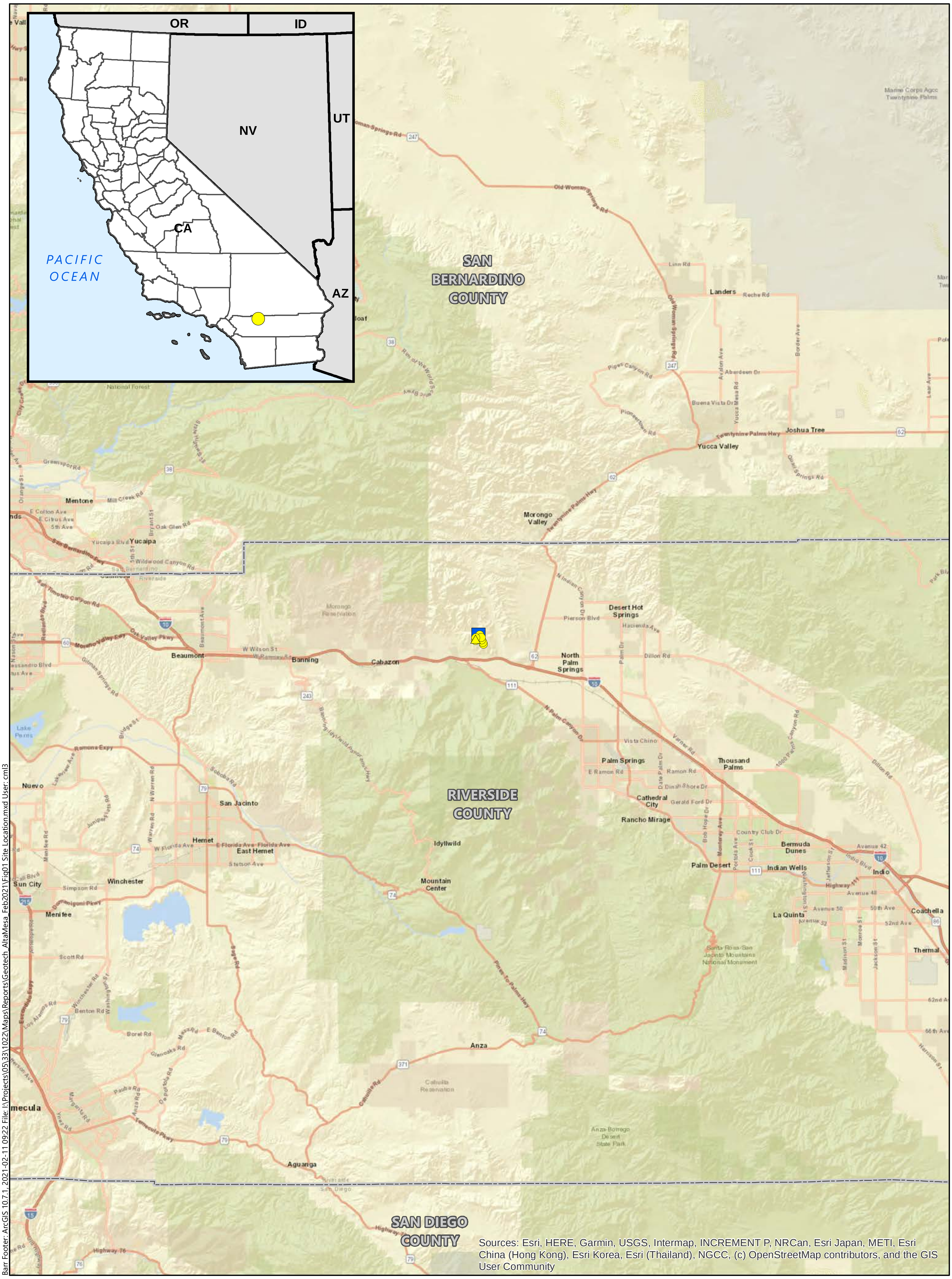
Note 2: Das, B. M., Principles of Foundation Engineering, Thomson Canada Limited, 2007 (pages 79-80, 126, 240, 324, 327, 599-604).

Note 3: LPILE Reference Manual, Ensoft, 2013.

Note 4: Parameter determined from SPT correlations and in conjunction with testing results from the previous geotechnical investigation.

Note 5: Field standard penetration test value conservatively taken as N_{60} in the absence of drill rig hammer calibration certificate.

Figures



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

● Turbine Location (9/3/2020)

△ Met Tower Location (8/31/2020)

■ Substation Location (8/31/2020)

▭ County Boundary

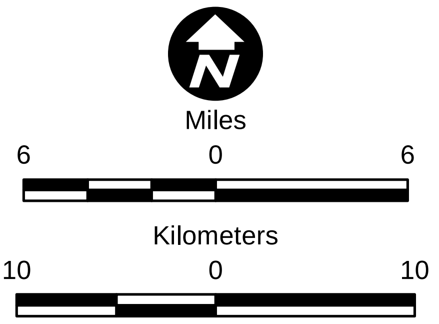


Figure 1

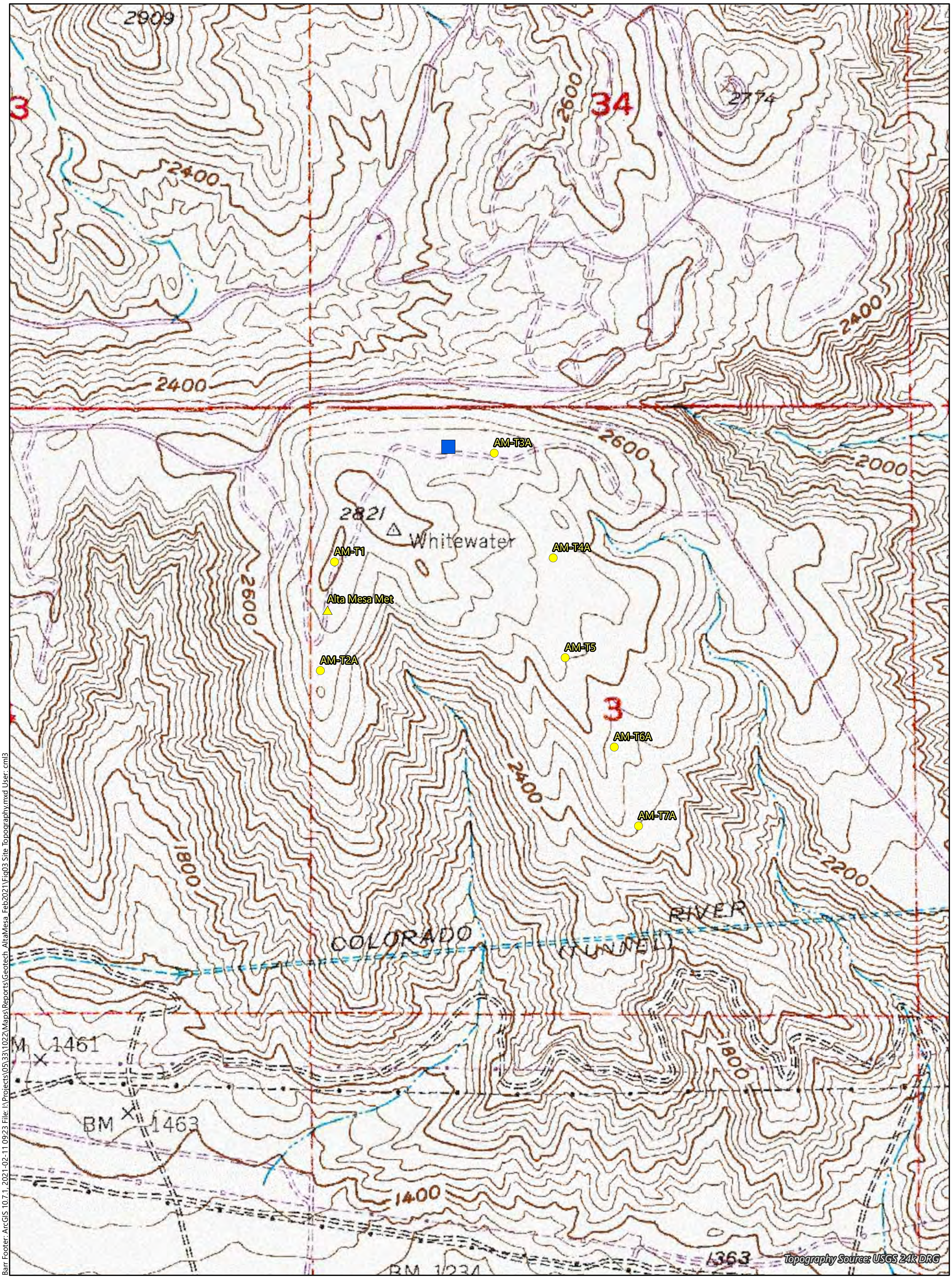
SITE LOCATION

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

● Turbine Location (9/3/2020)
△ Met Tower Location (8/31/2020)
🟦 Substation Location (8/31/2020)

Figure 2

SITE LAYOUT
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



○ Turbine Location (9/3/2020)
△ Met Tower Location (8/31/2020)
■ Substation Location (8/31/2020)

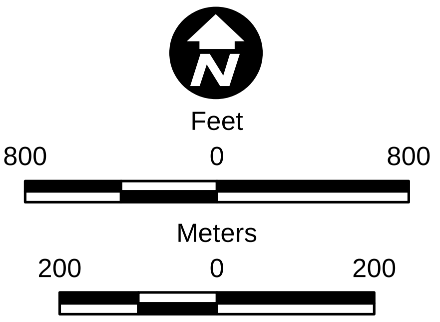
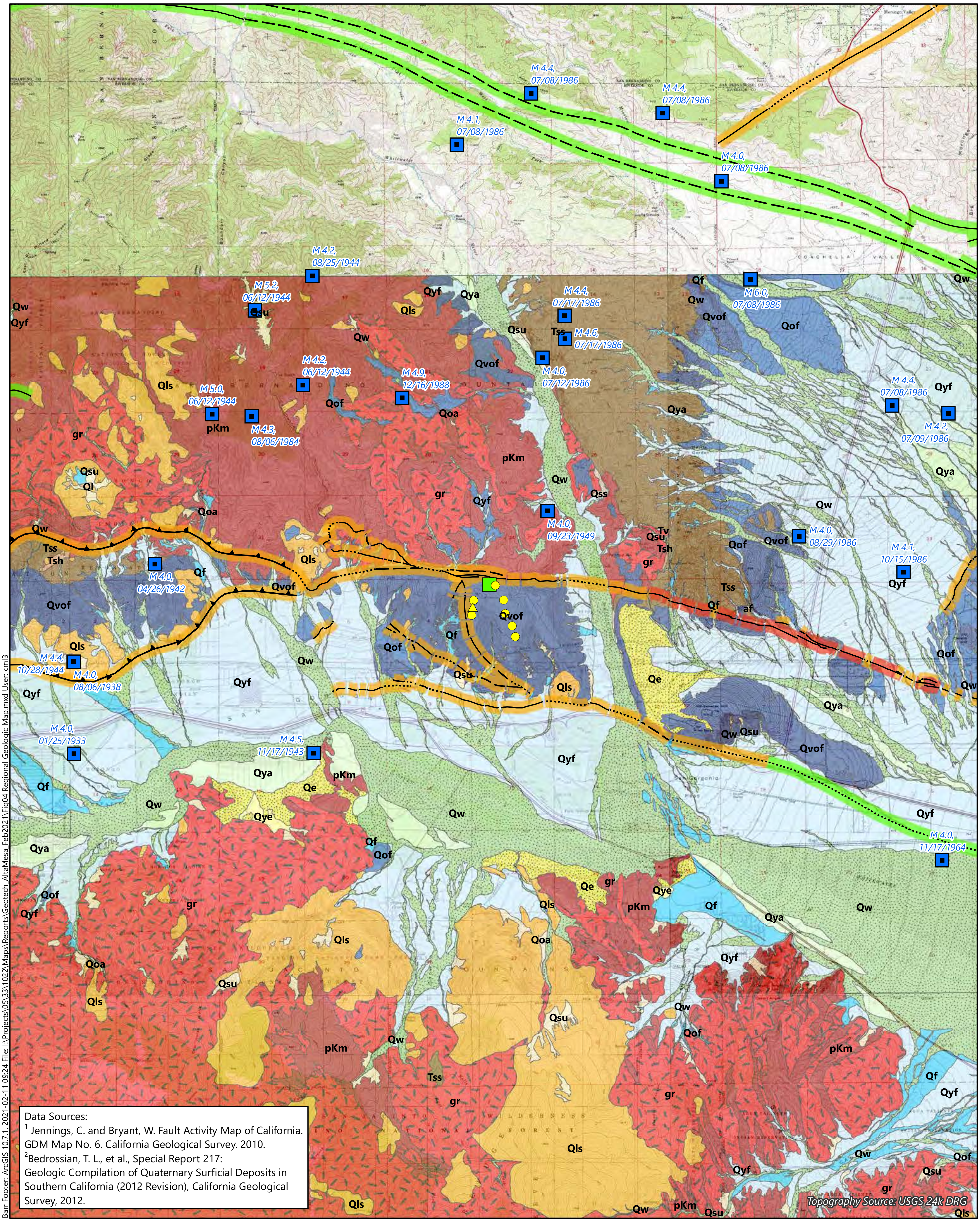


Figure 3

SITE TOPOGRAPHY
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Data Sources:
[1] Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010.
[2]Bedrossian, T. L., et al., Special Report 217: Geologic Compilation of Quaternary Surficial Deposits in Southern California (2012 Revision), California Geological Survey, 2012.

Barr Footer: ArcGIS 10.7.1, 2021-02-11 09:24 File: I:\Projects\05\33\1022\Maps\Reports\Geotech_AltaMesa_Feb2021\Fig04 Regional Geologic Map.mxd User: cml3

● Turbine Location (9/3/2020)
▲ Met Tower Location (8/31/2020)
🟩 Substation Location (8/31/2020)
■ Earthquake Epicenter (>M 4.0, Date)

Active Quaternary Faults[1]
— Fault, certain
– – Fault, approx. located
······ Fault, concealed
▼ Thrust fault, certain

Fault Age
🟩 Late Quaternary
🟧 Holocene
🟥 Historic

Surficial Geology[2]
Qoa - Old Alluvial Valley Deposits
Qye - Young Eolian and Dune Deposits
Qe - Eolian and Dune Deposits
Qyf - Young Alluvial Fan Deposits
Qf - Alluvial Fan Deposits
Qof - Old Alluvial Fan Deposits
Qvof - Very Old Alluvial Fan Deposits
Qya - Young Alluvial Valley Deposits
Qw - Alluvial Wash Deposits
Ql - Lacustrine, Playa and Estuarine (Paralic) Deposits
Qls - Landslide Deposits; may include debris flows and older landslides
Qsu - Undifferentiated Surficial Deposits; includes colluvium, slope wash, talus deposits, and other surface deposits of all ages
Tsh - Fine-grained Tertiary age formations of sedimentary origin
Qss - Coarse-grained formations of Pleistocene age and younger; primarily sandstone and conglomerate
Tss - Coarse-grained Tertiary age formations of sedimentary origin
gr - Granitic and other intrusive crystalline rocks of all ages
pKm - Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin

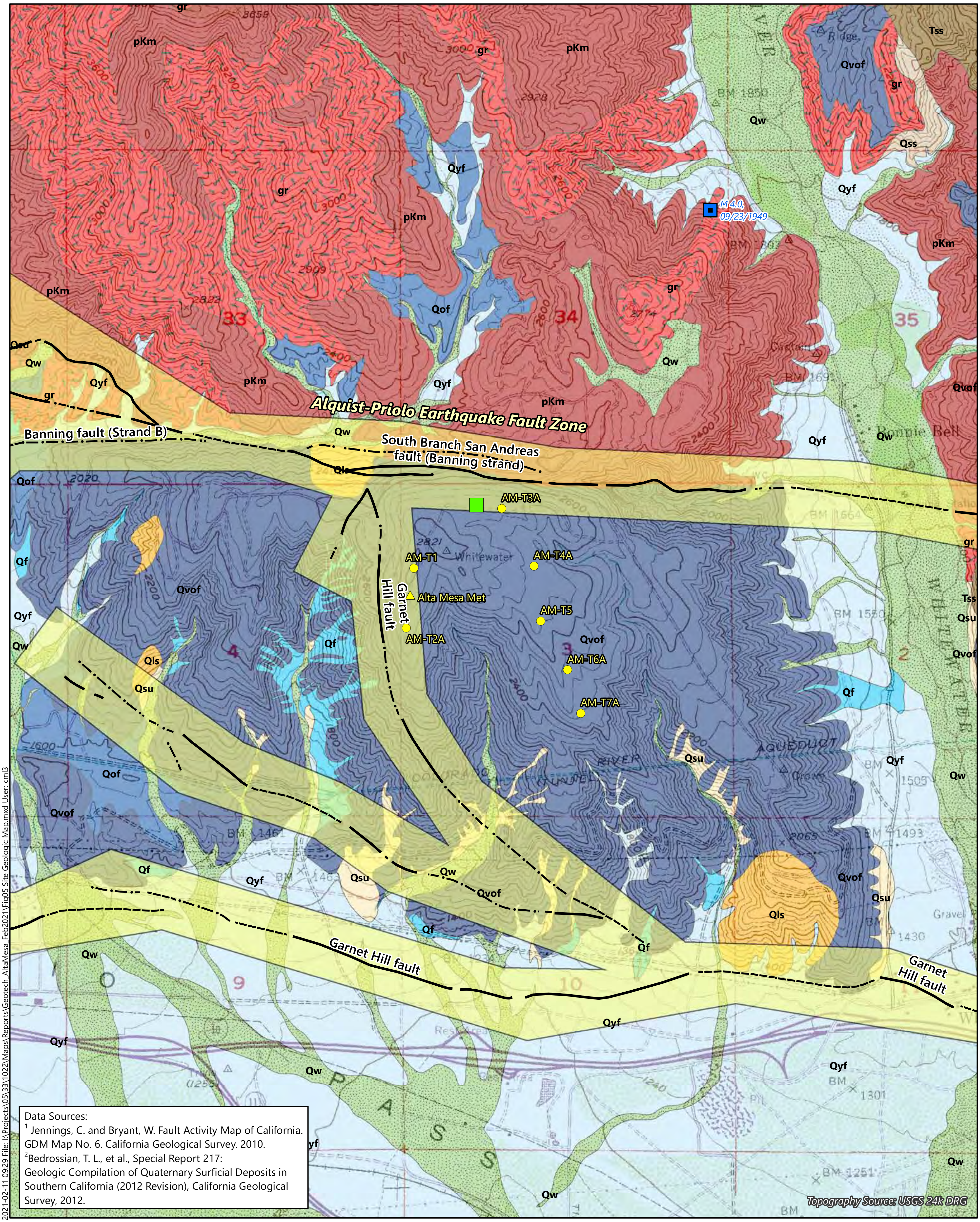
N

Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 4

REGIONAL GEOLOGIC MAP
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Data Sources:
[1] Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010.
[2] Bedrossian, T. L., et al., Special Report 217: Geologic Compilation of Quaternary Surficial Deposits in Southern California (2012 Revision), California Geological Survey, 2012.

● Turbine Location (9/3/2020)
▲ Met Tower Location (8/31/2020)
🟩 Substation Location (8/31/2020)
■ Earthquake Epicenter (>M 4.0, Date)

Active Quaternary Faults[1]
- Alquist-Priolo Earthquake Fault Zone
- Fault, approximately located
- Fault, concealed
- Fault Zone

Surficial Geology[2]
- Qyf - Young Alluvial Fan Deposits
- Qf - Alluvial Fan Deposits
- Qof - Old Alluvial Fan Deposits
- Qvof - Very Old Alluvial Fan Deposits
- Qw - Alluvial Wash Deposits
- Qls - Landslide Deposits; may include debris flows and older landslides
- Qsu - Undifferentiated Surficial Deposits; includes colluvium, slope wash, talus deposits, and other surface deposits of all ages
- Qss - Coarse-grained formations of Pleistocene age and younger; primarily sandstone and conglomerate
- Tss - Coarse-grained Tertiary age formations of sedimentary origin
- gr - Granitic and other intrusive crystalline rocks of all ages
- pKm - Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin

N

Feet
750 0 750

Meters
250 0 250

Figure 5

SITE GEOLOGIC MAP
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

● Turbine Location (9/3/2020)

▲ Met Tower Location (8/31/2020)

■ Substation Location (8/31/2020)

Active Quaternary Faults[1]

- Fault, certain
- Fault, approximately located
- Fault, concealed

Data Sources:
[1] Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010.

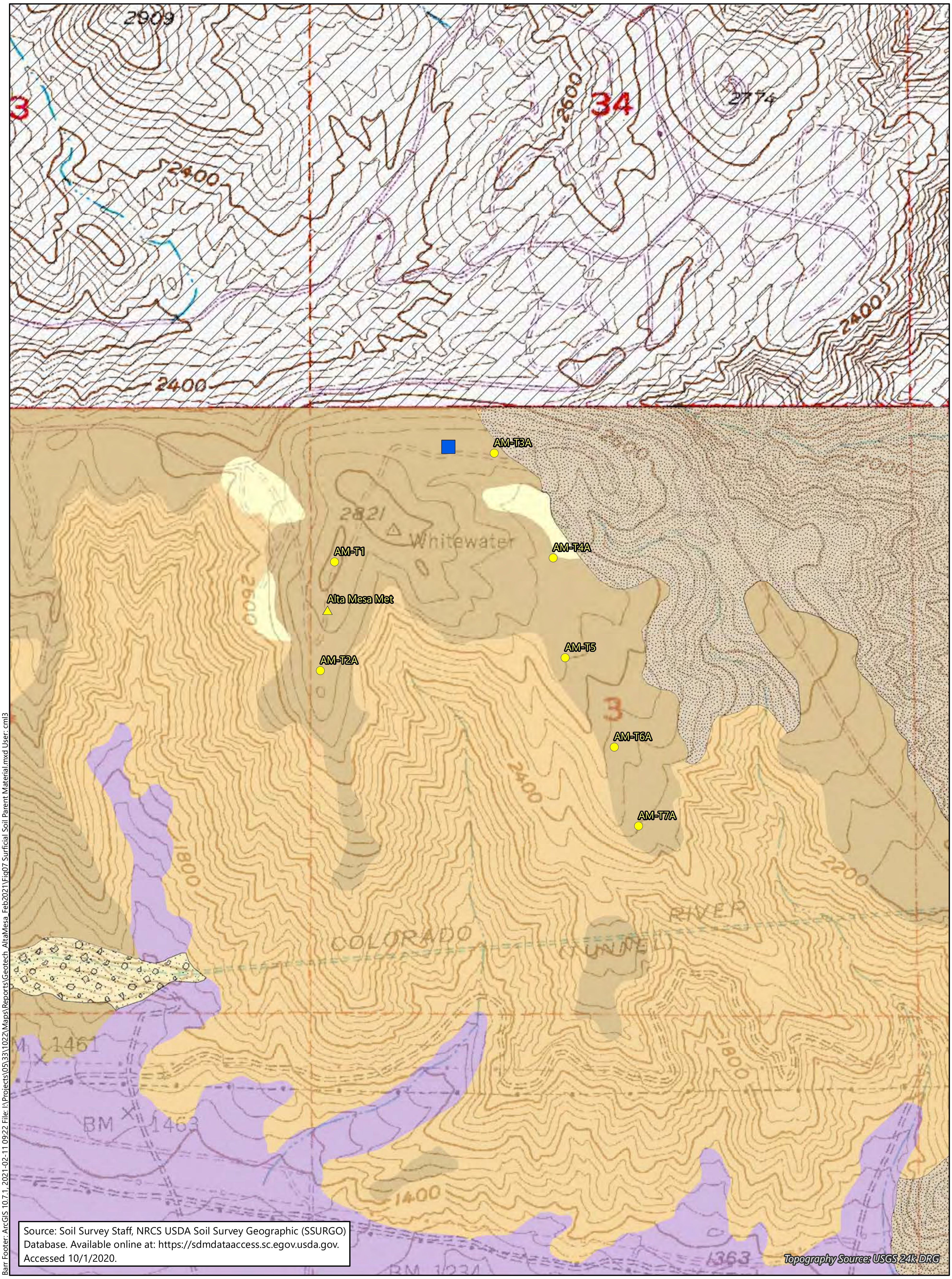
Topography:
Bevis, M. and Hudnut, K. (2005): B4 Lidar Project: Airborne Laser Swath Mapping (ALSM) survey of the San Andreas Fault (SAF) system of central and southern California, including the Banning segment of the SAF and the San Jacinto fault system. National Center for Airborne Laser Mapping (NCALM), U.S. Geological Survey, the Ohio State University, and the Southern California Integrated GPS Project. Distributed by OpenTopography. https://doi.org/10.5066/F7TQ5ZQ6. Accessed: 2020-10-06

Feet
1,500 0 1,500

Meters
400 0 400

Figure 6

FAULT DETAIL
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Source: Soil Survey Staff, NRCS USDA Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov. Accessed 10/1/2020.

Barr Footer: ArcGIS 10.7.1, 2021-02-11 09:22 File: I:\Projects\05\33\1022\Maps\Reports\Geotech_AltaMesa_Feb2021\Fig07 Surficial Soil Parent Material.mxd User: cml3

- ● Turning Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- ■ Substation Location (8/31/2020)

Surficial Soil Parent Material

- 🟧 consolidated sandy alluvium
- 🟫 gravelly alluvium
- 🟪 gravelly alluvium derived from granite
- ▨ sandy alluvium derived from sandstone
- ▨ sandy and gravelly alluvium
- 🟨 wind blown sandy alluvium
- ☐ Not Rated or Not Available

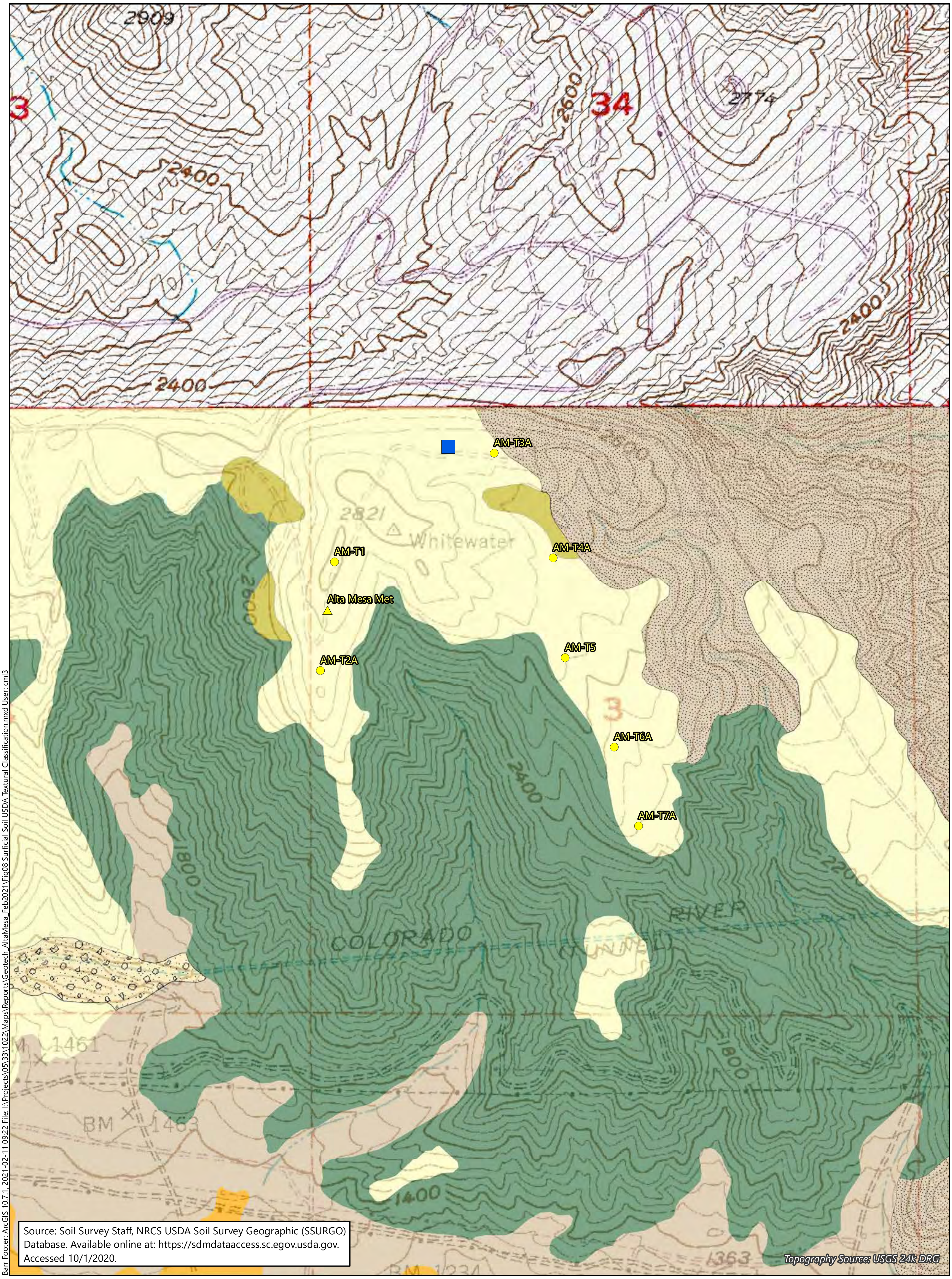
Feet
800 0 800

Meters
200 0 200

Figure 7

SURFICIAL SOIL PARENT MATERIAL

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Source: Soil Survey Staff, NRCS USDA Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov. Accessed 10/1/2020.

- ● Turbine Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- ■ Substation Location (8/31/2020)

Surficial Soil USDA Textural Classification

- ▨ Extremely gravelly coarse sand
- ▨ Cobbly sand
- ▨ Gravelly sand
- ▨ Sand
- ▨ Fine sand
- ▨ Cobbly fine sandy loam
- ▨ Weathered bedrock
- ☐ Not Rated or Not Available

N

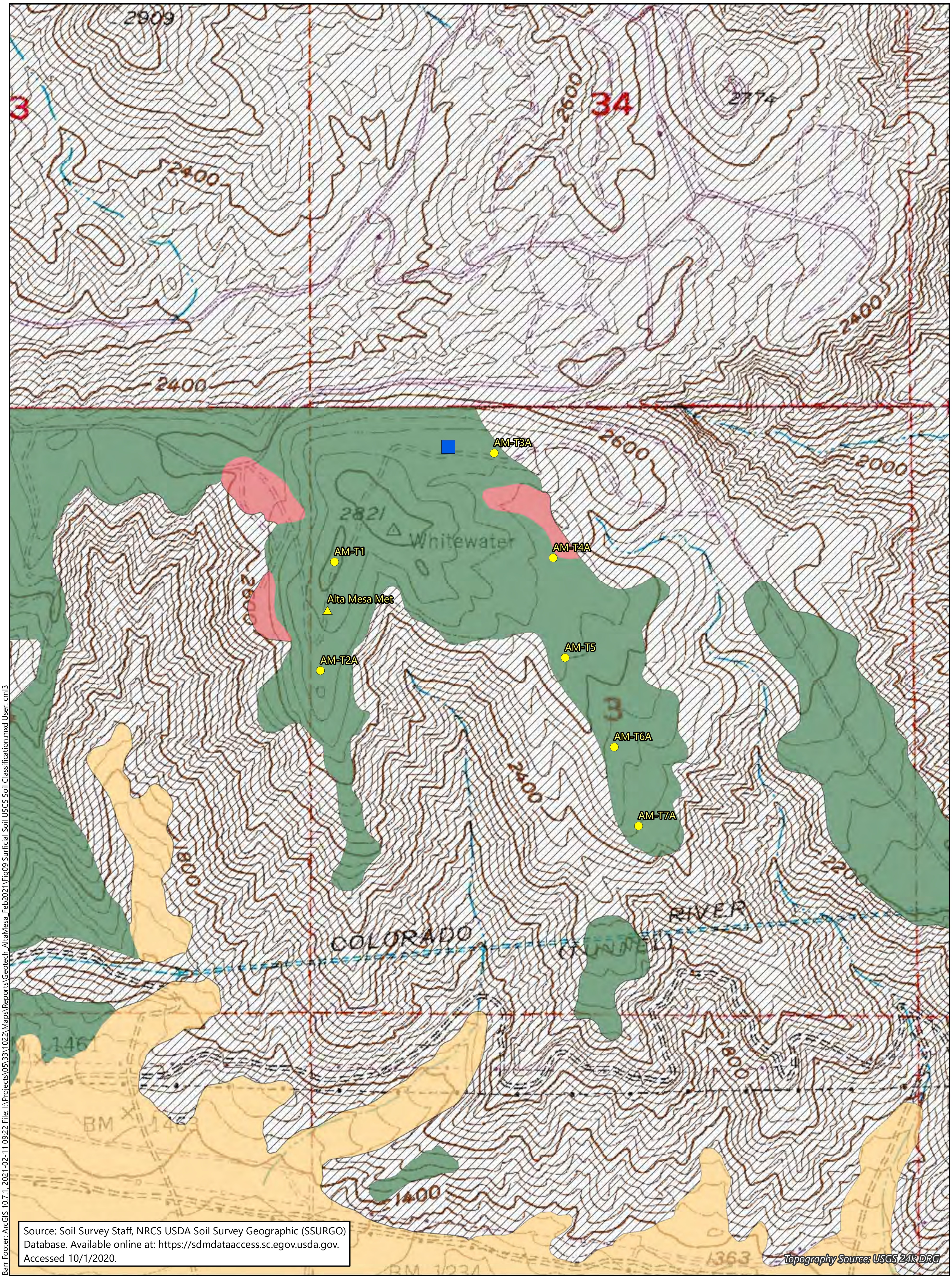
Feet
800 0 800

Meters
200 0 200

Figure 8

SURFICIAL SOIL USDA TEXTURAL CLASSIFICATION

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Source: Soil Survey Staff, NRCS USDA Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov. Accessed 10/1/2020.

Topography Source: USGS 24k DRG

Barr Footer: ArcGIS 10.7.1, 2021-02-11 09:22 File: I:\Projects\05\33\1022\Maps\Reports\Geotech_AltaMesa_Feb2021\Fig09 Surficial Soil USCS Soil Classification.mxd User: cml3

- ● Turbine Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- ■ Substation Location (8/31/2020)

Surficial Soil USCS Soil Classification

- 🟥 SM - Silty Sand
- 🟨 SP - Poorly Graded Sand
- 🟩 GM - Silty Gravel
- ▨ Not Rated or Not Available

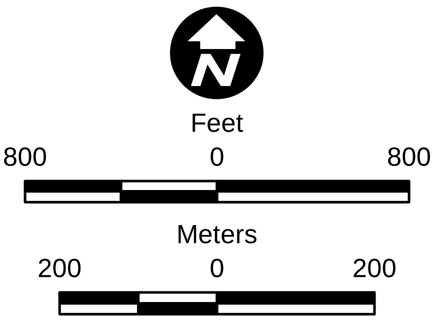
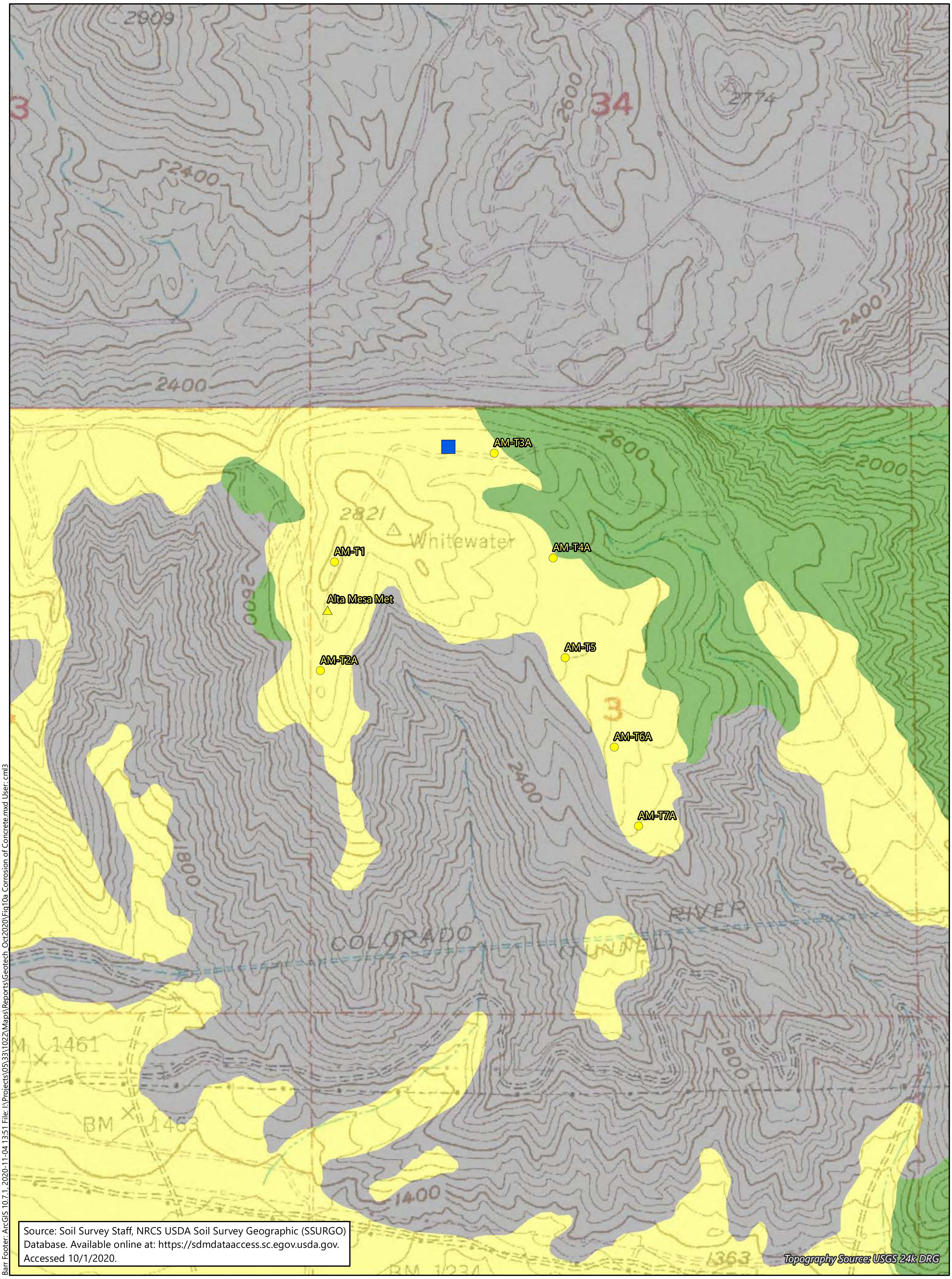


Figure 9

SURFICIAL SOIL USCS SOIL CLASSIFICATION

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Source: Soil Survey Staff, NRCS USDA Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov. Accessed 10/1/2020.

Topography Source: USGS 24k DRG

- ● Turbine Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- 🟦 Substation Location (8/31/2020)

Surface Soil Corrosion Risk - Concrete

- 🟨 Moderate
- 🟩 Low
- ⬜ Not Rated

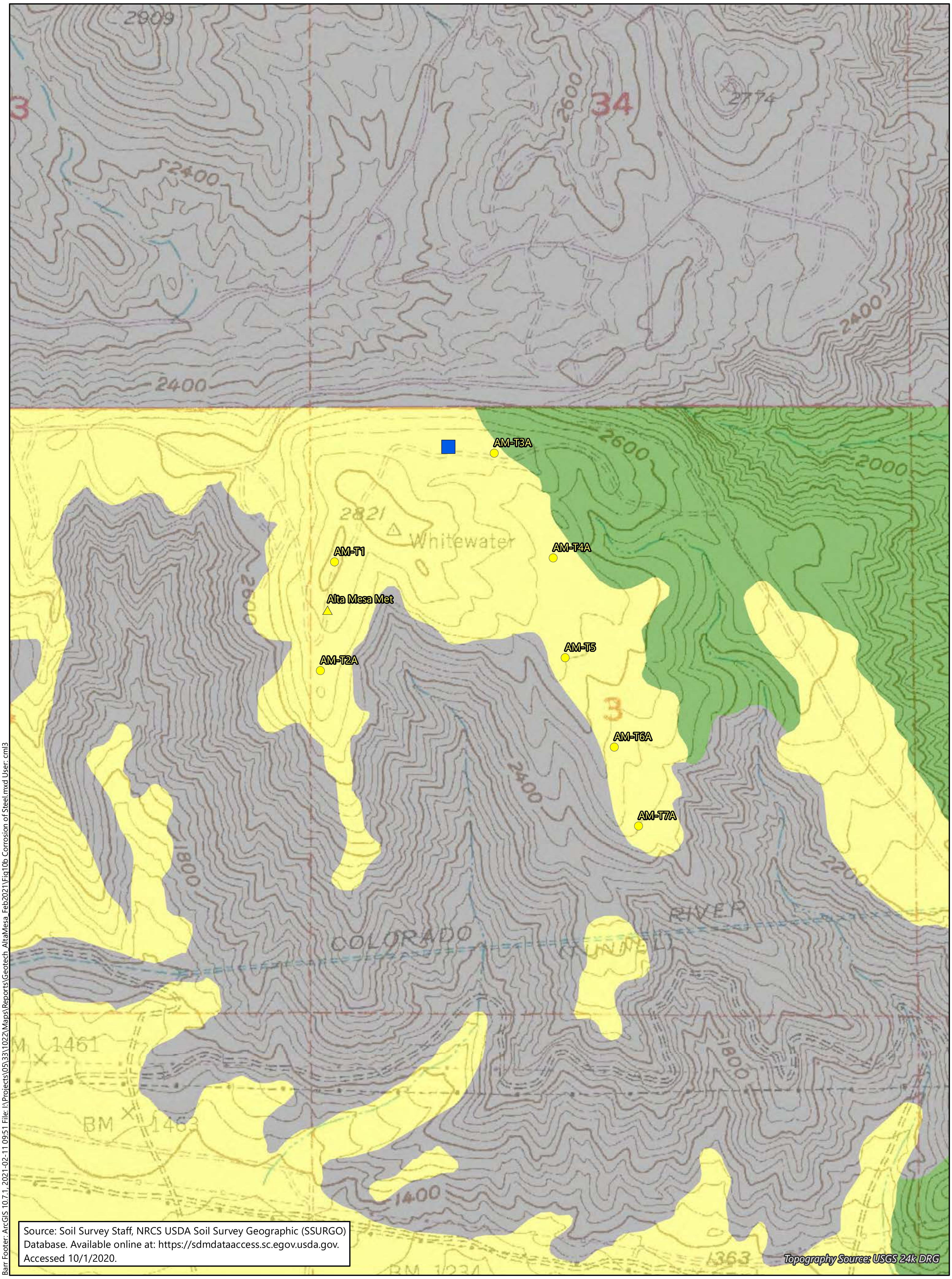
Feet
800 0 800

Meters
200 0 200

Figure 10a

SURFICIAL SOIL CORROSION RISK - CONCRETE

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California



Source: Soil Survey Staff, NRCS USDA Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov. Accessed 10/1/2020.

○ Turbine Location (9/3/2020)
△ Met Tower Location (8/31/2020)
■ Substation Location (8/31/2020)

Surface Soil Corrosion Risk - Steel
🟨 Moderate
🟩 Low
⬜ Not Rated

Feet
800 0 800

Meters
200 0 200

Figure 10b

SURFICIAL SOIL CORROSION RISK - STEEL

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

- ● Turbine Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- ● Geotechnical Boring Location

Feet
800 0 800

Meters
200 0 200

Figure 11

GEOTECHNICAL BORING LOCATIONS
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

● Turniline Location (9/3/2020)

▲ Met Tower Location (8/31/2020)

◐ Electrical Resistivity Test and Thermal Resistivity Sample Location

Figure 12

ELECTRICAL RESISTIVIY TEST AND THERMAL RESISTIVITY SAMPLE LOCATION

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

- ● Turbine Location (9/3/2020)
- ▲ Met Tower Location (8/31/2020)
- ■ Substation Location (8/31/2020)
- ● CBR Sample Location
- ● Geophysical Test Location

Figure 13

CBR SAMPLE AND GEOPHYSICAL TEST LOCATIONS

Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

Appendix A

Geotechnical Boring Logs

BARR

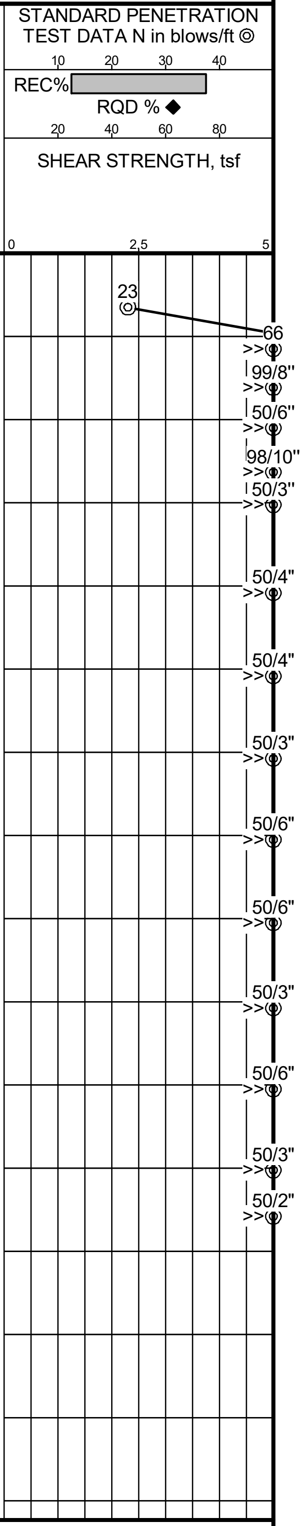
Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

LOG OF BORING GEO-10

Associated Boring #: AM-T1
Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2793.1 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94358° Long: -116.66653°	Completion Depth:	58.3 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 2793.1 ft					
		TOPSOIL (SP-SM): fine to medium grained; reddish brown; dry to moist. 0.4ft 2792.7 ft					
2790		POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; reddish brown; dry to moist; medium dense.		☒	1	100	23
	5	5.0ft 2788.1 ft		☒	2	100	66
2785		POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; light brown to gray; dry to moist; very dense.		☒	3	100	99/8"
	10			☒	4	100	50/6"
2780		2780.6 ft POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; very dense. 12.5ft		☒	5	62	98/10"
	15			☒	6	100	50/3"
2775							
	20			☒	7	100	50/4"
2770		2768.1 ft					
	25	SILTY SAND (SM): very fine to fine grained; light brown; dry to moist; very dense. 25.0ft		☒	8	100	50/4"
2765							
	30			☒	9	100	50/3"
2760							
	35			☒	10	100	50/6"
2755							
	40			☒	11	100	50/6"
2750							
	45			☒	12	100	50/3"
2745		2743.1 ft					
	50	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; very dense. 50.0ft		☒	13	100	50/6"
2740							
	55			☒	14	100	50/3"
2735		2734.8 ft Bottom of Boring at 58.3 feet 58.3ft		☒	15	100	50/2"



Date Boring Started:	9/10/20 7:30 am
Date Boring Completed:	9/10/20 11:00 am
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling
Dry
▽ At Time of Drilling
Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 77°F, Sunny

M:\GINTPROJECTS\05331022.00_MESA-ALTA MESA.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

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Minneapolis, MN 55435
Telephone: 952-832-2600

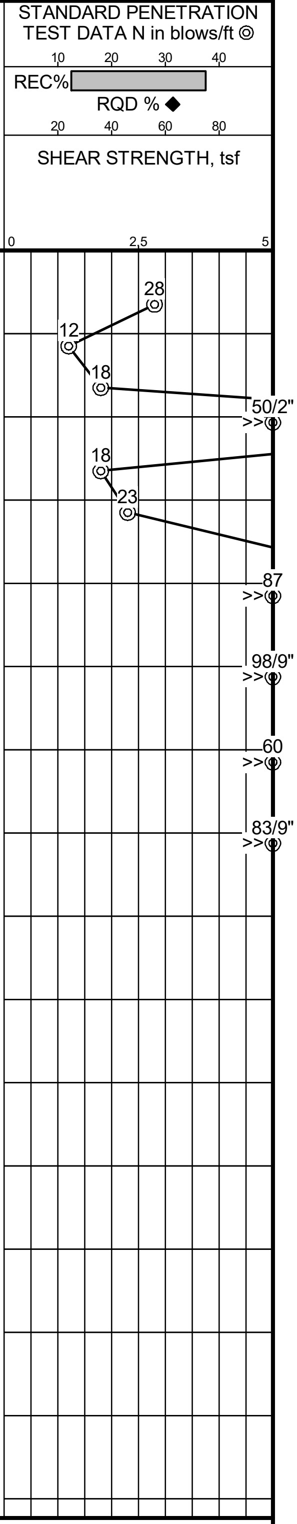
LOG OF BORING GEO-11

Associated Boring #: AM-T2A

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2737.9 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94098° Long: -116.66694°	Completion Depth:	37.5 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION Surface Elev.: 2737.9 ft		Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	TOPSOIL (SP): fine to medium grained; brown to light brown; dry to moist. 2737.5 ft	0.4ft					
2735		POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; light brown; dry to moist; medium dense to very dense.			☒	1	100	28
	5	5': increase in grain size.			☒	2	100	12
2730					☒	3	45	18
	10	2725.9 ft			☒	4	100	50/ 2"
2725		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): fine to coarse grained; brown to gray; dry to moist; medium dense to very dense; with gravel.	12.0ft		☒	5	17	18
	15				☒	6	100	23
2720								
	20				☒	7	83	87
2715		2712.9 ft						
	25	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown to gray; dry to moist; very dense.	25.0ft		☒	8	96	98/ 9"
2710								
	30	2706.9 ft			☒	9	100	60
2705		POORLY GRADED SAND WITH GRAVEL (SP): fine to coarse grained; gray; dry to moist; very dense. 2702.9 ft	31.0ft					
	35	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; very dense. 2700.4 ft	35.0ft 37.5ft		☒	10 11	80 100	83/ 9" REF
		Bottom of Boring at 37.5 feet						



		Water Levels (ft)	Remarks: Elevation data provided by Westwood on September 3, 2020.
Date Boring Started:	9/9/20 8:00 am	▼ End of Drilling Dry	
Date Boring Completed:	9/9/20 11:45 am	▽ At Time of Drilling Dry	
Logged By:	KSB		
Drilling Contractor:	Cascade		
Drill Rig:	CME		Weather: 80°F, Sunny

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LOG OF BORING GEO-12

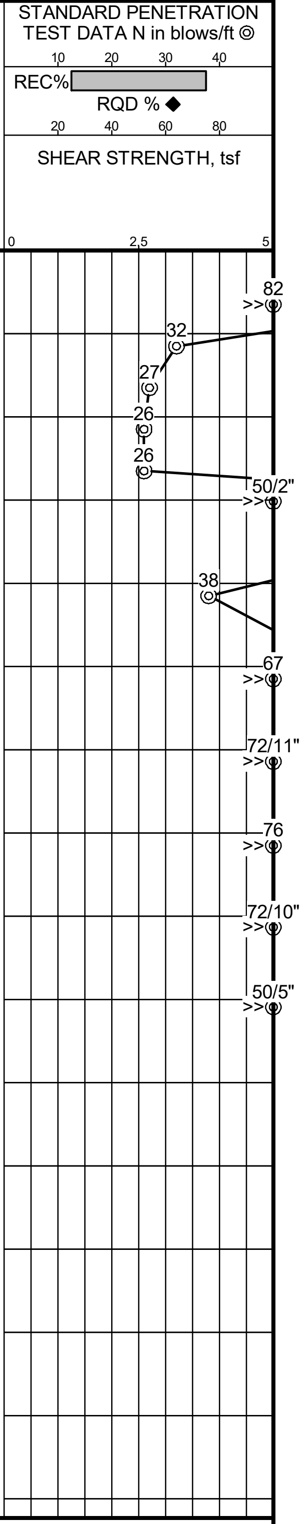
Associated Boring #: AM-T3A

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2723.7 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94616° Long: -116.66194°	Completion Depth:	50.0 ft
Datum:	NAD83		

Surface Elev.: 2723.7 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	TOPSOIL (SP): fine to medium grained; brown; dry to moist. 0.4ft 2723.3 ft					
2720	5	POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; reddish brown; dry to moist; dense to very dense. 5': trace gravel. 2716.2 ft 7.5ft		☒ ☒	1 2	100 100	82 32
2715	10	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown to gray; dry to moist; medium dense. 2708.7 ft		☒ ☒ ☒	3 4 5	100 100 100	27 26 26
2710	15	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; very dense. 15.0ft 2703.7 ft			6	47	50/ 2"
2705	20	SILTY SAND (SM): very fine to fine grained; brown to gray; dry to moist; dense. 20.0ft 2698.7 ft		☒	7	22	38
2700 2695 2690	25 30 35	POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; brown to gray; dry to moist; very dense. 25.0ft 30': color change to light brown. 35': trace gravel. 2683.7 ft		☒ ☒ ☒	8 9 10	53 70 33	67 72/ 11" 76
2685 2680 2675	40 45	POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; brown; dry to moist; very dense. 40.0ft 42.5': trace gravel. 2673.7 ft		☒ ☒	11 12	75 98	72/ 10" 50/ 5"
	50	Bottom of Boring at 50.0 feet 50.0ft			13	100	REF



Date Boring Started:	9/11/20 11:00 am
Date Boring Completed:	9/11/20 4:00 pm
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling
Dry
▽ At Time of Drilling
Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 90°F, Sunny

M:\GINTPROJECTS\05331022.00_MESA-ALTA MESA.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

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Minneapolis, MN 55435
Telephone: 952-832-2600

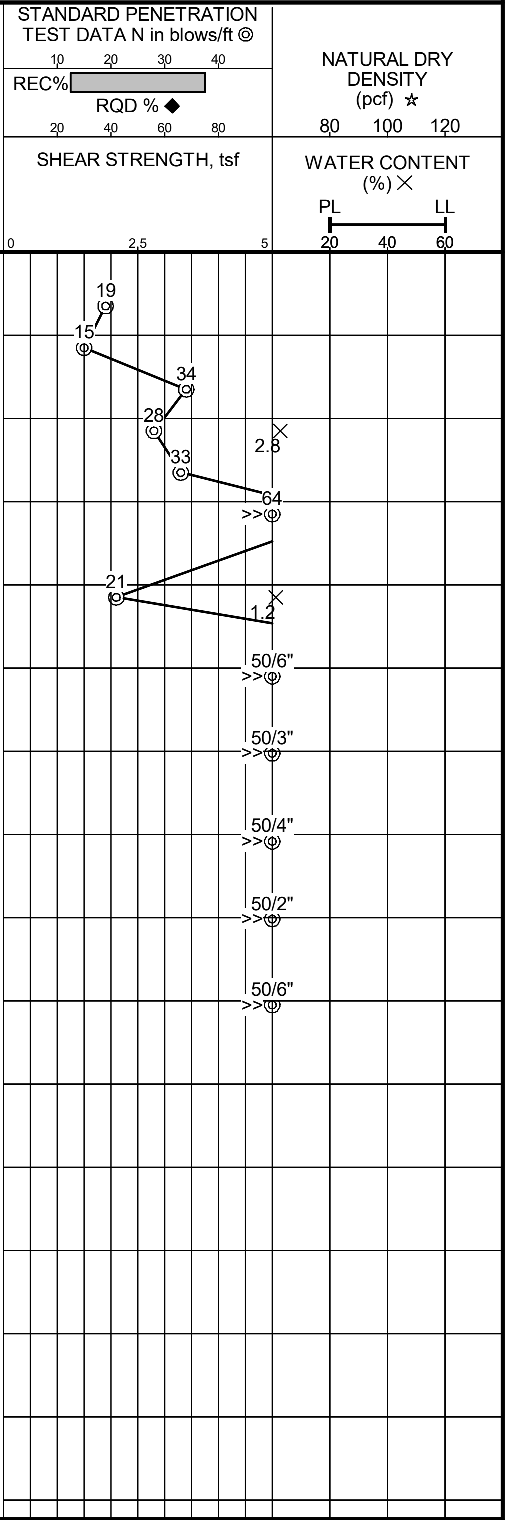
LOG OF BORING GEO-13

Associated Boring #: AM-T4A

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2648.9 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94365° Long: -116.66027°	Completion Depth:	50.0 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION Surface Elev.: 2648.9 ft	Sample No.	% Recovery	SPT, N value or RQD %
2648.9	0	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; reddish brown; dry to moist; medium dense.	1	100	19
		2641.9 ft	2	89	15
2641.9	7.0ft	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; medium dense to very dense; no cementation; trace fine gravel. 10': fine to medium grained.	3	100	34
			4	83	28
			5	100	33
			6	100	64
		2625.9 ft	7	100	21
2625.9	23.0ft	SILTY SAND (SM): very fine to fine grained; light brown; dry to moist; very dense; with gravel; no cementation. 25': fine gravel in split spoon.	8	100	50/ 6"
		31' to 33': moderate cementation.	9	68	50/ 3"
		35': fine to medium grained.	10	100	50/ 4"
			11	100	50/ 2"
			12	16	50/ 6"
2598.9	50.0ft	2598.9 ft Bottom of Boring at 50.0 feet	13	100	REF



Date Boring Started:	9/16/20 3:45 pm
Date Boring Completed:	9/17/20 9:45 am
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Boring offset approximately 35 feet south-southeast of surveyed location. Elevation data provided by Westwood on September 3, 2020.

Weather: 95°F, Sunny

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Minneapolis, MN 55435
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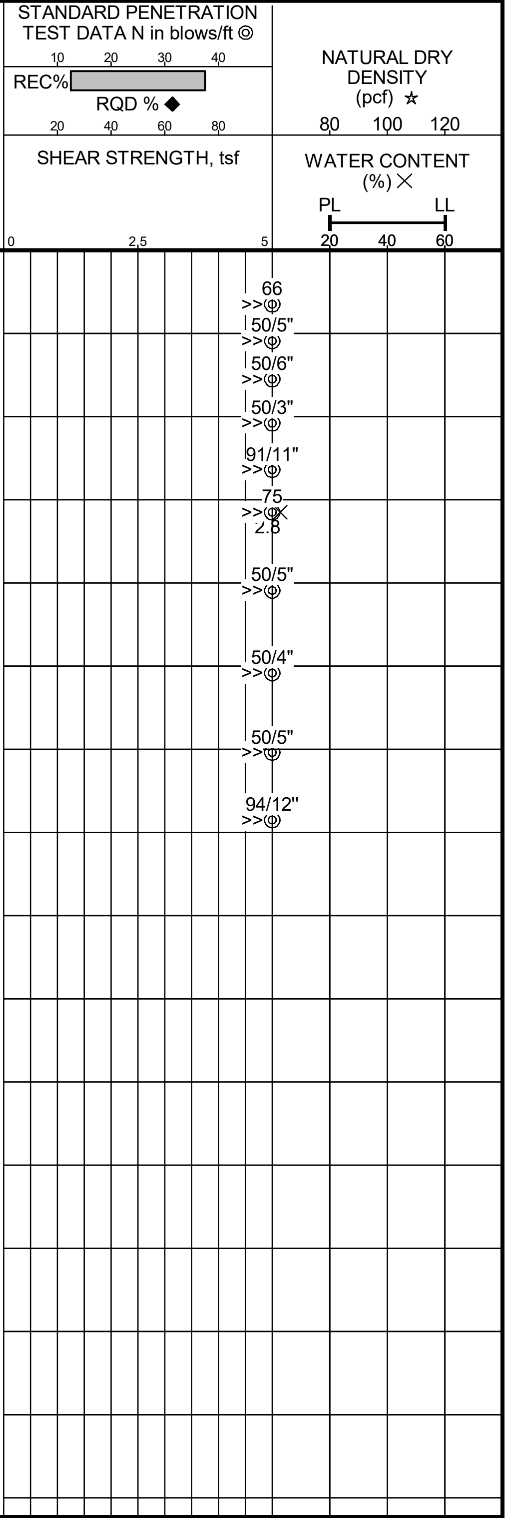
LOG OF BORING GEO-14

Associated Boring #: AM-T5

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2636.3 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94127° Long: -116.65993°	Completion Depth:	35.0 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION Surface Elev.: 2636.3 ft	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	FILL (SP-SM): fine grained; reddish brown; dry to moist; very dense; no cementation.					
2635					1	83	66
2630	5				2	74	50/ 5"
		2628.3 ft			3	50	50/ 6"
		POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense; weak to moderate cementation. 8.0ft					
2625	10				4	94	50/ 3"
					5	100	91/ 11"
2620	15	2618.3 ft			6	100	75
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): medium grained; light brown; dry to moist; very dense. 20': fine gravel in split spoon. 18.0ft					
2615	20				7	92	50/ 5"
2610	25				8	90	50/ 4"
2605	30				9	63	50/ 5"
		2601.3 ft			10	33	94/ 12"
	35	Bottom of Boring at 35.0 feet 35.0ft					



Date Boring Started:	9/17/20 11:00 am	Water Levels (ft)	Remarks: Boring offset approximately 25 feet south of surveyed location. Elevation data provided by Westwood on September 3, 2020.
Date Boring Completed:	9/17/20 5:00 pm	▼ End of Drilling Dry	
Logged By:	AJF3	▽ At Time of Drilling Dry	
Drilling Contractor:	Cascade		
Drill Rig:	CME		Weather: 100°F, Sunny

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LOG OF BORING GEO-15

Associated Boring #: AM-T6A

Sheet 1 of 1

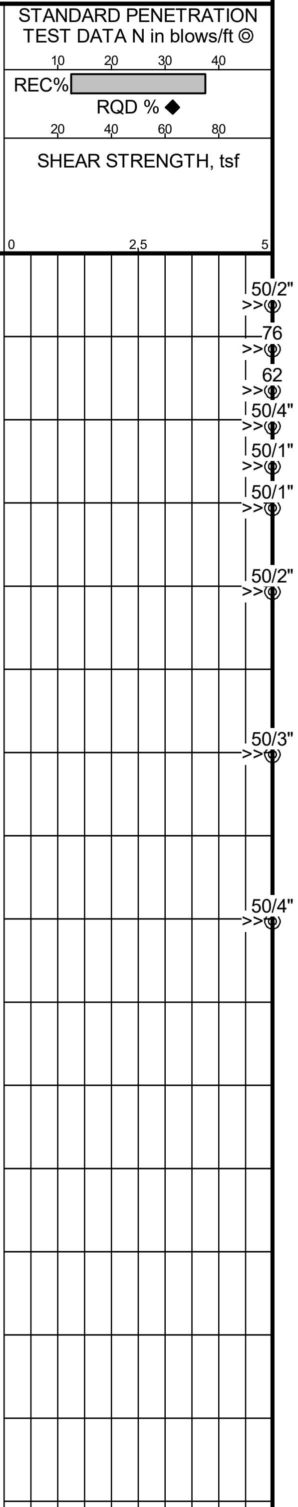
Project:	Alta Mesa Wind Project	Surface Elevation:	2556.1 ft
Job No.:	05331021.00	Drilling Method:	HSA / MRO
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.93914° Long: -116.65853°	Completion Depth:	50.0 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2556.1 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	
2556.1 ft	0	FILL (SP-SM): fine to medium grained; brown; dry to moist.	
2555.1 ft	1.0ft	SILTY SAND (SM): fine to medium grained; reddish brown; dry to moist; very dense; trace gravel; weak cementation.	
2549.1 ft	7.0ft	SILTY SAND (SM): very fine to fine grained; reddish brown; dry to moist; very dense; no cementation.	
2546.6 ft	9.5ft	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): medium grained; dry to moist; very dense; weak cementation. 10 to 14': medium coarse grained; trace to with gravel.	
2534.1 ft	22.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; white; dry to moist; very dense; moderate cementation. 25': switch to mud rotary.	
2506.1 ft	50.0ft	Bottom of Boring at 50.0 feet	

Sample No.	% Recovery	SPT, N value or RQD %
1	90	50/ 2"
2	100	76
3	100	62
4	84	50/ 4"
5	83	50/ 1"
6	97	50/ 1"
7	100	50/ 2"
8	0	REF
9	40	50/ 3"
10	0	REF
11	67	50/ 4"
12	0	REF
13	0	REF



Date Boring Started:	9/15/20 12:40 pm
Date Boring Completed:	9/16/20 11:16 am
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Boring offset approximately 50 feet south of surveyed location. Elevation data provided by Westwood on September 3, 2020.

Weather: 100°F, Sunny

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4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

LOG OF BORING GEO-16

Associated Boring #: AM-T7A

Sheet 1 of 1

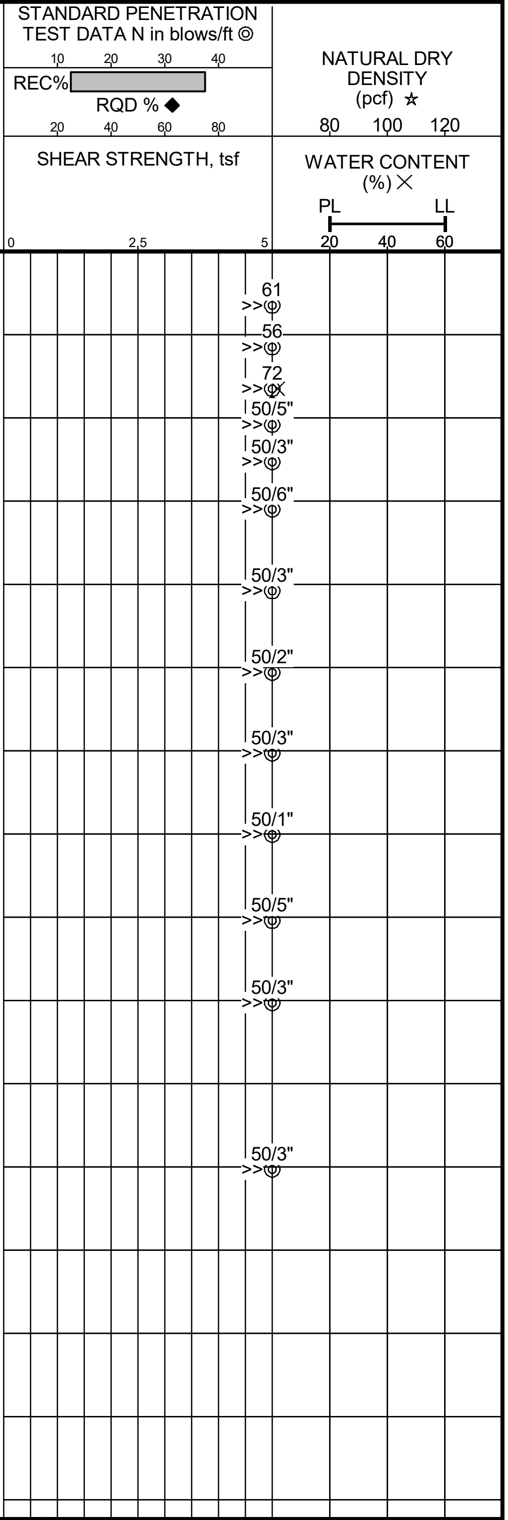
Project:	Alta Mesa Wind Project	Surface Elevation:	2487.5 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.93725° Long: -116.65784°	Completion Depth:	55.3 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2487.5 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	
2487.5	0	FILL (SP-SM): fine to medium grained; light brown; dry to moist.	
2486.5 ft	1.0ft	SILTY SAND (SM): fine grained; reddish brown; dry to moist; very dense; no cementation.	
2478.0 ft	9.5ft	SILTY SAND (SM): fine grained; light brown; dry to moist; very dense; weak cementation. 20': trace gravel.	
2432.2 ft	55.3ft	Bottom of Boring at 55.3 feet	

Sample No.	% Recovery	SPT, N value or RQD %
1	89	61
2	100	56
3	100	72
4	71	50/5"
5	83	50/3"
6	58	50/6"
7	63	50/3"
8	83	50/2"
9	57	50/3"
10	0	50/1"
11	0	50/5"
12	83	50/3"
13	0	REF
14	83	50/3"



Date Boring Started:	9/15/20
Date Boring Completed:	9/15/20 10:15 am
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 90°F, Sunny

Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

LOG OF BORING GEO-17

Sheet 1 of 1

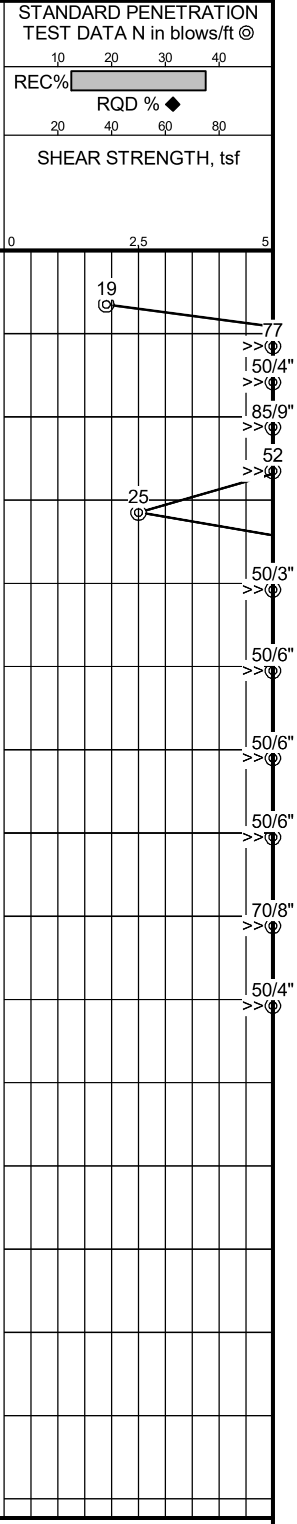
Project:	Alta Mesa Wind Project	Surface Elevation:	2761.1 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94608° Long: -116.66625°	Completion Depth:	50.0 ft
Datum:	NAD83		

Surface Elev.: 2761.1 ft

MATERIAL DESCRIPTION	Bottom Elevation	Depth
TOPSOIL (SM): brown; dry to moist.	2760.8 ft	0.3ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; reddish brown; dry to moist; medium dense; with gravel.	2756.1 ft	5.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; gray; dry to moist; very dense; with gravel.	2754.1 ft	7.0ft
POORLY GRADED SAND (SP): fine to medium grained; brown; dry to moist; very dense.	2751.1 ft	10.0ft
POORLY GRADED SAND (SP): very fine to fine grained; light brown; dry to moist; very dense; trace silt.	2746.1 ft	15.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; brown; dry to moist; medium dense.	2741.1 ft	20.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray; dry to moist; very dense.	2731.1 ft	30.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray to brown; dry to moist; very dense.	2726.1 ft	35.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense.	2721.1 ft	40.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray to brown; dry to moist; very dense.	2711.1 ft	50.0ft

Bottom of Boring at 50.0 feet 50.0ft

Sample No.	% Recovery	SPT, N value or RQD %
1	33	19
2	67	77
3	100	50/ 4"
4	80	85/ 9"
5	100	52
6	100	25
7	67	50/ 3"
8	0	50/ 6"
9	100	50/ 6"
10	100	50/ 6"
11	57	70/ 8"
12	67	50/ 4"
13	100	REF



Date Boring Started:	9/10/20 1:00 pm
Date Boring Completed:	9/11/20 10:30 am
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 98°F, Sunny

BARR
Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

LOG OF BORING MET-02

Sheet 1 of 1

Project: Alta Mesa Wind Project
Job No.: 05331021.00
Location: Riverside County, California
Coordinates: Lat: 33.94242° Long: -116.66673°
Datum: NAD83

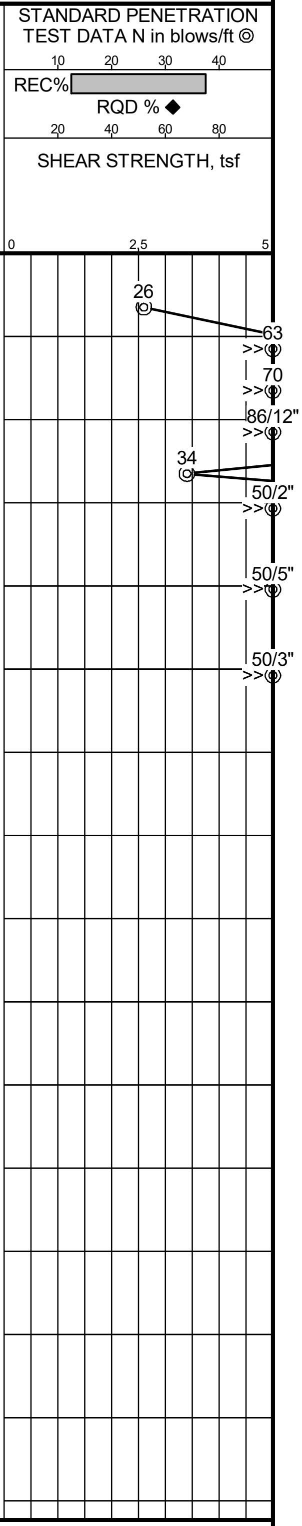
Surface Elevation: 2667.0 ft
Drilling Method: HSA
Sampling Method: SS
Completion Depth: 25.8 ft

MATERIAL DESCRIPTION

Surface Elev.: 2667.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	
2666.6 ft	0.4ft	TOPSOIL (SM): brown; dry to moist.	
2662.0 ft	5.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; reddish brown; dry to moist; medium dense.	
2652.0 ft	15.0ft	SILTY SAND (SM): fine to medium grained; light brown; dry to moist; very dense.	
2647.0 ft	20.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense.	
2641.2 ft	25.8ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense.	
		Bottom of Boring at 25.8 feet	

Sample No.	% Recovery	SPT, N value or RQD %
1	100	26
2	100	63
3	100	70
4	100	86/12"
5	100	34
6	100	50/2"
7	100	50/5"
8	100	50/3"



Date Boring Started: 9/9/20 12:30 pm
Date Boring Completed: 9/9/20 2:30 pm
Logged By: KSB
Drilling Contractor: Cascade
Drill Rig: CME

Water Levels (ft)
End of Drilling: Dry
At Time of Drilling: Dry

Remarks: Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).

Weather: 88°F, Sunny

Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

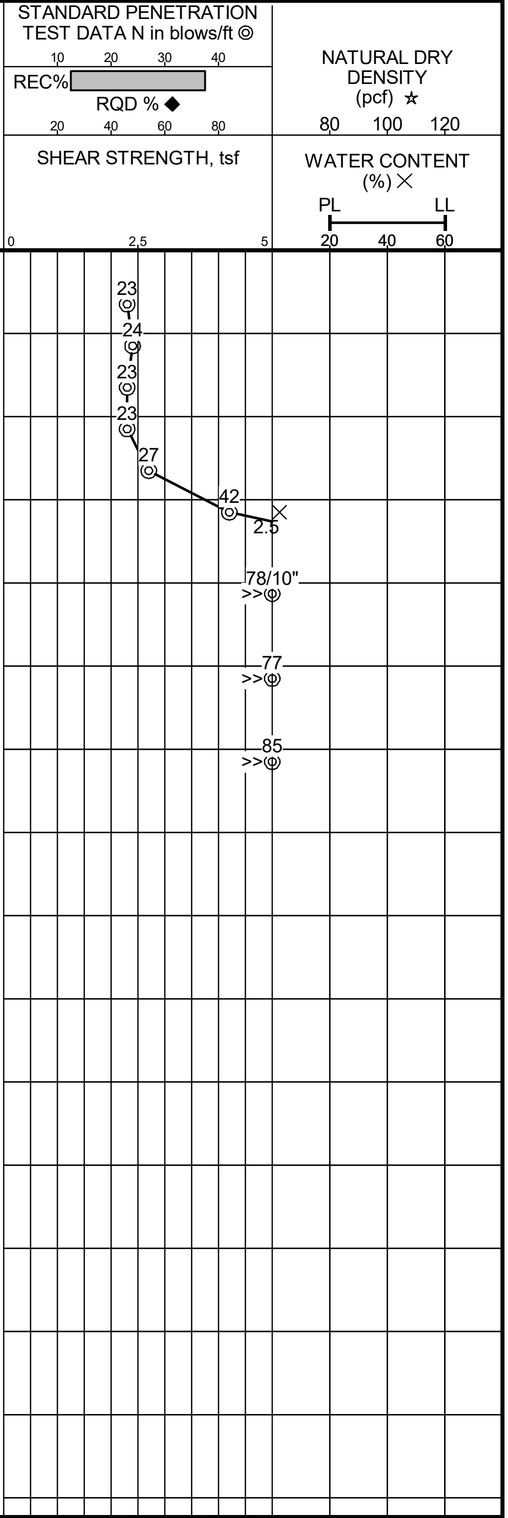
LOG OF BORING SUB-02

Sheet 1 of 1

Project: Alta Mesa Wind Project
Job No.: 05331021.00
Location: Riverside County, California
Coordinates: Lat: 33.94631° Long: -116.66325°
Datum: NAD83

Surface Elevation: 2628.0 ft
Drilling Method: HSA
Sampling Method: SS
Completion Depth: 31.5 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION Surface Elev.: 2628.0 ft	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	SILTY SAND (SM): fine to medium grained; light brown; dry to moist; medium dense; no cementation.				
2625			☒	1	83	23
	5	4': increasing fines content.	☒	2	100	24
2620		7.5': trace gravel; color change to light brown and gray.	☒	3	100	23
	10		☒	4	100	23
2615		2613.5 ft	☒	5	89	27
	15	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; dense to very dense; no cementation. 14.5ft	☒	6	83	42
2610						
	20	19' to 22': weak cementation.	☒	7	90	78/ 10"
2605						
	25	25': trace to with gravel.	☒	8	100	77
2600						
	30	2596.5 ft	☒	9	100	85
		Bottom of Boring at 31.5 feet 31.5ft				



Date Boring Started: 9/14/20 9:35 am
Date Boring Completed: 9/14/20 10:50 am
Logged By: AJF3
Drilling Contractor: Cascade
Drill Rig: CME

Water Levels (ft)
End of Drilling
Dry
At Time of Drilling
Dry

Remarks: Boring offset approximately 85 feet east-northeast of surveyed location. Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).

Weather: 95°F, Sunny

Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

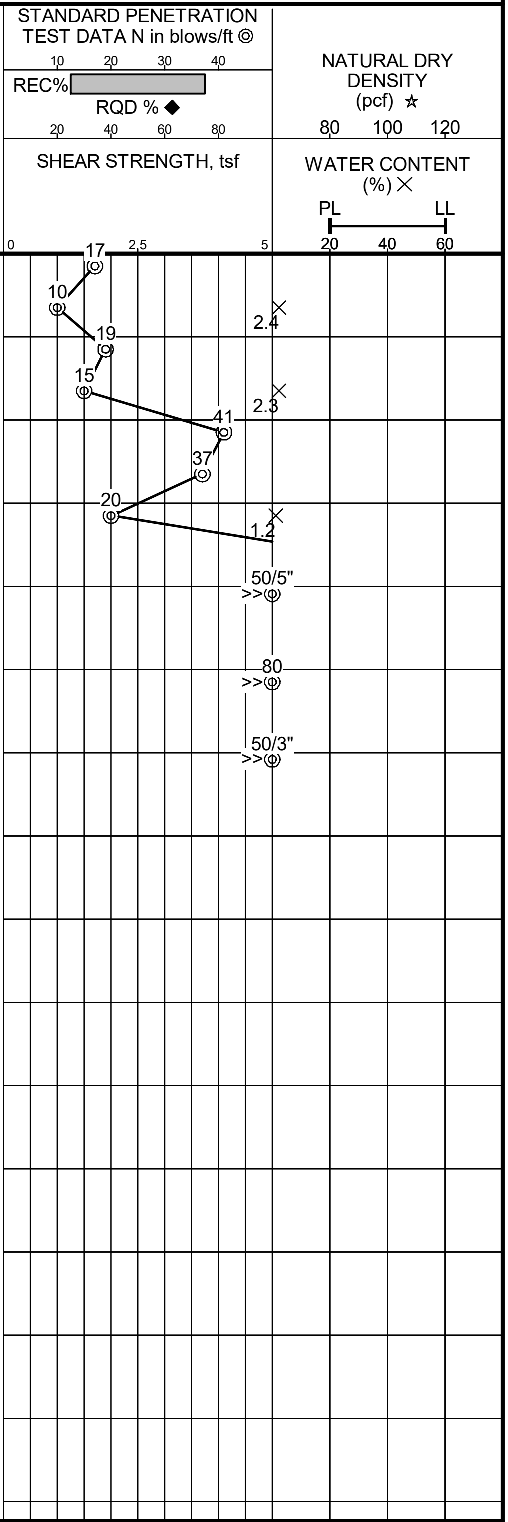
LOG OF BORING SUB-03

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2628.0 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94611° Long: -116.66326°	Completion Depth:	30.8 ft
Datum:	NAD83		

Surface Elev.: 2628.0 ft

MATERIAL DESCRIPTION		Sample No.	% Recovery	SPT, N value or RQD %
SILTY SAND (SM): fine grained; reddish brown; dry to moist; loose to medium dense.		1	78	17
		2	100	10
2620.5 ft		3	100	19
POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; white; dry to moist; medium dense to very dense; weak cementation.	7.5ft	4	89	15
		5	100	41
		6	89	37
		7	100	20
		8	92	50/ 5"
25 to 30': with fine gravel.		9	22	80
2597.2 ft		10	63	50/ 3"
Bottom of Boring at 30.8 feet	30.8ft			



Date Boring Started:	9/14/20 11:35 am
Date Boring Completed:	9/14/20 1:50 pm
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling
Dry
▽ At Time of Drilling
Dry

Remarks: Boring offset approximately 65 feet southeast of surveyed location. Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).

Weather: 100°F, Sunny

Appendix B

Laboratory Test Results

Water Content Test Summary (ASTM:D2216)

Project: Alta Mesa Job: 12782

Client Barr Engineering Company Date: 10/6/2020

Sample Information & Classification

Boring #	Geo-013	Geo-013	Geo-016	Sub-02	Sub-03	Sub-03	Sub-03	
Sample #								
Depth (ft)	10-11.5	20-21.5	7.5-9	15-16.5	2.5-4	7.5-9	15-16.5	
Type	Bag	Bag	Bag	Bag	Bag	Bag	Bag	
Material Classification	Silty Sand w/gravel (SM/SP-SM)	Sand w/silt and gravel (SP-SM/SP)	Silty Sand w/gravel (SM/SP-SM)	Sand w/silt and a little gravel (SP-SM)	Silty Sand (SM/SP-SM)	Sand w/silt and a trace of gravel (SP-SM)	Sand w/silt and gravel (SP-SM)	
Water Content (%)	2.8	1.2	1.8	2.5	2.4	2.3	1.2	

Sample Information & Classification

Boring #								
Sample #								
Depth (ft)								
Type								
Material Classification								
Water Content (%)								

Sample Information & Classification

Boring #								
Sample #								
Depth (ft)								
Type								
Material Classification								
Water Content (%)								

Sample Information & Classification

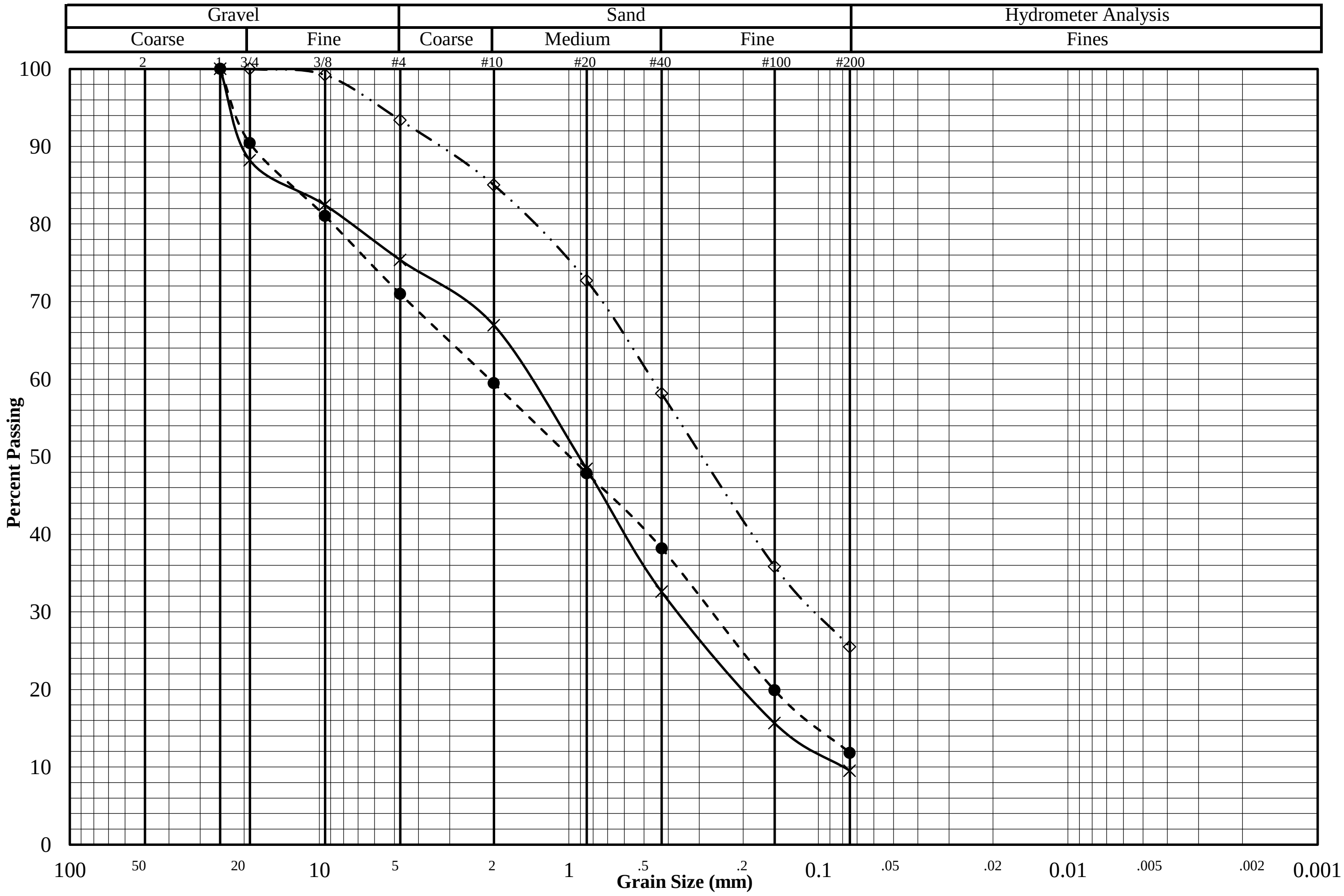
Boring #								
Sample #								
Depth (ft)								
Type								
Material Classification								
Water Content (%)								

Grain Size Distribution ASTM D422-16

Job No. : **12782**

Project:	Alta Mesa	Test Date:	9/21/20
Reported To:	Barr Engineering Company	Report Date:	9/24/20

	Location / Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Classification
*	Geo-11	(Composite)	10-16.5	Bags	Sand w/silt and gravel, medium to fine grained (SP-SM)
●	Geo-12		10-11.5	Bag	Sand w/silt and gravel, fine to medium grained (SP-SM/SM)
◇	Met-02		7.5-9	Bag	Silty Sand w/a little gravel (SM)



Additional Results	*	●	◇
Liquid Limit			
Plastic Limit			
Plasticity Index ASTM:D4316			
Water Content ASTM:D2216			
Dry Density (pcf) ASTM:D7263			
Specific Gravity ASTM:D854			
Porosity			
Organic Content ASTM:D2974			
pH ASTM:D4972 Method B			

(* = assumed)

Percent Passing

	*	●	◇
Mass (g)	939.4	329.1	323.3
2"			
1.5"			
1"	100.0	100.0	
3/4"	88.2	90.4	100.0
3/8"	82.5	81.1	99.2
#4	75.4	71.0	93.4
#10	67.0	59.5	85.0
#20	48.4	47.9	72.7
#40	32.6	38.2	58.1
#100	15.7	19.9	35.9
#200	9.5	11.8	25.5

	*	●	◇
D_{60}	1.5		
D_{30}	0.28		
D_{10}	0.08		
C_U	18.75		
C_C	0.65		

Remarks:

Grain Size Distribution ASTM D422-16

Job No. : **12782**

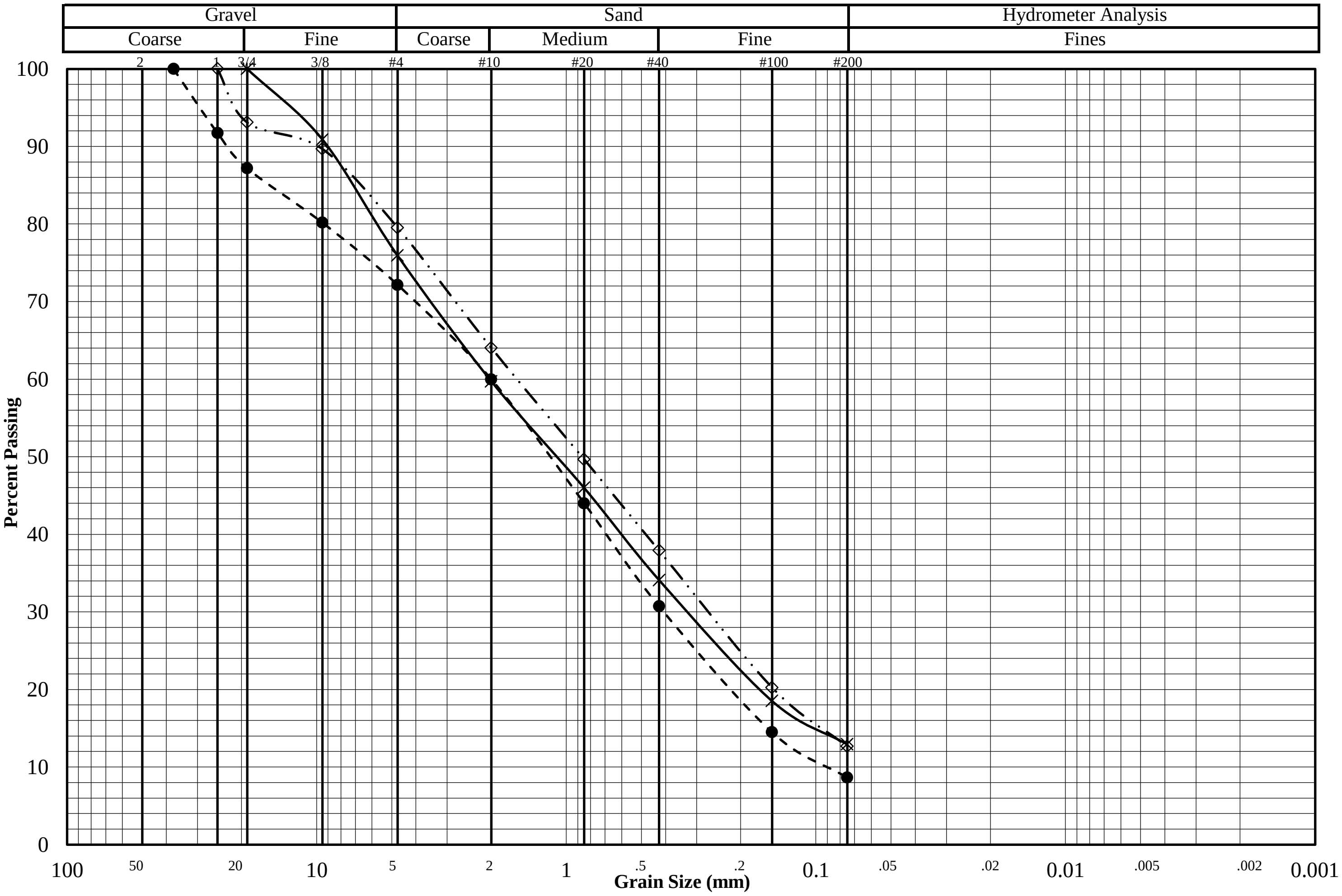
Project: Alta Mesa

Test Date: 9/25/20

Reported To: Barr Engineering Company

Report Date: 9/29/20

	Location / Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Classification
*	Geo-013		10-11.5	Bag	Silty Sand w/gravel (SM/SP-SM)
●	Geo-014		15-16.5	Bag	Sand w/silt and gravel, medium to fine grained (SP-SM)
◇	Sub-02		5-6.5	Bag	Silty Sand w/gravel (SM/SP-SM)



Additional Results	*	●	◇
Liquid Limit			
Plastic Limit			
Plasticity Index ASTM:D4316			
Water Content ASTM:D2216	2.8		
Dry Density (pcf) ASTM:D7263			
Specific Gravity ASTM:D854			
Porosity			
Organic Content ASTM:D2974			
pH ASTM:D4972 Method B			

(* = assumed)

Percent Passing

	*	●	◇
Mass (g)	377.0	569.4	422.1
2"			
1.5"		100.0	
1"		91.7	100.0
3/4"	100.0	87.2	93.1
3/8"	90.9	80.2	89.7
#4	75.9	72.2	79.5
#10	59.7	60.0	64.0
#20	46.0	44.0	49.7
#40	34.1	30.7	37.9
#100	18.5	14.5	20.3
#200	12.9	8.7	12.7

	*	●	◇
D_{60}		2.01	
D_{30}		0.41	
D_{10}		0.09	
C_U		22.33	
C_C		0.93	

Remarks:

Direct Shear Test

ASTM: D3080

Job No.: **12782**

Project/Client: **Alta Mesa / Barr Engineering Company**

Boring No.: **Geo-11** Sample No. **Composite** Depth: **10-16.5**

Location: Sample Type: **Bags**

Soil Type: **Sand with Silt and Gravel, medium to fine grained (SP-SM)**

Test Date:	**9/21/2020**
Date Reported:	**9/30/2020**

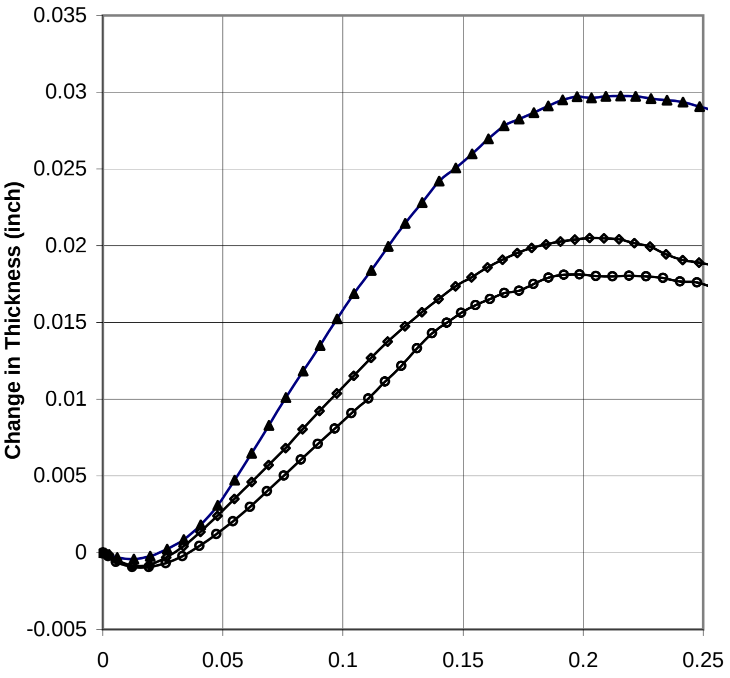
Shear Rate

0.007 (in/min)

Remarks: Specimens compacted to given density (medium dense) at received moisture content using -#4 material; Inundated after applying normal load. Consolidated and sheared to given displacements at constant rate of 0.007 inches/minute.

Liquid Limit:	
Plastic Limit:	
Plasticity Index:	
Specific Gravity (*):	**2.68**

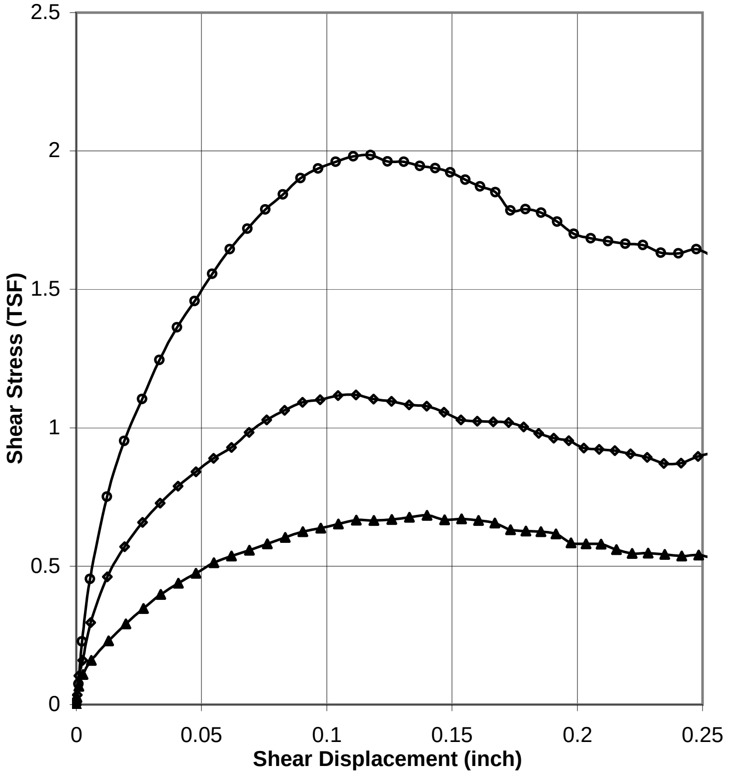
(*) = Assumed Specific Gravity

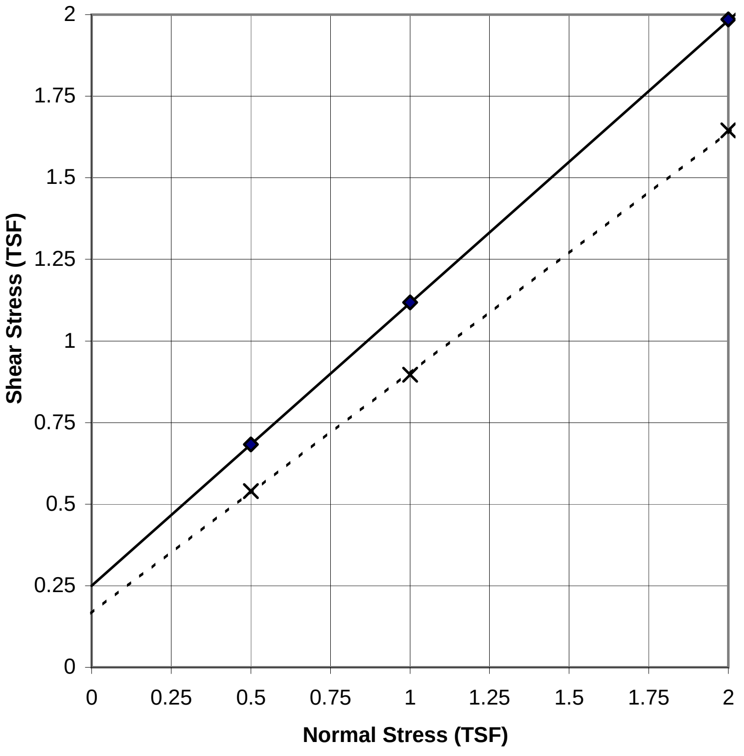


Failure Criterion:				
Max Stress	A	B	C	D
Initial	▲	◇	○	X
Diameter (In.)	2.50	2.50	2.50	
Thickness (In.)	0.97	0.97	0.97	
Water Content (%)	1.2	1.2	1.2	
Dry Density (pcf)	115.2	115.2	115.2	
Before Shear				
Thickness (In.)	0.95	0.95	0.94	
Water Content (%)	16.3	16.0	15.6	
Dry Density (pcf)	116.5	117.1	117.9	
Normal Stress	0.50	1.00	2.00	
Shear Stress	0.68	1.12	1.99	

"These tests are for informational purposes only and must be reviewed by a qualified professional engineer to verify that the test parameters shown are appropriate for any particular design."

Peak Conditions		At Given Shear Disp. Of:	0.25
Friction Angle:	= **40.9 deg.**	Friction Angle:	= **36.4 deg.**
Apparent Cohesion	**0.250 TSF**	Apparent Cohesion	**0.165 TSF**





Moisture Density Curve ASTM: D698, Method B

Project: **Alta Mesa** Date: **9/29/20**

Client: **Barr Engineering Company** Job No. **12782**

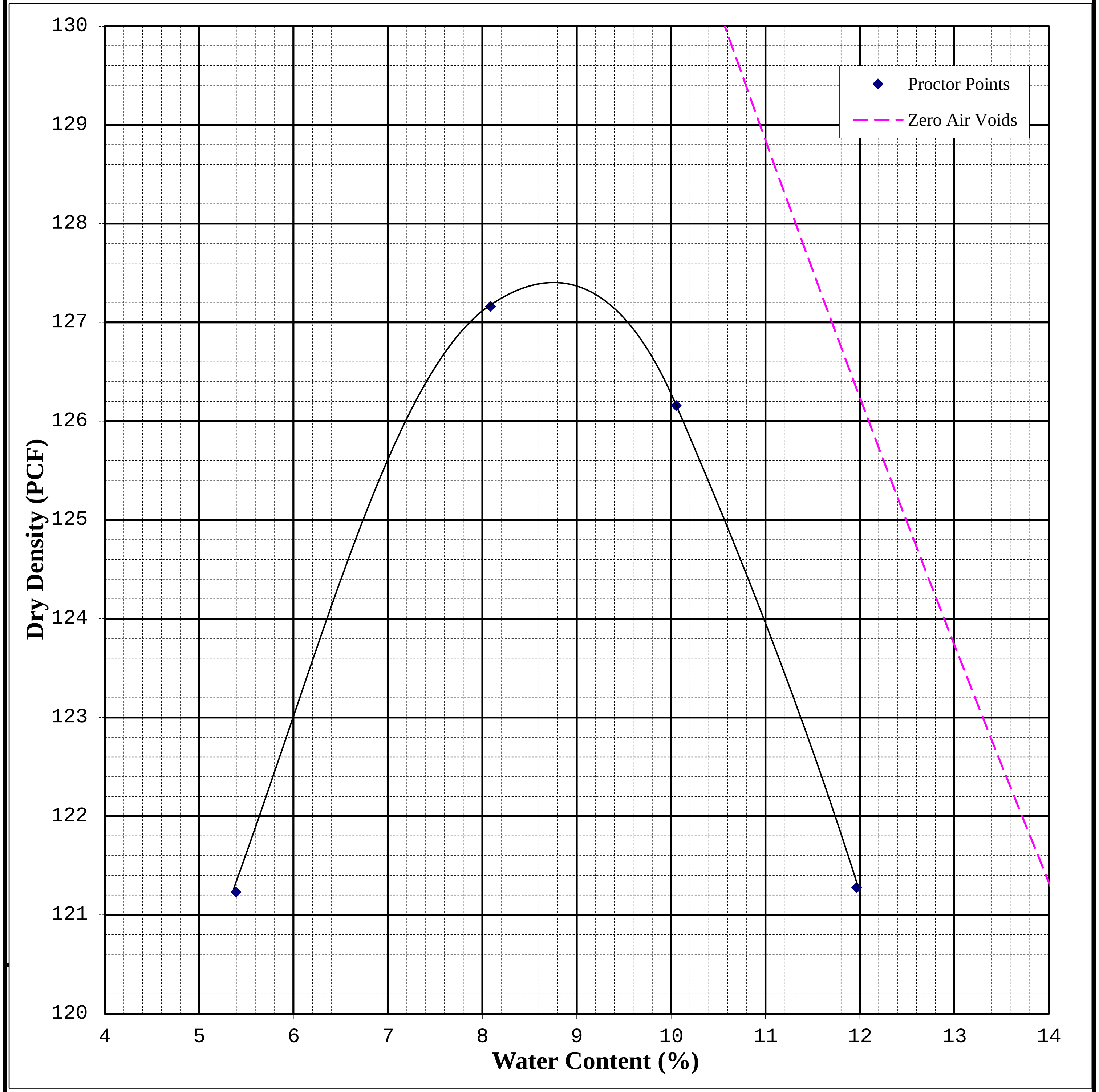
Boring No. **Geo-10** Sample: Depth(ft): **0.5-2** Location:

Soil Type: **Silty Sand with a trace of gravel (SM)**

As Received W.C. (%): **2.0** LL: PL: PI: Specific Gravity: **2.67** *Assumed

◆ △ ◆ △

Maximum Dry Density (pcf): **127.4** Opt. Water Content (%): **8.7**



9530 James Ave South

SOIL ENGINEERING TESTING, INC.

Bloomington, MN 55431

SET-R18a

Moisture Density Curve ASTM: D698, Method B

Project: **Alta Mesa** Date: **9/28/20**

Client: **Barr Engineering Company** Job No. **12782**

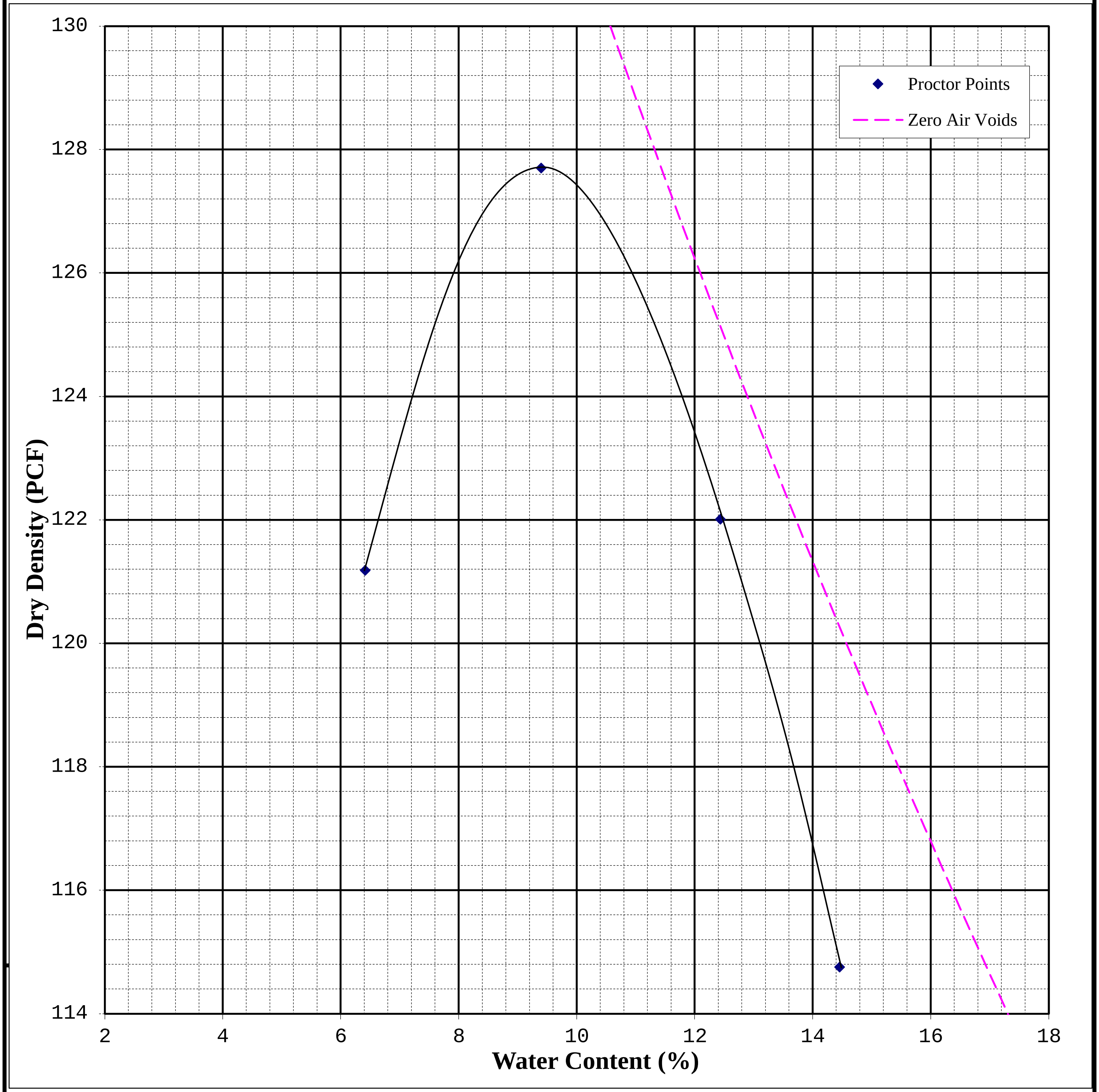
Boring No. **Geo-14** Sample: Depth(ft): **3-5** Location:

Soil Type: **Silty Sand with a little gravel (SM)**

As Received W.C. (%): **2.8** LL: PL: PI: Specific Gravity: **2.67** *Assumed

◆ △ ◆ △

Maximum Dry Density (pcf): **127.7** ______ Opt. Water Content (%): **9.4** ______



Moisture Density Curve ASTM: D698, Method B

Project: **Alta Mesa** Date: **9/28/20**

Client: **Barr Engineering Company** Job No. **12782**

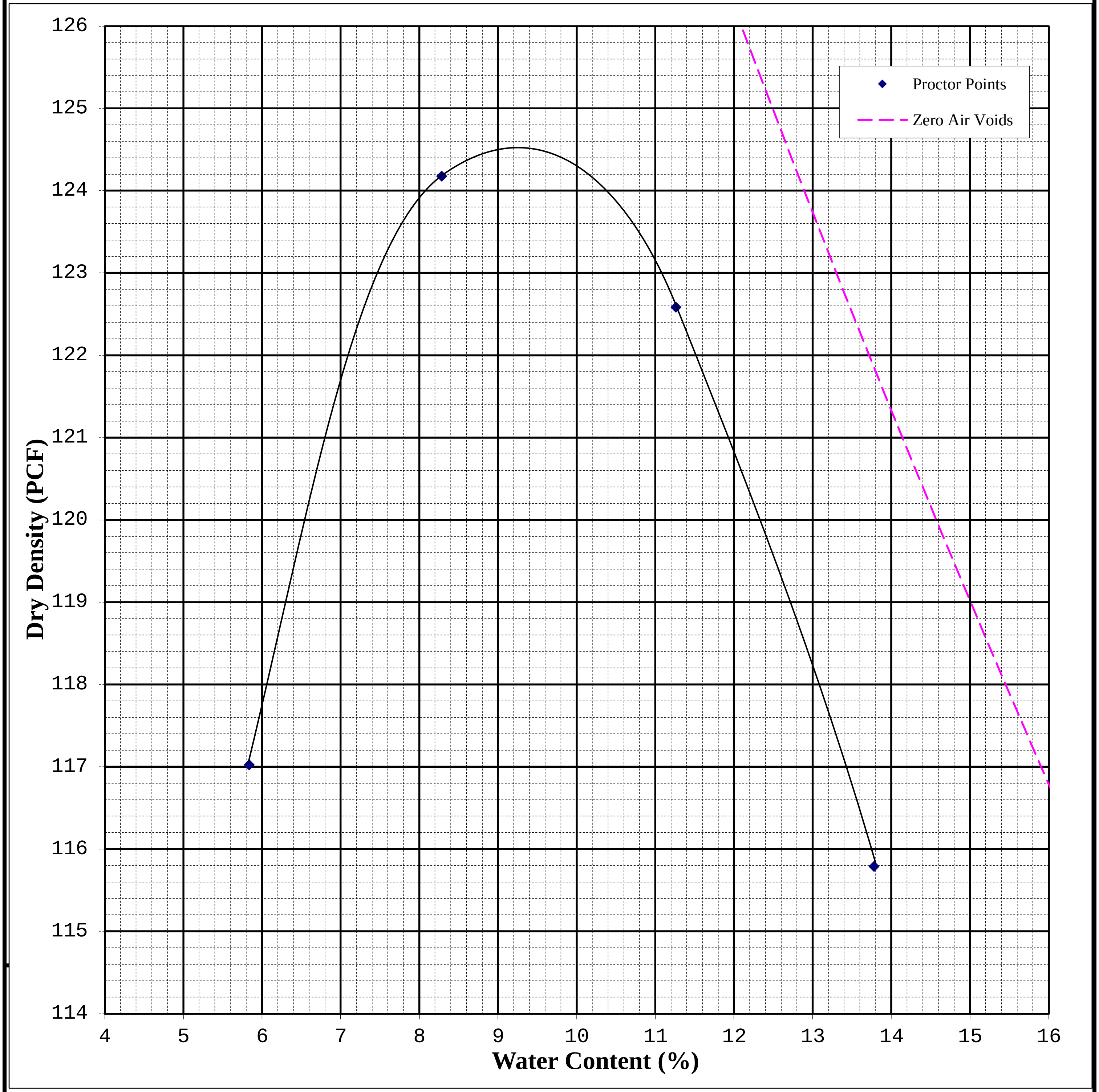
Boring No. **Sub-03** Sample: Depth(ft): **3-5** Location:

Soil Type: **Silty Sand with a trace of gravel (SM)**

As Received W.C. (%): **2.0** LL: PL: PI: Specific Gravity: **2.67** *Assumed

◆ △ ◆ △

Maximum Dry Density (pcf): **124.5** ______ Opt. Water Content (%): **9.2** ______



9530 James Ave South

SOIL ENGINEERING TESTING, INC.

Bloomington, MN 55431

SET-R18a

California Bearing Ratio ASTM:D1883

Project:	Alta Mesa	Job:	**12782**
Client:	Barr Engineering Company	Date:	10/6/20

Boring #:	Geo-10			Procedural Method:
Sample:				Specimen compacted to approximately 95% of maximum standard proctor density at optimum moisture content. Specimens soaked for a period of 4 days before CBR test was performed.
Depth (ft):	0.5-2			
Type:	Bulk			
Classification:	Silty Sand w/a trace of gravel (SM)			

Laboratory Moisture-Density Values				Index Properties	
Method:	ASTM:D698 Method B			LL:	Gs:
Maximum Dry Density (PCF):	127.4			PL:	Organic Content:
Optimum Water Content:	8.7%			PI:	pH:

Initial Molding Conditions

Specimen	A		
Compaction Hammer:	5 lb		
Number of Layers:	3		
Blows per Layer:	NA		
Initial Moisture Content:	8.7%		
Initial Dry Density (PCF)	121.2		
Relative Compaction	95.1%		

Soaking Phase

Days Soaked	4		
Surcharge (psf)	50		
Total Swell (%)	-0.1%		

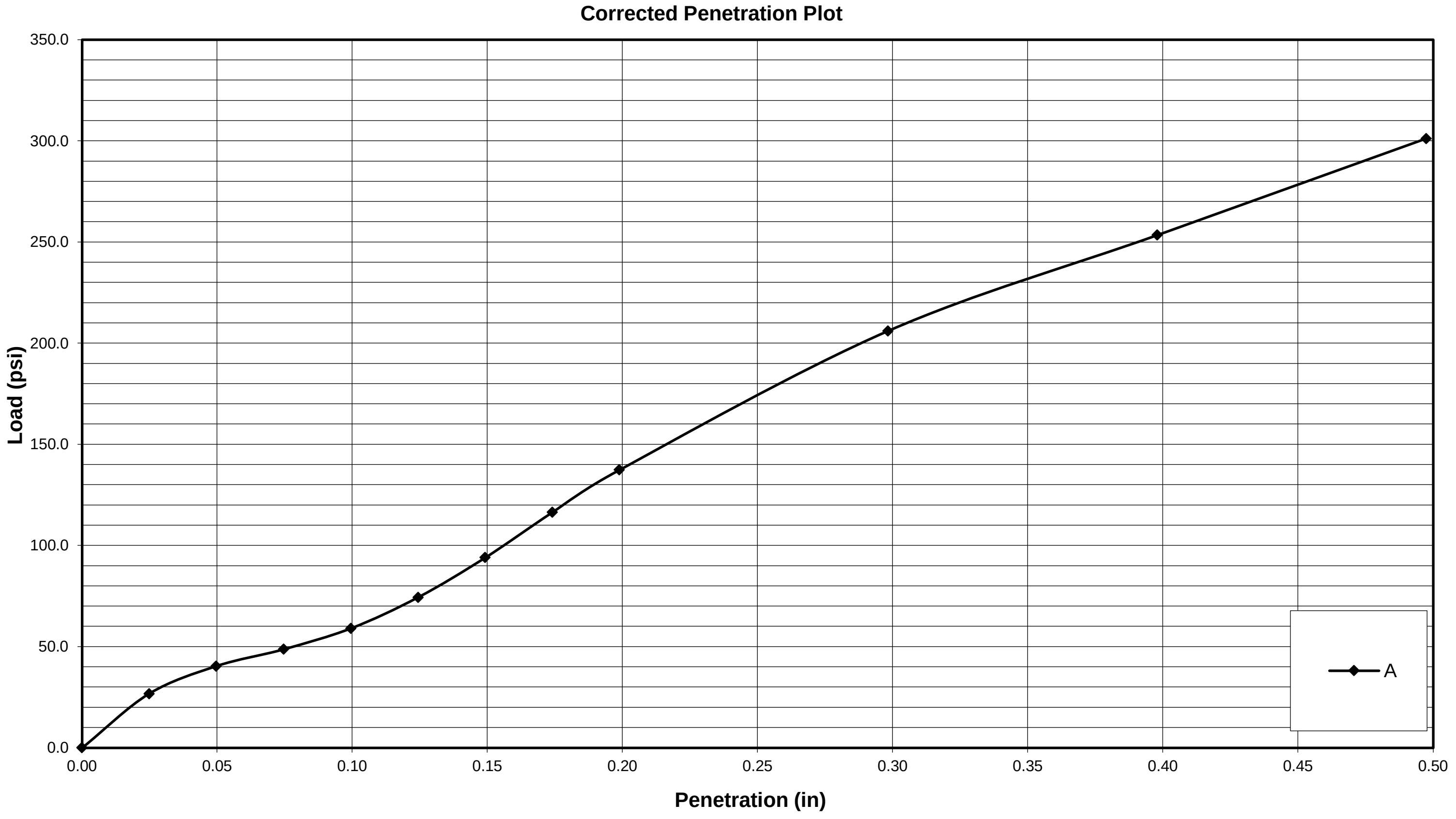
Penetration Phase

Surcharge (psf)	50		
Corrected CBR Values			
at 0.1 inch (%)	5.9%		
at 0.2 inch (%)	**9.2%**		

Moisture Content After Penetration

Top 1" of Specimen:	9.9%		
Average of specimen:	10.2%		

Stress vs. Penetration Graph



pH Testing Summary Sheet (ASTM:D4972)

Project: **Alta Mesa** Job: **12782**
Client: **Barr Engineering Company** Date: **9/29/2020**

Boring / Location	Sample	Sample Type	Depth (ft)	pH	Visual Classification
Geo-11		**Bags**	**2.5-9**	**5.8**	**Sand w/silt, a trace of gravel and occasional clay pieces (SP-SM)**

pH Testing Summary Sheet (ASTM:D4972)

Project: **Alta Mesa**
Job: **12782**
Client: **Barr Engineering Company**
Date: **10/6/2020**

Boring / Location	Sample	Sample Type	Depth (ft)	pH	Visual Classification
Sub-03		**Bulk**	**3-5**	**7.6**	**Silty Sand w/a trace of gravel (SM)**

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

September 28, 2020

Soil Engineering Testing, Inc.

Sample Delivery Group:	L1265433
Samples Received:	09/23/2020
Project Number:	12782
Description:	Alta Mesa

Report To:
John Whelan
9530 James Ave. South
Bloomington, MN 55431

Entire Report Reviewed By: John V Hawkins

John Hawkins
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

	Collected by	Collected date/time	Received date/time
GEO-11 L1265433-01 Solid		09/21/20 12:00	09/23/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1550044	1	09/27/20 10:53	09/27/20 19:51	ELN	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John V Hawkins

John Hawkins
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chloride	ND		20.0	1	09/27/2020 19:51	WG1550044
Sulfate	ND		50.0	1	09/27/2020 19:51	WG1550044

Method Blank (MB)

(MB) R3575213-1 09/27/20 17:32

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		9.20	20.0
Sulfate	U		12.9	50.0

L1265971-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1265971-01 09/27/20 21:36 • (DUP) R3575213-5 09/27/20 21:53

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	175	172	1	1.76		15
Sulfate	1860	1830	1	1.45	E	15

L1266515-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1266515-04 09/28/20 01:40 • (DUP) R3575213-6 09/28/20 01:57

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	ND	ND	1	0.000		15
Sulfate	ND	ND	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3575213-2 09/27/20 17:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	198	99.0	80.0-120	
Sulfate	200	193	96.5	80.0-120	

L1265433-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1265433-01 09/27/20 19:51 • (MS) R3575213-3 09/27/20 20:09 • (MSD) R3575213-4 09/27/20 20:26

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	500	ND	477	502	95.5	100	1	80.0-120			4.94	15
Sulfate	500	ND	476	502	95.3	100	1	80.0-120			5.29	15

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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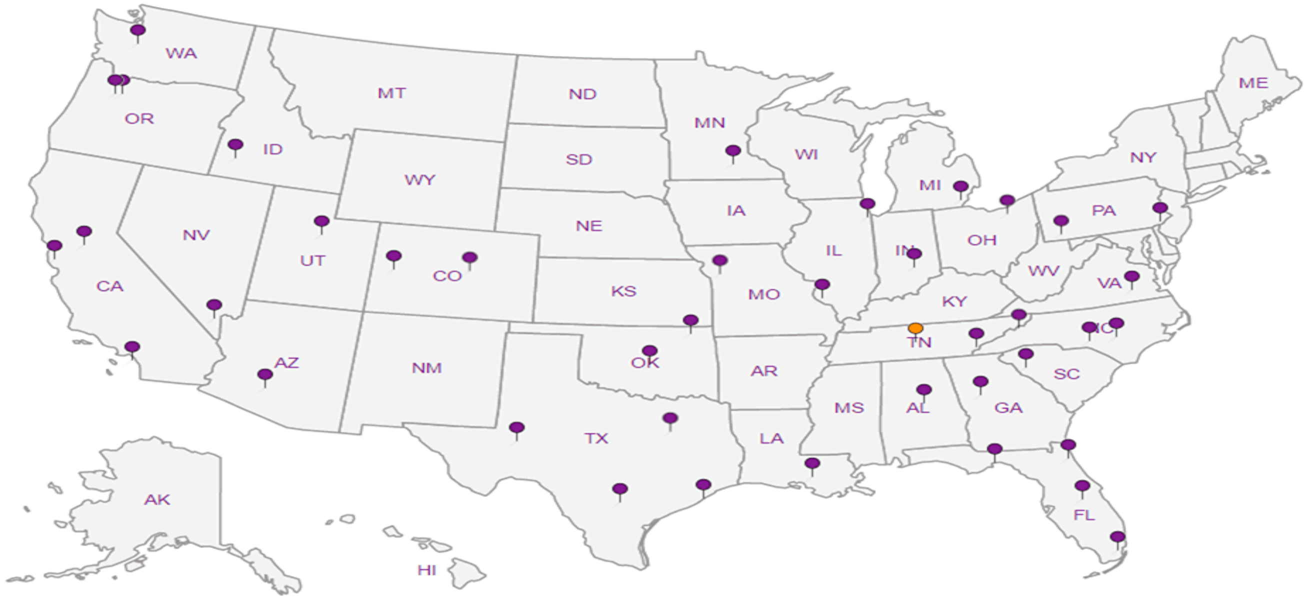

Soil Engineering Testing, Inc.
9530 James Ave S, Bloomington MN
55431

Billing Information:
Soil Engineering Testing, Inc.
9530 James Ave S, Bloomington
MN
55431

Pres Chk

Email To:
jwhelan@soilengineeringtesting.com

Report to:
John Whelan

Project Description: ALTA MESA

City/State Collected:

Phone:
Fax:

Client Project # 12782

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Immediately Packed on Ice N ___ Y ___

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1265433

H148

Acctnum: SOIENGBMN
Template:
Prelogin:
TSR: 341 - John Hawkins
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	SULFATE ION	CHLORIDE ION								Remarks	Sample # (lab only)
GEO-11		SS	7.5-9	9/21/20	12:00	1	*	*									-01

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
___ UPS ___ FedEx ___ Courier ______

Tracking # 905008871436

Relinquished by : (Signature) Date: 9/21/20 Time: 16:30

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) Date: Time:

Received by: (Signature)

Temp: Amb °C Bottles Received: 1

Relinquished by : (Signature) Date: Time:

Received for lab by: (Signature)

Date: 9/23/20 Time: 0900

Sample Receipt Checklist
COC Seal Present/Intact: [✓ NP] __Y __N
COC Signed/Accurate: [✓ Y] __N
Bottles arrive intact: [✓ Y] __N
Correct bottles used: [✓ Y] __N
Sufficient volume sent: [✓ Y] __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

RAD SCREEN: <0.5 mR/hr

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

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ANALYTICAL REPORT

October 05, 2020

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Soil Engineering Testing, Inc.

Sample Delivery Group:	L1267077
Samples Received:	09/26/2020
Project Number:	12782
Description:	Alta Mesa
Report To:	John Whelan 9530 James Ave. South Bloomington, MN 55431

Entire Report Reviewed By: John V Hawkins

John Hawkins
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

	Collected by	Collected date/time	Received date/time
SUB-03 L1267077-01 Solid		09/25/20 13:00	09/26/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1552543	1	10/04/20 08:37	10/04/20 12:31	ST	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John V Hawkins

John Hawkins
Project Manager

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Chloride	ND		20.0	1	10/04/2020 12:31	WG1552543
Sulfate	ND		50.0	1	10/04/2020 12:31	WG1552543

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3577698-1 10/04/20 10:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		9.20	20.0
Sulfate	U		12.9	50.0

L1267076-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1267076-01 10/04/20 11:40 • (DUP) R3577698-3 10/04/20 11:57

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	ND	ND	1	0.000		15
Sulfate	ND	ND	1	0.000		15

L1267629-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1267629-01 10/04/20 16:27 • (DUP) R3577698-6 10/04/20 16:44

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	34.5	33.6	1	2.42		15
Sulfate	157	149	1	5.56		15

Laboratory Control Sample (LCS)

(LCS) R3577698-2 10/04/20 10:44

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	202	101	80.0-120	
Sulfate	200	205	103	80.0-120	

L1267077-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1267077-01 10/04/20 12:31 • (MS) R3577698-4 10/04/20 12:47 • (MSD) R3577698-5 10/04/20 13:04

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	500	ND	505	506	101	101	1	80.0-120			0.103	15
Sulfate	500	ND	513	513	103	103	1	80.0-120			0.165	15

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Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

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State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

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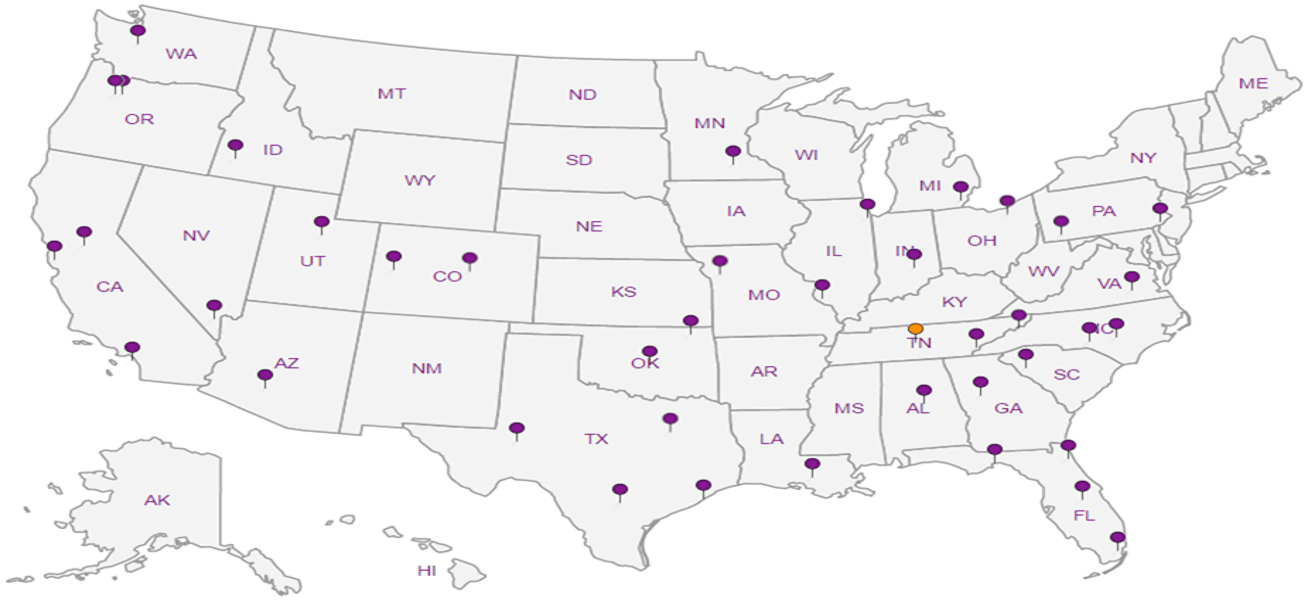

Soil Engineering Testing, Inc.
9530 James Ave S.
Bloomington, MN 55431
952-406-8957

Billing Information:

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **John Whelan**

Email To: jwhelan@soilengineeringtesting.com

Project Description: ALTA MESA

City/State Collected:

Please Circle: PT MT CT ET

Phone:

~~Client Project #~~ 12782

~~Lab Project #~~

SDG # L1267077
D151

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Immediately Packed on Ice N ____ Y ____

Acctnum:
Template:
Prelogin:
PM:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	SULFATE 10W	CHLORIDE 10W	Remarks	Sample # (lab only)
SUB-03		SS	3-5	9/25/20	13:00	1	X	X		-01

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking # 905008871469

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature) Date: 9/25/20 Time: 16:30 Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) Date: Time: Received by: (Signature)

Temp: Amb °C Bottles Received: 1

If preservation required by Login: Date/Time

Relinquished by : (Signature) Date: Time: Received for lab by: (Signature)

Date: 9/26/20 Time: 0900

Hold:

Condition: NCF / [✓ OK]

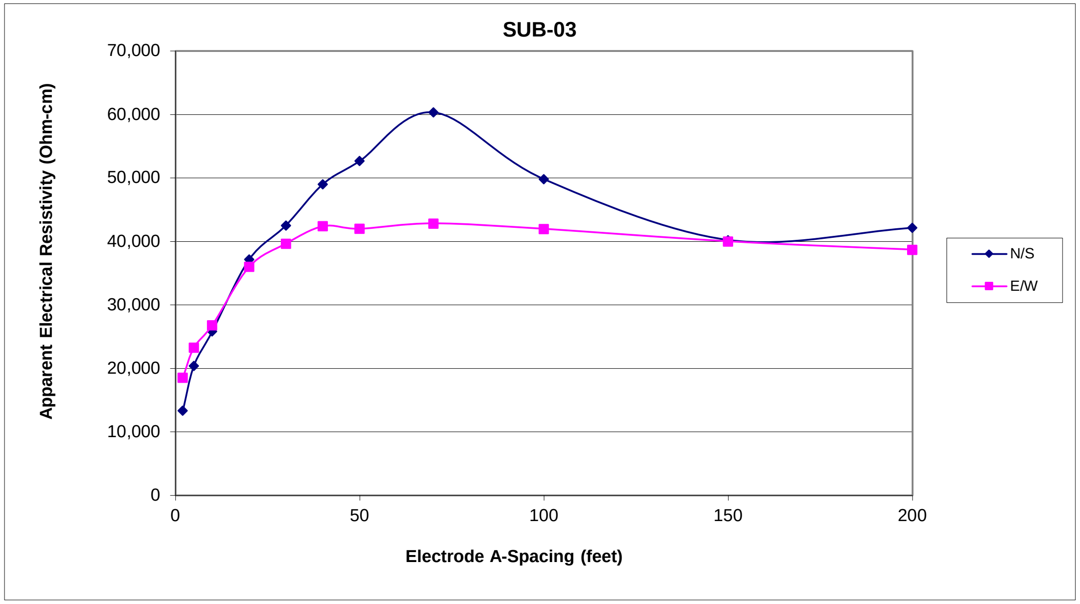
Appendix C

Electrical Resistivity Test Results

WENNER SOUNDING
PROJECT: **Alta Mesa Wind Project**

Sounding No. **SUB-03** **Date** **10/6/2020**
Observer **CJA2**
Location **Alta-Mesa Substation**

Electrode	**Resistance**	**Geometric**	**Apparent**	**Apparent**
Spacing		**Factor**	**Resistivity**	**Resistivity**
"a"	**V/I**	**K=2πa**	**ρ_a=K(V/I)**	**ρ_a=K(V/I)**
feet	Ohms	feet	Ohm-feet	Ohm-cm
N/S Orientation				
2	34.900	12.57	438.57	13371.0
5	21.300	31.42	669.16	20401.2
10	13.500	62.83	848.23	25860.7
20	9.700	125.66	1218.94	37162.8
30	7.400	188.50	1394.87	42526.5
40	6.400	251.33	1608.50	49039.6
50	5.500	314.16	1727.88	52679.3
70	4.500	439.82	1979.21	60341.7
100	2.600	628.32	1633.63	49805.9
150	1.400	942.48	1319.47	40227.8
200	1.100	1256.64	1382.30	42143.4
E/W Orientation				
2	48.400	12.57	608.21	18543.1
5	24.300	31.42	763.41	23274.7
10	14.000	62.83	879.65	26818.5
20	9.400	125.66	1181.24	36013.5
30	6.900	188.50	1300.62	39653.1
40	5.533	251.33	1390.60	42396.3
50	4.385	314.16	1377.59	41999.7
70	3.195	439.82	1405.24	42842.6
100	2.191	628.32	1376.65	41971.0
150	1.393	942.48	1312.87	40026.7
200	1.010	1256.64	1269.21	38695.3



Notes	N/A
Ground Cover	Dry Grass and Brush
Weather	Partly Cloudy, 98F
Line Location and Bearing	N-S/E-W

Appendix D

Thermal Resistivity Test Results

Thermal Resistivity Report ASTM D:5334

Project: **Alta Mesa**
Job #: **12782**
Client: **Barr Engineering Company**
Date: **10/21/20**

					Initial Conditions			Dry
Boring	Specimen Type	Depth (ft)	Type	Classification	Dry Density (PCF)	WC (%)	Thermal Resistivity (ºC-cm/W)	Thermal Resistivity (ºC-cm/W)
Sub-03	**Reconstituted**	**3-5**	**Bulk**	**Silty Sand with a trace of gravel (SM)**	**106.4**	**1.9%**	**293**	**374**

Specimen reconstituted to approximately 85% of maximum standard proctor density near the as received moisture content.

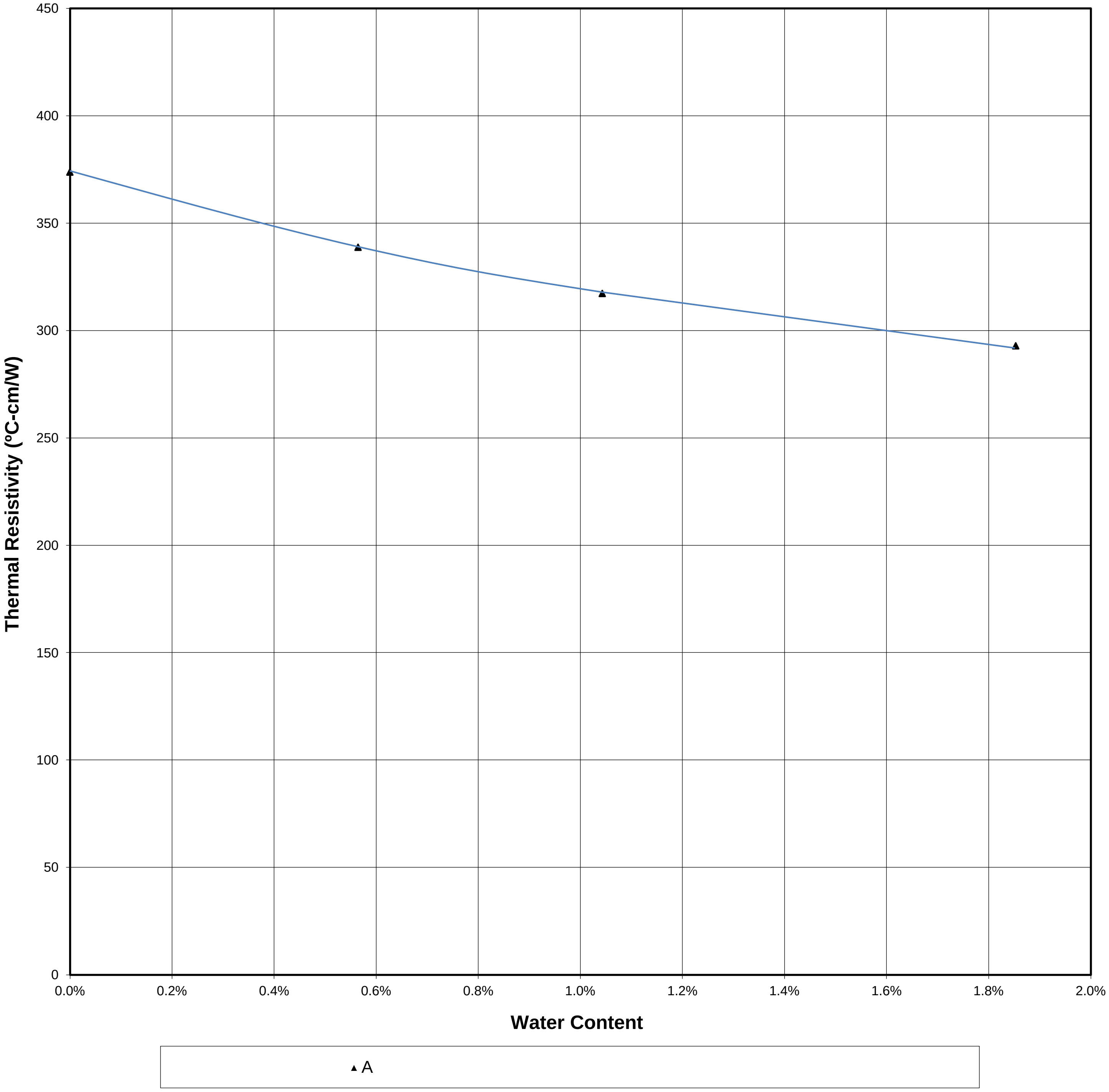
9530 James Ave South
SOIL ENGINEERING TESTING, INC.
Bloomington, MN 55431
http://www.soilengineeringtesting.com

Thermal Resistivity Report ASTM D:5334

Project: Alta Mesa
Job: 12782
Client: Barr Engineering Company
Date: 10/21/20

	Boring	Depth (ft)
Specimen A:	Sub-03	3-5
Specimen B:		
Specimen C:		

Thermal Dryout Curves (Water Content vs. Resistivity)



Thermal Resistivity Report ASTM D:5334

Project: **Alta Mesa** Job #: **12782**

Client: **Barr Engineering Company** Date: **10/21/20**

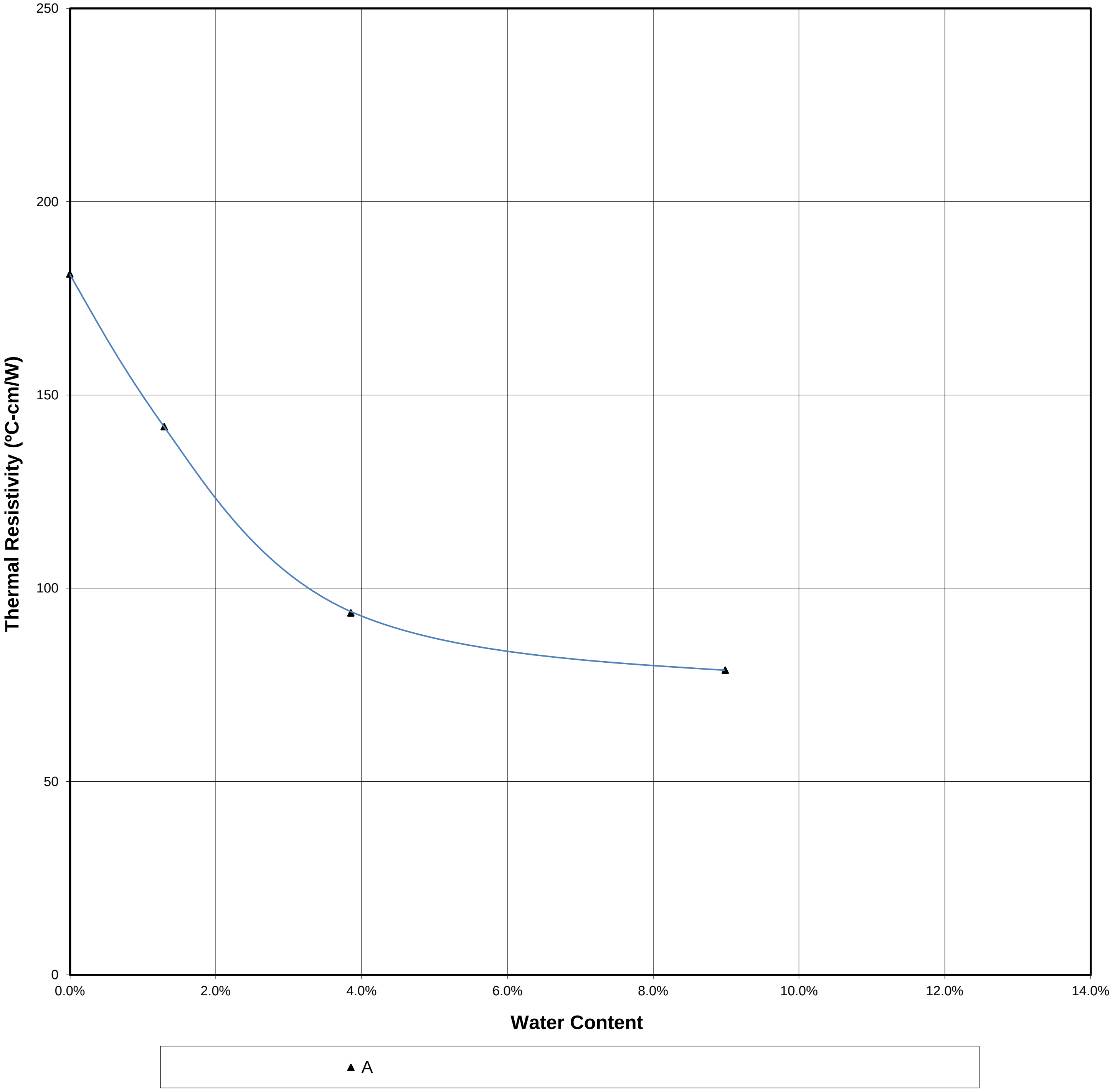
					Initial Conditions			Dry
Boring	Specimen Type	Depth (ft)	Type	Classification	Dry Density (PCF)	WC (%)	Thermal Resistivity (ºC-cm/W)	Thermal Resistivity (ºC-cm/W)
Sub-03	**Reconstituted**	**3-5**	**Bulk**	**Silty Sand with a trace of gravel (SM)**	**106.1**	**9.0%**	**79**	**181**
	Specimen reconstituted to approximately 85% of maximum standard proctor density near the optimum moisture content.							

Thermal Resistivity Report ASTM D:5334

Project: Alta Mesa Job: 12782
Client: Barr Engineering Company Date: 10/21/20

	Boring	Depth (ft)
Specimen A:	Sub-03	3-5
Specimen B:		
Specimen C:		

Thermal Dryout Curves (Water Content vs. Resistivity)



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Moisture Density Curve ASTM: D698, Method B

Project: **Alta Mesa** Date: **9/28/20**

Client: **Barr Engineering Company** Job No. **12782**

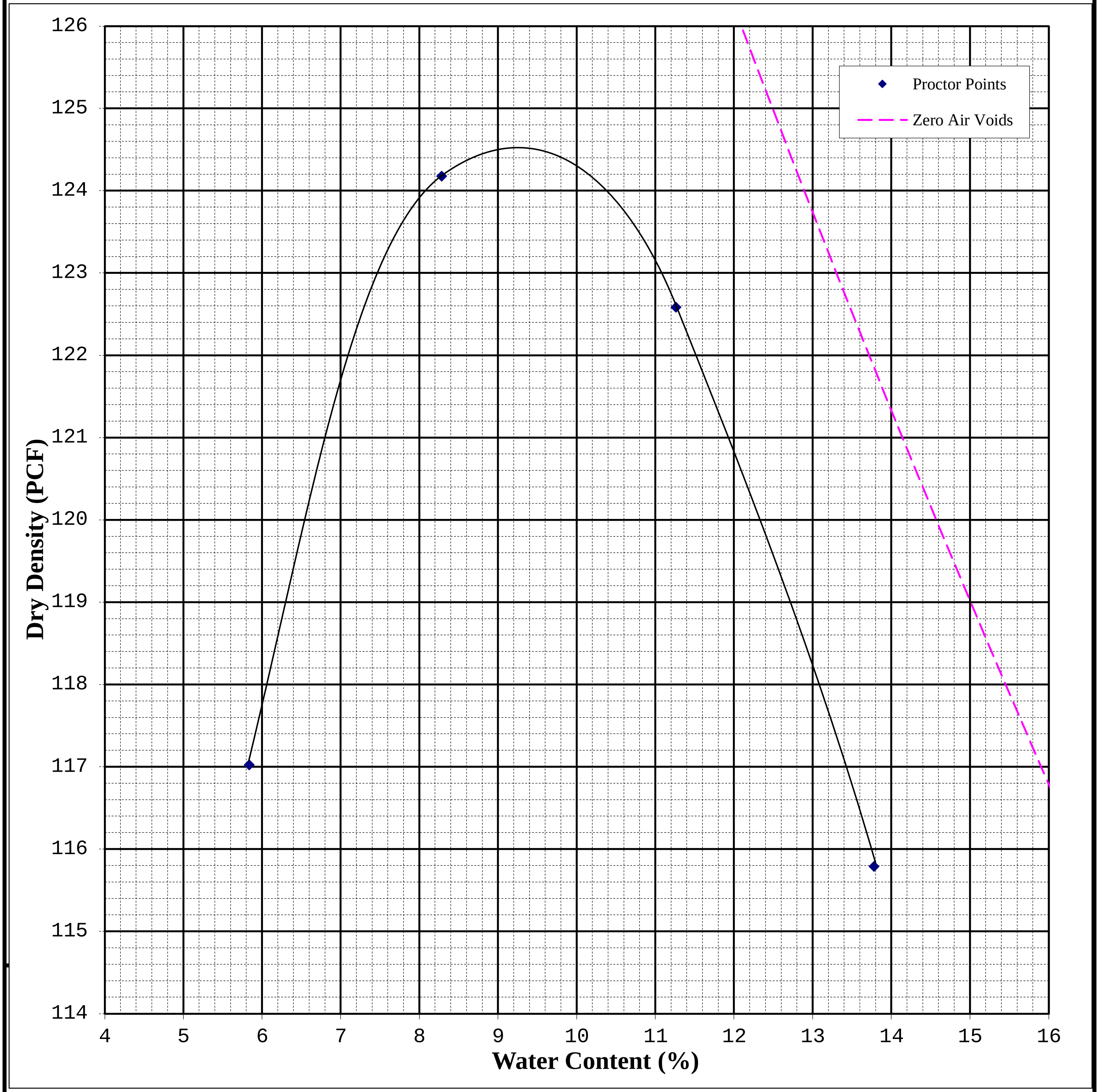
Boring No. **Sub-03** Sample: Depth(ft): **3-5** Location:

Soil Type: **Silty Sand with a trace of gravel (SM)**

As Received W.C. (%): **2.0** LL: PL: PI: Specific Gravity: **2.67** *Assumed

◆ △ ◆ △

Maximum Dry Density (pcf): **124.5** Opt. Water Content (%): **9.2**



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Bloomington, MN 55431

SET-R18a

Appendix E

Geophysical Survey Report

COLLIER
GEOPHYSICS
Surface • Marine • Borehole

7711 W. 6th Ave., Ste G/H | Lakewood, CO 80217 | (720) 487-9200

October 6, 2020

Benjamin R. Borree, PE
Senior Geotechnical Engineer

Barr Engineering Co.
4300 MarketPointe Dr.
Minneapolis, MN 55435
952-842-3576

Email: BBorree@barr.com

RE: Geophysical Letter Report | Project # 20-158
Mesa / Alta Mesa Wind Project
Riverside County, CA

Collier Geophysics, LLC (Collier) conducted a geophysical investigation on behalf of Barr Engineering, Inc. (Barr) at the Mesa/Alta Mesa Wind Project located approximately 10 miles northwest of Palm Springs, CA (Figure 1). The objective of the investigation was to characterize the subsurface compressional (P-) and shear (S-) wave velocities, and determine the depth weighted average shear wave velocity up to 100 feet below ground surface (Vs100). The investigation was completed using Seismic Refraction Tomography (SRT) and Multi-channel Analysis of Surface Waves (MASW) surveys.

The surveys were conducted at three (3) wind tower generator sites (Figure 1), pre-selected by Barr, on September 24nd, 2020. The survey was led by Collier Senior Geophysicist Jim Pfeiffer. The following report presents results from the geophysical investigation and summarizes the site conditions, field methods, data acquisition, and interpretation procedures.

Site Description

The site consisted of moderate to steep hillslopes. Vegetation consisted of desert brush and grasses. Weather conditions were dry and hot with light to moderate winds. See Figure 2 for photos of field conditions at the time of data collection.

Figure 1: (Top) Approximate location of project site (yellow star) Riverside County, CA. (Bottom) Location of surveyed WTG sites. Imagery source: Google Earth 2020.

Figure 2: Site conditions encountered at time of survey.

Data Acquisition

A total of three (3) seismic lines were surveyed, numbered by their GEO site designation. Each seismic line was collected using twenty-four (24) 4.5 Hz geophones, with a sensor spacing of 10 feet, for a total line length of 230 feet. Each WTG line was centered on the site marker/borehole located in the field. Line orientations were determined on site by the field geophysicist based on line accessibility.

Seismic data were acquired using a Geometrics Geode 24-channel digital seismograph. This system utilizes a state-of-the-art, 24-bit seismograph connected to a field laptop via an Ethernet cable. Analog data from the geophones are collected in the seismograph where the data are digitized, transmitted to the laptop computer, and then recorded on the hard drive. The line locations and orientations were measured with a handheld GPS unit.

Active MASW and SRT data were acquired concurrently using an active seismic source, consisting of a 16-lb sledgehammer impacting a metal strike plate. Shot points were located every 30 feet along the line, beginning with a 30 foot off-end shot. Acquisition parameters comprised of stacked 2-second records at a 0.125 millisecond (ms) sample rate. Passive MASW data were acquired as well, using acquisition parameters of fifteen 30-second records with a 2 ms sample rate. Background ambient seismic noise, which provides the seismic signals for passive surface wave surveys, was minimal due to the rural setting of the survey area.

Data Processing

Multi-channel Analysis of Surface Waves (MASW)

Active and passive MASW analysis consists of generating a frequency-velocity transform from the surface waves, picking the transformed data to derive a dispersion curve, and inverting this dispersion curve to create a layered shear-wave velocity (Vs) model. Figure 3 illustrates the dispersion curve picking approach used for MASW soundings, with an example from this investigation. These steps result in a one-dimensional (1D) Vs sounding. The program SurfSeis©, version 6.3, by the Kansas Geological Survey, was used to accomplish these steps.

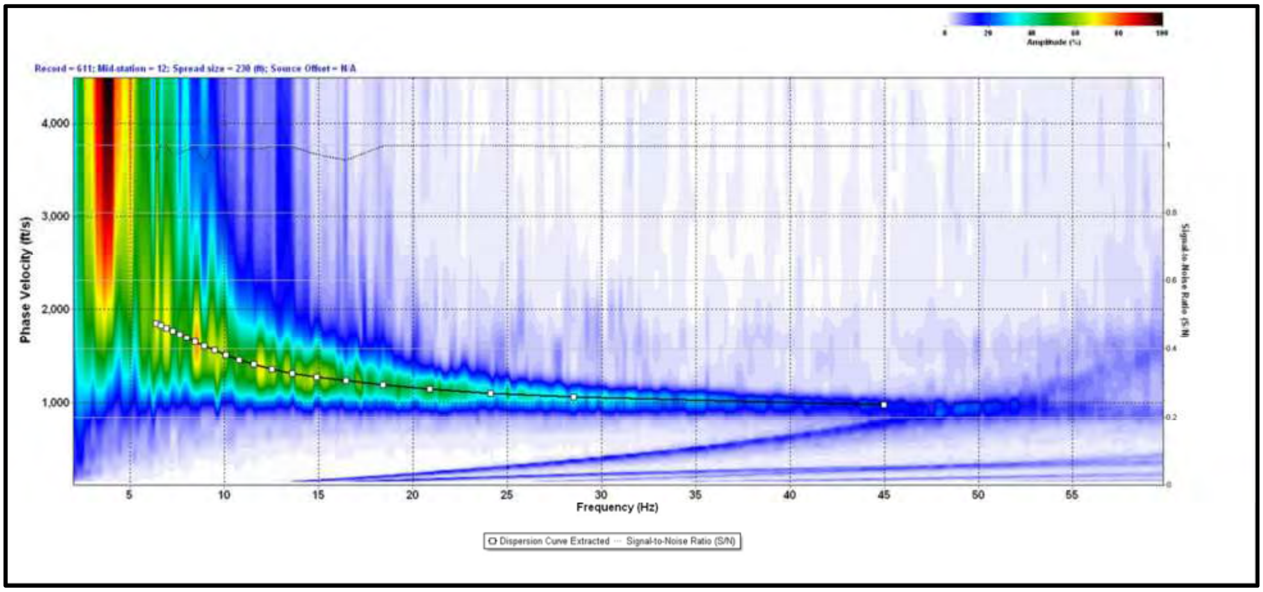


Figure 3: Example of dispersion curve picking (white boxes) from this project.

Seismic Refraction Tomography (SRT)

Refraction data from this investigation were processed using Rayfract®, version 3.36, by Intelligent Resources Inc. The two steps involved with SRT processing are first arrival picking and tomographic inversion. The first arrival picking step consists of picking the time for each signal trace where the first-arrival energy is observed at the geophone position from each shot record. Figure 4 illustrates the picking approach used for SRT records, with an example from this investigation. After picking is completed, an inversion is performed generating a two-dimensional (2D) P-wave velocity (Vp) model that best fits the arrival picks by iteratively modifying an initial velocity grid model until the misfit between the modeled and measured travel-time values is minimized, subject to smoothing constraints.

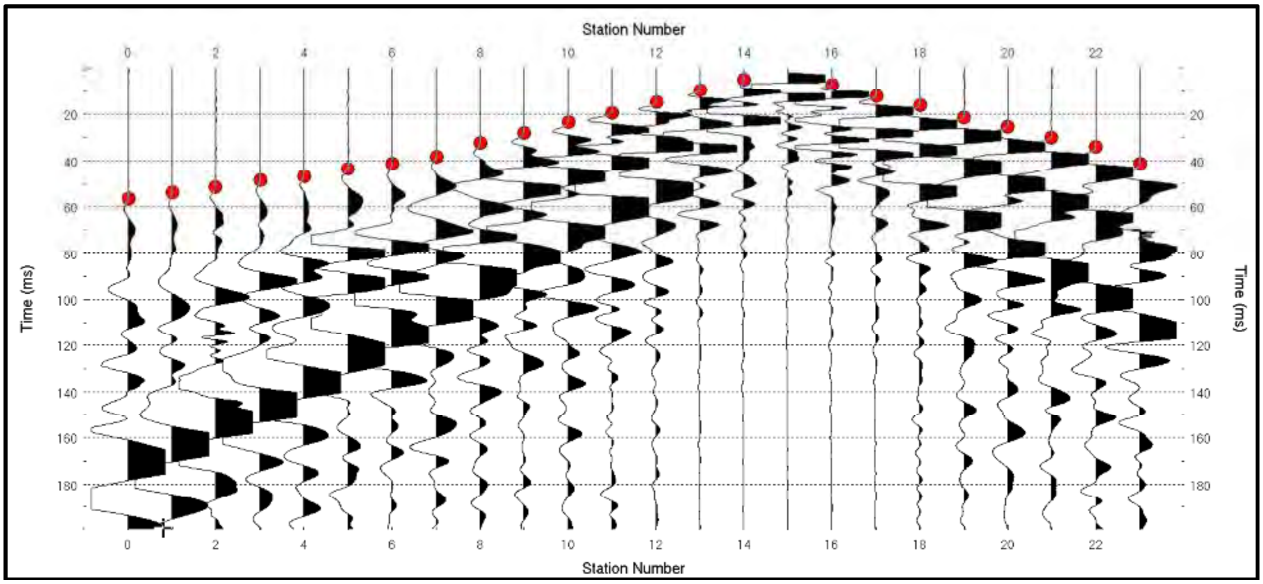


Figure 4: Example of the first-arrival picking (red circle) on a sample refraction record from this project.

Results and Discussion

The seismic results for each of the proposed WTG sites are presented in Figures 5 through 7, attached to this report. The figures are 11x17 inches in landscape format. Figures 5 through 7 have four components: a 2D color contour Vp profile, a 1D Vs model, an aerial map showing line location, orientation and center point coordinate, and a table summarizing velocity values derived from the geophysical models along with a calculated Poisson's ratio.

The 2D Vp profiles are presented using the same seismic color scale, line to line, with 'cool' colors (e.g. blue) representing lower velocity values and 'warm' colors (e.g., red) representing higher velocity values. Each of the Vp profiles are presented at the same horizontal and vertical scale.

The 1D Vs graphs represent a seismic sounding at the middle of each line, the Vs value is essentially a bulk average of the full line length rather than a true sounding at the center of the line.

The table displays the Vs and Vp results from the MASW and SRT geophysical data, respectively, and the computed Poisson's ratio with depth. The velocity values are taken from each 1D Vs sounding, and by sampling the average P-wave velocity over the depth range for each layer defined by the 1D Vs sounding, at the center of each 2D velocity profile (115 feet along the geophone array). Each table and Vs sounding also gives the layer weighted average shear-wave velocity down to a depth of 100 feet, designated Vs100. The Vs100 values range from a low of 1,428 ft/s for GEO-08 to a high of 1,455 ft/s for GEO-02.

The Vp values range from about 1,000 ft/s to about 5,700 ft/s. The Vp results show some variability across the site, likely due to variable thickness of alluvium over bedrock. Borehole data were not available at the time of this survey.

The results for GEO-02 (Figure 5) show a gradual increase in velocity in both Vp and Vs beneath most of the array. However, there is a near surface isolated higher P-wave velocity zone (3,000 ft/s) beneath the first 70 ft of the array. The Vp contours show an apparent dip to the south. The results for GEO-08 (Figure 6) show a gradual increase in Vs and Vp with depth. The SRT also imaged to the greatest depth at this location (i.e., greater than 100 ft bgs). The results for GEO-13 (Figure 7) also show a gradual increase in Vs and Vp with depth.

Closure

The quality of the seismic data acquired during this investigation varied from good to very good for the SRT and from moderate to good for the MASW. Generally, the Vs and Vp correlate well to each other; however, no borehole information was provided for correlation with the seismic results.

The geophysical methods and field procedures defined in this report were applicable to the project objectives and have been successfully applied by Collier geophysicists to investigations of similar size and nature. However, sometimes field or subsurface conditions are different from those anticipated and the resultant data may not achieve the investigation objectives. Collier warrants that our services were performed within the limits prescribed for this project, with the usual thoroughness and competence of the geophysical profession. Collier conducted this project using the current standards of the geophysical industry and utilized in house quality control standards to produce a precise geophysical survey.

If you have any questions regarding the field procedures, data analyses, or the interpretive results presented herein, please do not hesitate to contact us. For further information regarding the details of MASW and SRT techniques, Collier can submit a more detailed description of the methods upon request. We appreciate working with you and look forward to providing Barr with geophysical services in the future.

Respectfully Submitted,

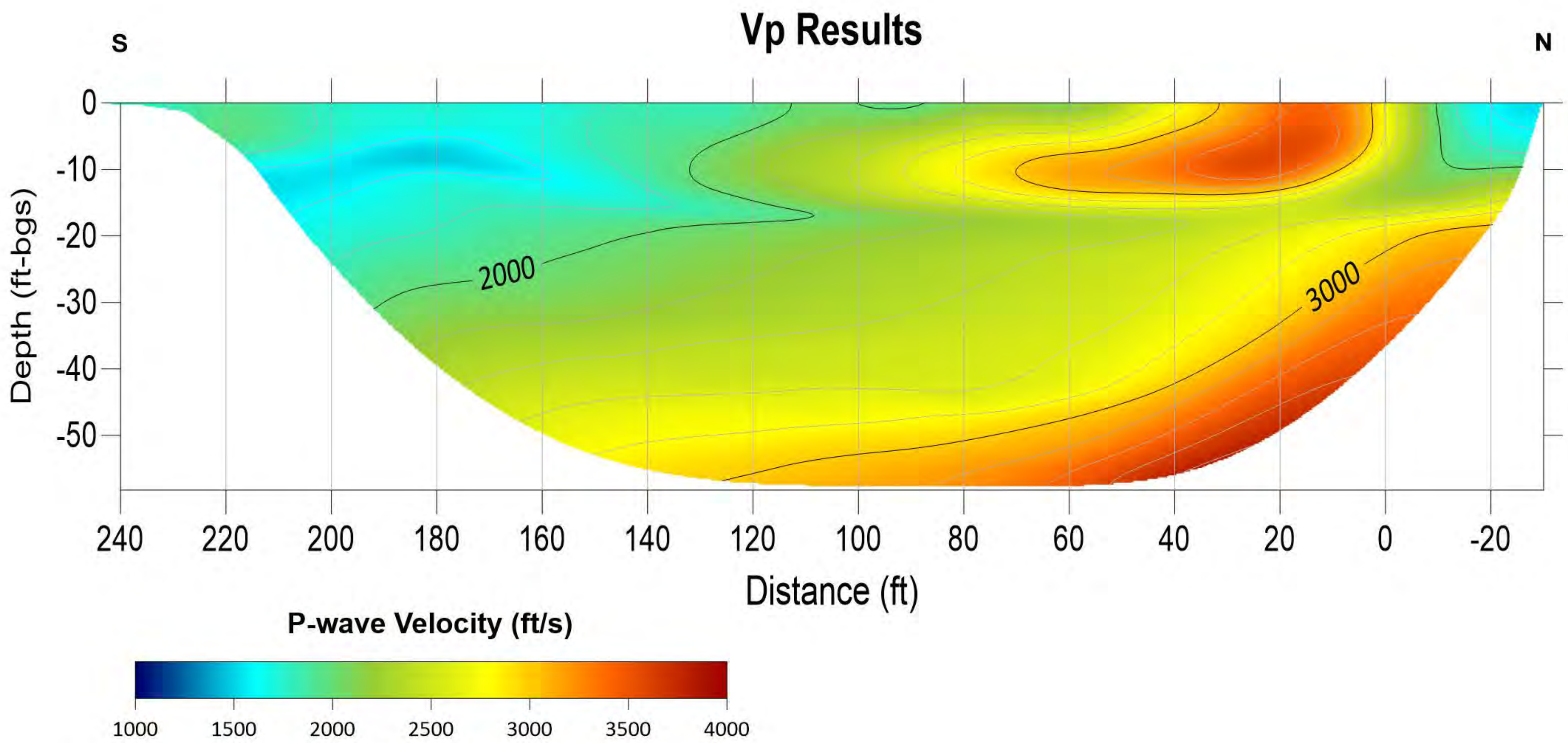
Collier Geophysics, LLC

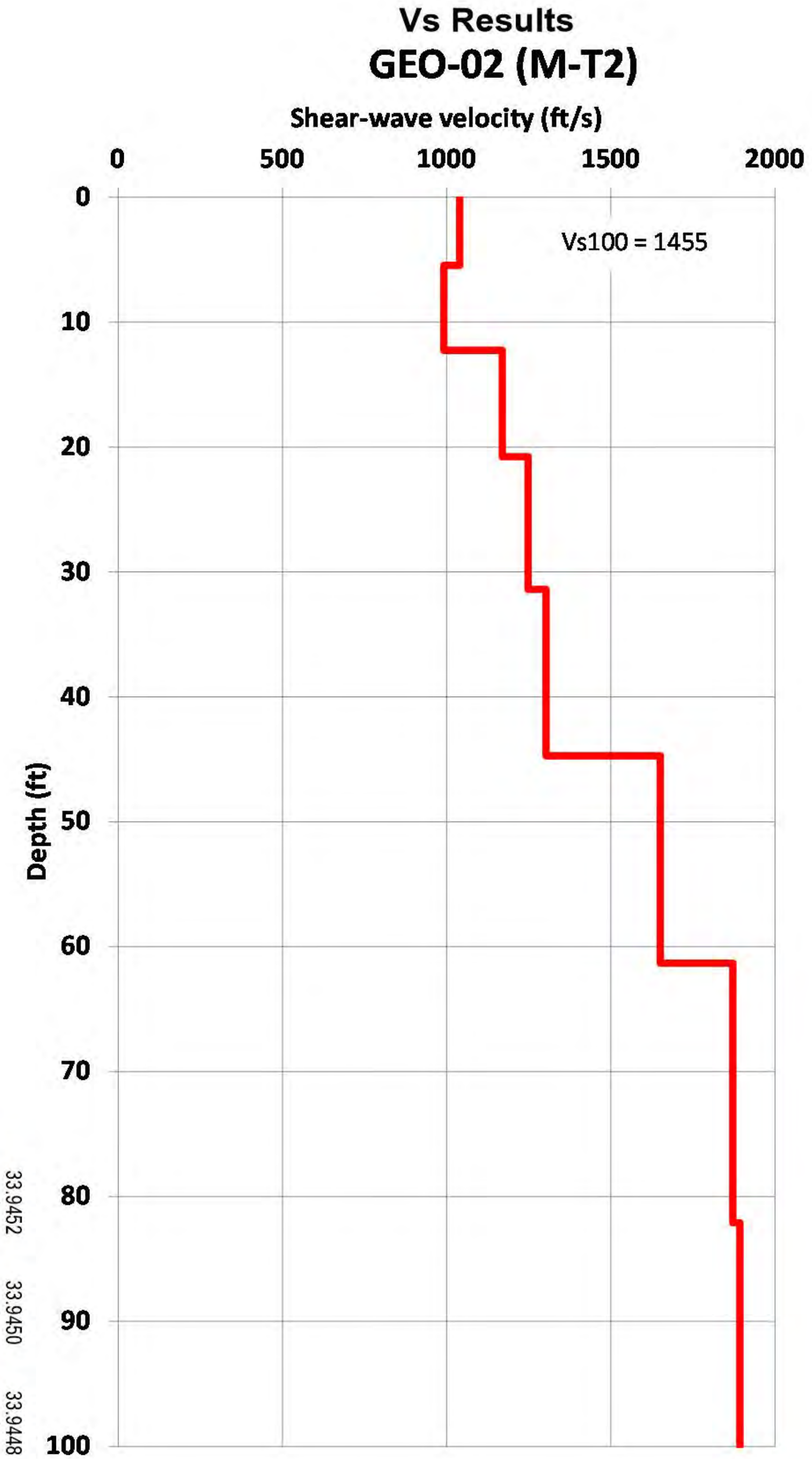
J. Pfeiffer

Jim Pfeiffer
Senior Geophysicist
California Reg. Geophysicist #1092
(1 copy e-mailed PDF format)

Nicole Pendrigh
Senior Geophysicist

TABLES AND FIGURES


Vp Results


Vs Results
GEO-02 (M-T2)

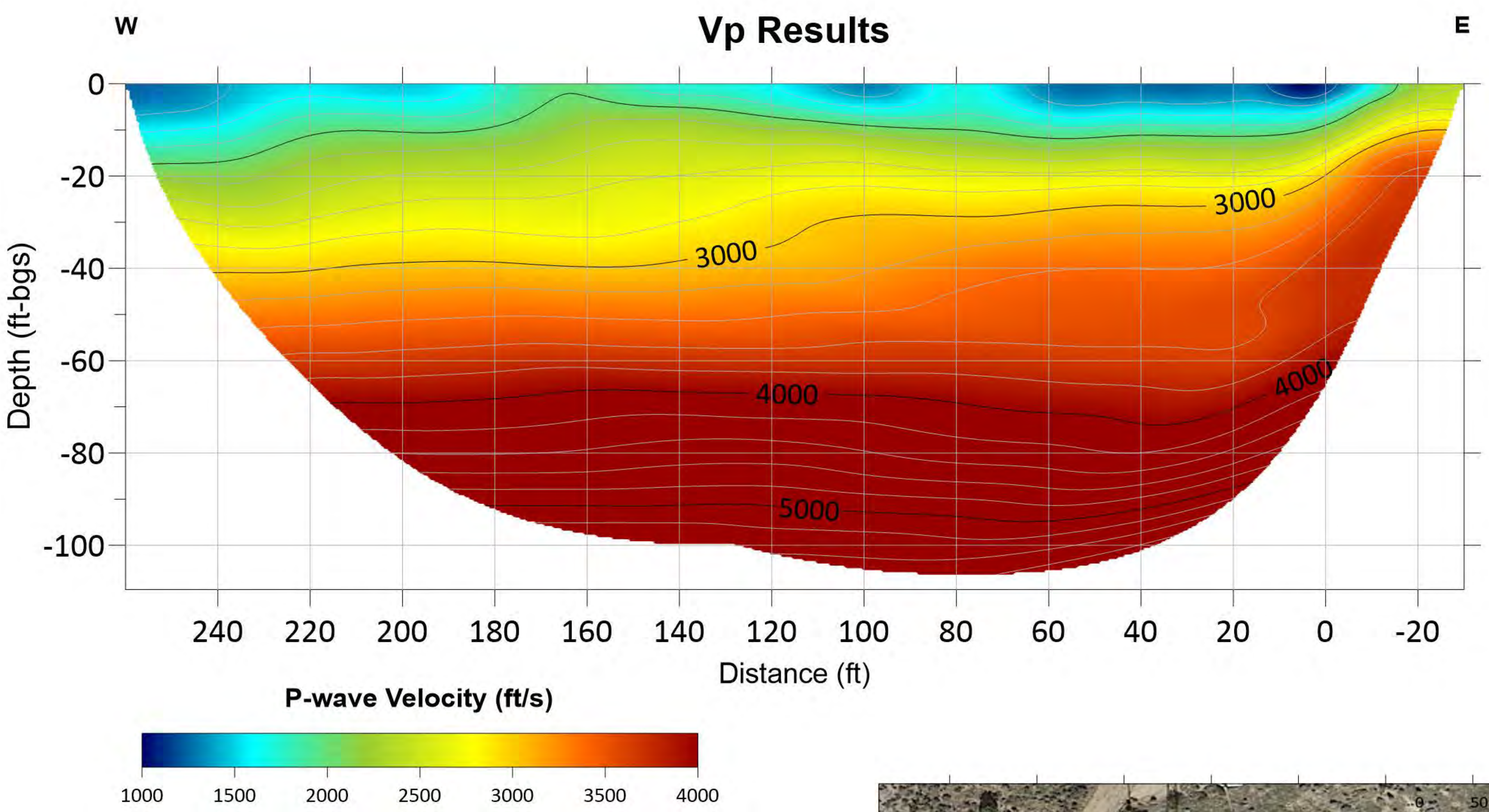
Layer Velocity Table

Depth Range (ft-bgs)	Vs (ft/s)	Vp (ft/s)	Poisson's Ratio
0 - 5	1040	2054	0.33
5 - 12	992	2160	0.37
12 - 21	1169	2157	0.29
21 - 31	1248	2217	0.27
31 - 45	1303	2475	0.31
45 - 61	1651		
61 - 82	1872		
82 - 100	1893		

Mesa/Alta Mesa Seismic Survey
GEO-02 (M-T2)
Riverside County, CA

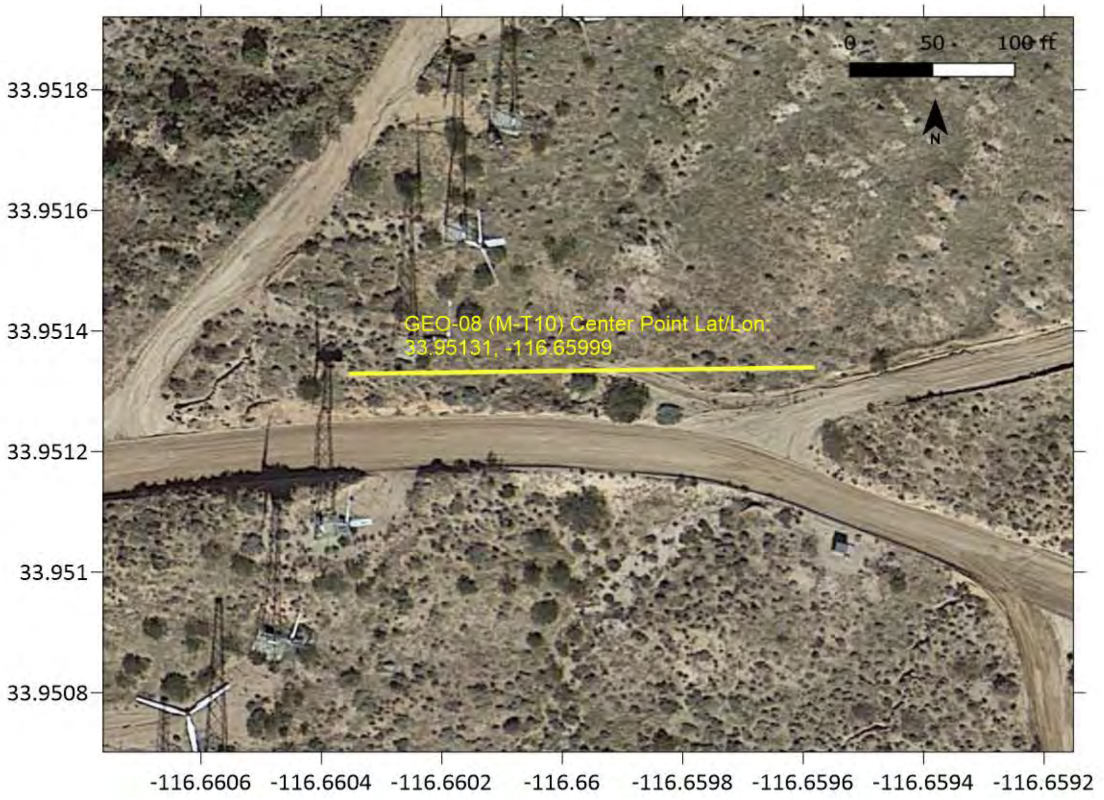
Barr Engineering Co.

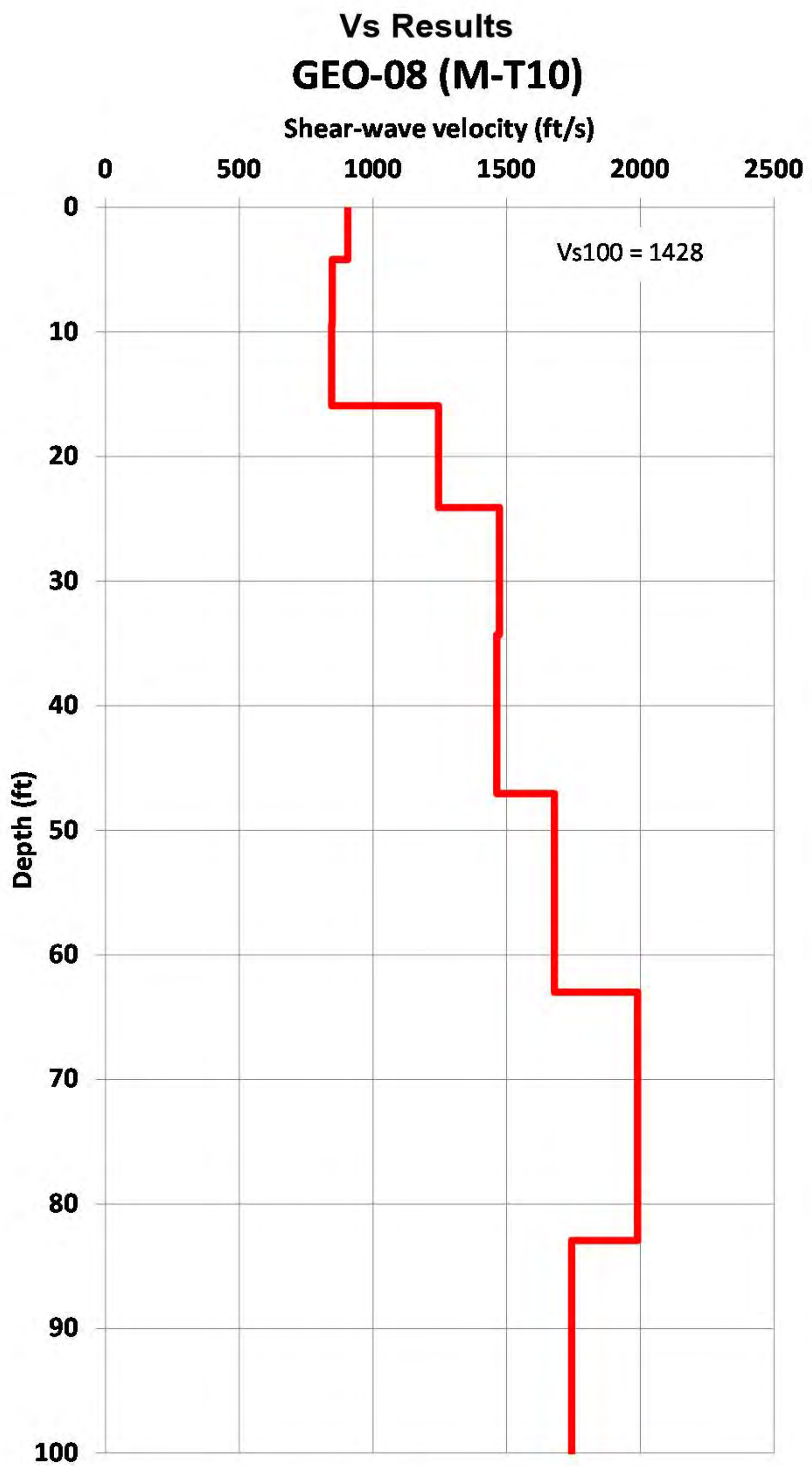
Project #: 20-158	Oct 2020	COLLIER GEOPHYSICS
Drafted by: J. Pfeiffer	Checked by: N. Pendrigh	Figure 5


Vp Results

Layer Velocity Table

Depth Range (ft)			Vs (ft/s)	Vp (ft/s)	Poisson's Ratio
0	-	4	906	**1616**	**0.27**
4	-	9	847	**1924**	**0.38**
9	-	16	845	**2343**	**0.43**
16	-	24	1245	**2683**	**0.36**
24	-	34	1473	**2921**	**0.33**
34	-	47	1463	**3164**	**0.36**
47	-	63	1678	**3568**	**0.36**
63	-	83	1989	**4216**	**0.36**
83	-	100	1743	**4972**	**0.43**




Vs Results
GEO-08 (M-T10)

Mesa/Alta Mesa Seismic Survey
GEO-08 (M-T10)
Riverside County, CA

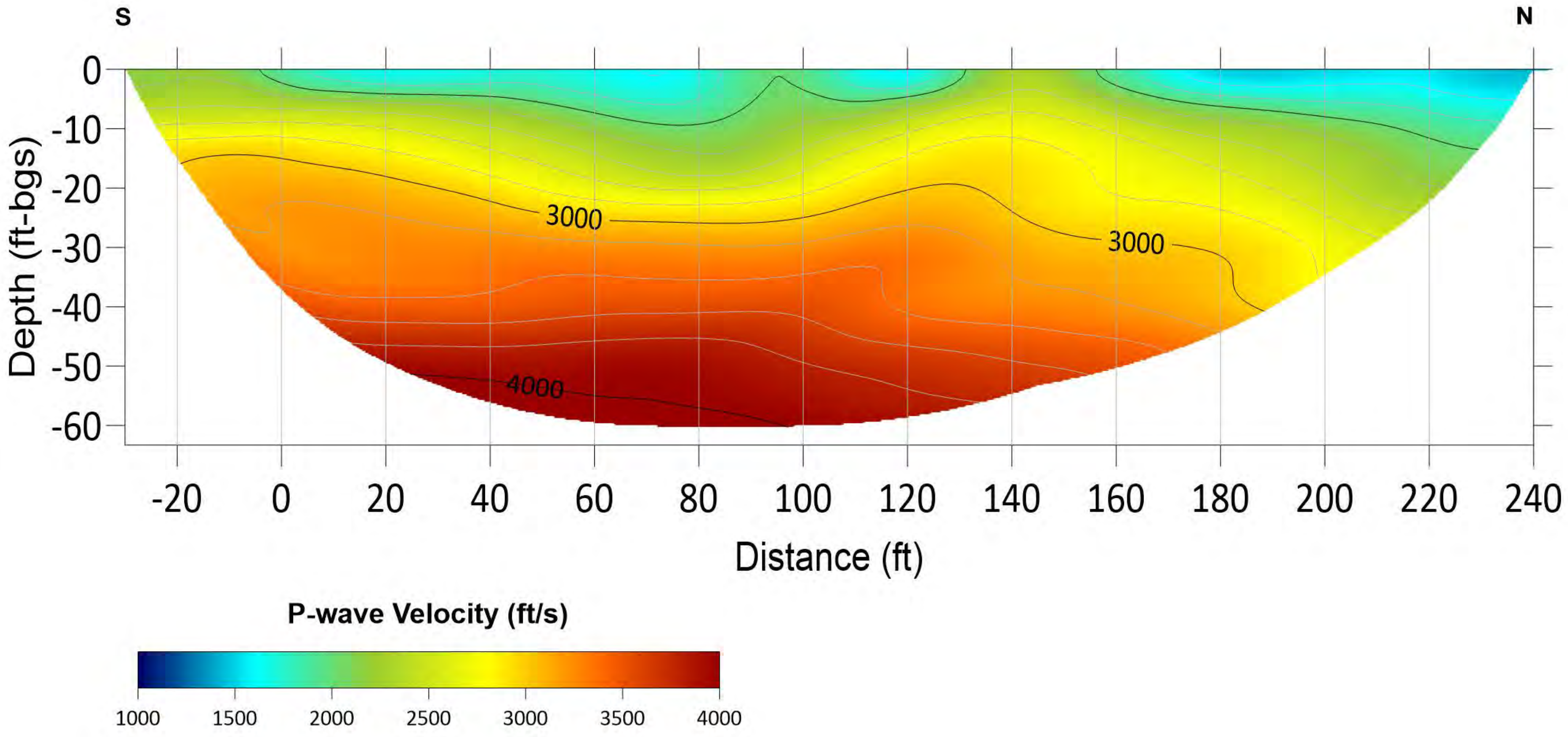
Barr Engineering Co.

COLLIER GEOPHYSICS

Project #: 20-158
Oct 2020

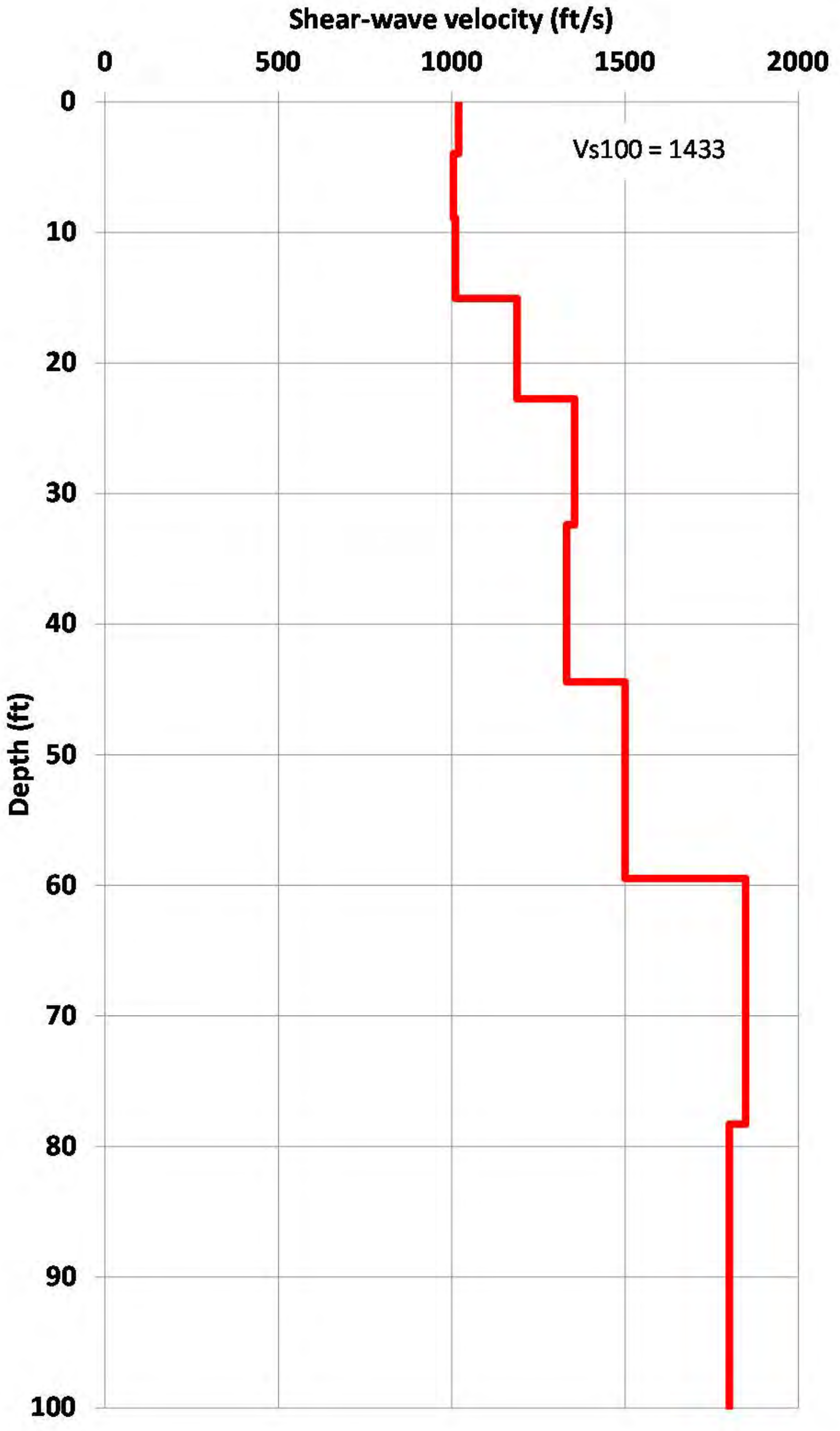
Drafted by: J. Pfeiffer
Checked by: N. Pendrigh

Figure 6



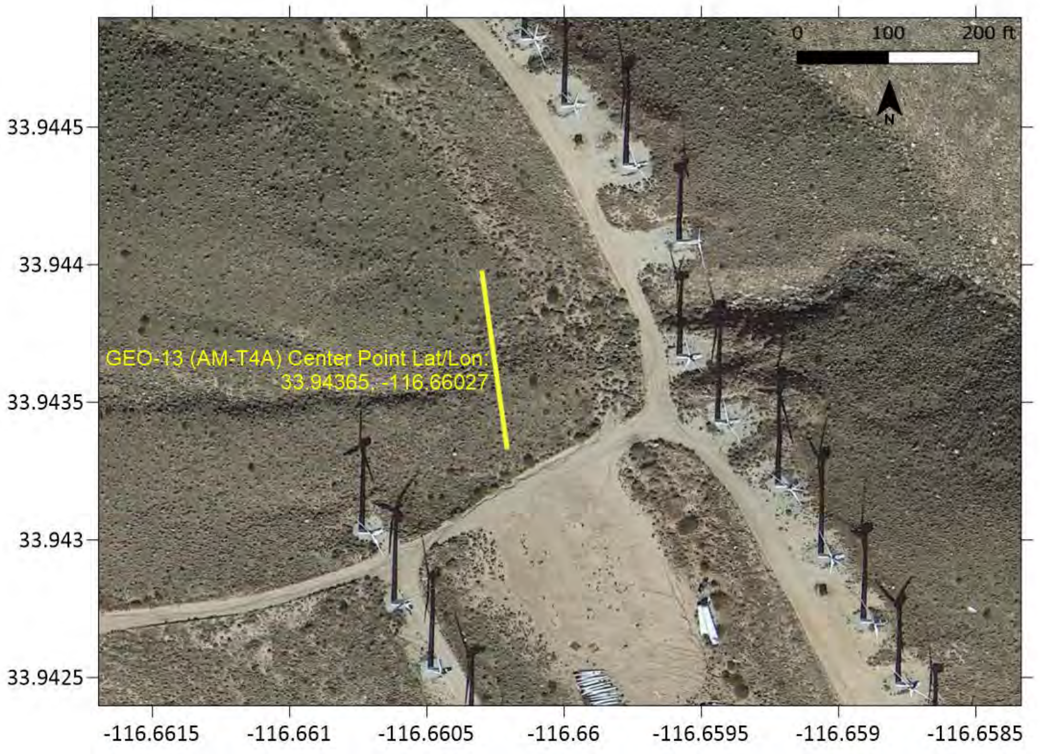
Vs Results

GEO-13 (AM-T4A)



Layer Velocity Table

Depth Range (feet)			Vs (ft/s)	Vp (ft/s)	Poisson's Ratio
0	-	4	1019	1734	0.24
4	-	9	1004	2115	0.35
9	-	15	1010	2561	0.41
15	-	23	1188	2903	0.40
23	-	32	1354	3215	0.39
32	-	44	1331	3459	0.41
44	-	59	1500	3727	0.40
59	-	78	1848		
78	-	100	1801		



Mesa/Alta Mesa Seismic Survey
GEO-13 (AM-T4A)
Riverside County, CA

Barr Engineering Co.

COLLIER GEOPHYSICS

Project #: 20-158
Oct 2020

Drafted by: J. Pfeiffer
Checked by: N. Pendrigh

Figure 7

resourceful. naturally.
engineering and environmental consultants
BARR

February 9, 2021

Ms. Robin Saidov
Brookfield Renewable Partners
200 Liberty Street, 14th FL
New York, NY 10281

Re: Response to County Comments, Alta Mesa Wind Project, Riverside County, California, Rev. 3

Dear Ms. Saidov,

At your request, Barr Engineering Co. (Barr) has provided responses to comments received from the Riverside County Planning Department in a letter dated January 5, 2021 (Review Comments No. 2, County Geologic Report No. 200033, "Geotechnical Engineering Report, Mesa-Alta Mesa Wind Project, Brookfield Renewable Partners, Riverside County, California," dated November 6, 2020). The County comments were in response to the referenced geotechnical report prepared by Barr. Barr's responses include additional field work on January 13-14, 2021, to perform a second round of geologic site reconnaissance and fault trenching at three turbine locations located within Alquist-Priolo (A-P) Earthquake Fault Zones.

The County comments are repeated (in bold italics) and addressed one by one below.

1. Barr Engineering should provide a letter stating that they are taking over as the geotechnical consultant of record on this project.

Barr response: This letter is intended to satisfy the requirement. Barr Engineering Co. is the geotechnical consultant of record for the Alta Mesa Wind Project going forward.

2. The consultant concludes that the proposed turbines and ancillary structures, including those located within a State-designated Earthquake Fault Zone for fault surface rupture hazard, are at a sufficient distance from the "actual location" of the fault. Please provide the site-specific data geologic evidence, trench logs, geophysical studies, etc.) that support the conclusion that the mapped location of onsite faulting is the actual location.

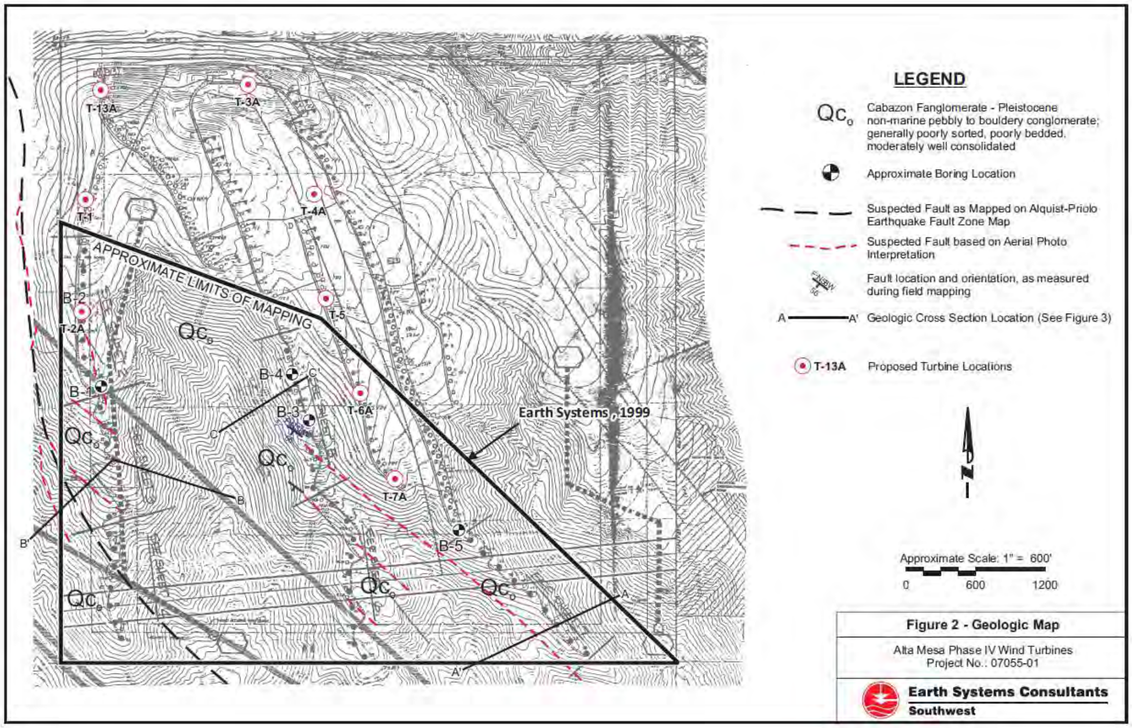
Barr response: The "actual location" of the fault in the report entitled "Geotechnical Engineering Report, Mesa-Alta Mesa Wind Project, Brookfield Renewable Partners, Riverside County, California," dated November 6, 2020, was determined in the following ways:

- Published mapping by the California Geological Survey (Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010). See Figures 5 and 6 in the referenced Barr report.
- Major topographic features confirm the location of the published fault traces. These topographic features were determined through site reconnaissance and examination of aerial photographs.

- The deep east-west canyon created by the Coachella Valley strand of the Banning fault is a very prominent feature just north of the Alta Mesa site. No branches of this fault were observed closer to turbine AM-T3A (GEO-12) than stated in the report (approximately 450 feet) through site reconnaissance and examination of aerial photographs.
- The major slope break west of proposed wind turbines AM-T1 (GEO-10) and AM-T2A (GEO-02) and the Alta Mesa met tower (MET-02) marks the furthest north branch of the Garnet Hill fault. This topographic feature is oriented north-south. No branches of this fault were observed closer to the two turbines and the met tower than stated in the report (375 feet from AM-T2A [GEO-11]) through site reconnaissance and examination of aerial photographs. A Google Earth image showing this feature is included below.

View of Garnet Hill fault topographic feature (looking north, AM-T2A [T-2A] on right)

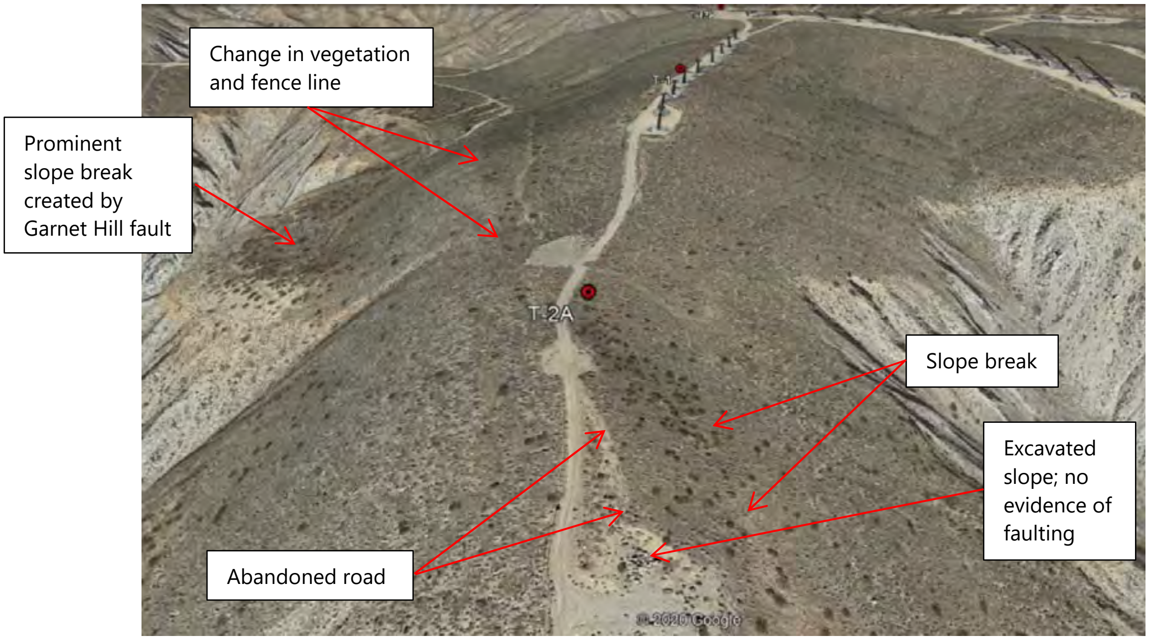
The figure below is taken from the July 31, 2020, memorandum by Earth Systems. This figure is a reprint from earlier work by Earth Systems in 1999 (Earth Systems, 1999) with the currently proposed turbine locations shown. The field mapping area is shown on the figure with the red dashed lines indicating "suspected faults based on aerial photo interpretation". The two features of interest are the suspected faults adjacent to AM-T2A and AM-T7A. On this figure, they are shown as the north-south suspected fault just south of the AM-T2A location (called T-2A on the figure) and the northwest-southeast suspected fault just southwest of the AM-T7A location (called T-7A on the figure). These features were examined in detail during the January 13-14, 2021, site visit in addition to examination in aerial photographs before and after the site visit.



Earth Systems figure showing "suspected faults" (Earth Systems, 2020)

In the case of the north-south suspected fault just south of AM-T2A, the feature previously identified by Earth Systems appears to be a relatively linear change in vegetation in addition to a fence line north of the turbine and an abandoned road south of the turbine based on the site visit. Furthermore, the excavated slope south of the abandoned road did not show evidence of fault material or fault movement.

A slight slope break located further east than the identified suspected fault feature could possibly be a fault, but it is on an east-facing slope as opposed to the slope break created by the Garnet Hill fault on the west-facing slope. This would be considered unusual to be associated with the Garnet Hill fault. Furthermore, all the other suspected faults identified by Earth Systems were on west-facing slopes, which would be more consistent with the character of the Garnet Hill fault. A Google Earth image showing these features is included below.



View of north-south suspected fault (looking north)

In the case of the northwest-southeast suspected fault just southwest of AM-T7A, Earth Systems drew the feature about halfway down the steep slope southwest of the turbine. Barr could not find any evidence of a fault feature on this slope during the site visit but there appears to be a linear feature following the drainage at the bottom of this slope. This feature is likely a fault in Barr's opinion but it is located about 450 feet away from the AM-T7A turbine location such that it is not a concern from a ground rupture standpoint. A Google Earth image showing this feature is included below.

View of northwest-southeast suspected fault (looking north-northeast)

3. Provide the site-specific data (geologic evidence, trench logs, geophysical studies, etc.) that support the consultant's conclusion that active faulting does not exist within an appropriate setback distance from the foundations of the proposed towers/structures.

Barr response: In order to clear the turbine locations and demonstrate that no fault trace is located within the proposed turbine footprint nor within 20 feet of the foundation edge, fault trenching was performed at three proposed turbine locations in January 2021:

- AM-T1 (GEO-10)
- AM-T2A (GEO-02)
- AM-T3A (GEO-12)

Trench locations are shown in Figure 1 along with surficial geology, active Quaternary faults, A-P Fault Zones, turbine locations, and borings performed as part of Barr's 2020 geotechnical investigation.

Trenching was performed by BL Wilson Backhoe Service of Indio, California, on January 13-14, 2021. The backhoe was a New Holland B95 using a standard bucket with five teeth. The trenches were observed and logged by Jed Greenwood, CEG, GE, of Barr. After excavation, a measuring tape was stretched along the entire length of the trench. The trench was logged and photographs were taken approximately every 5 feet along both walls. This investigation was completed in accordance with CGS Special Publication No. 42 and CGS Note 49.

The trenches were approximately 130 feet long, which corresponded to the assumed maximum foundation diameter of 90 feet in addition to 20 feet on each side. Each trench extended 65 feet from the turbine stake perpendicular to the orientation of the nearby fault trace and corresponding A-P Zone boundary.

The trenches were generally 4.5 feet deep. The depth was governed by the fact that digging deeper than about 4.5 feet was not possible due to cemented alluvium leading to very difficult excavating conditions. Furthermore, safety protocols set a limit of 59 inches on trench depth, in addition to electrical conduit being buried in the existing site access roads. Lastly, the very old alluvium (on the order of 100,000 years old) should show fault movement at depths shallower than in younger alluvium such that deeper excavation was deemed to not be necessary.

The three Alta Mesa trenches (AM-T1, AM-T2A, and AM-T3A) were excavated in Qvof (Very Old Alluvial Fan Deposits). A surficial silty sand (SM) horizon generally ranging from 1-2 feet in thickness was the upper unit encountered. Below this, alluvium classifying as sand with silt (SP-SM) was encountered to the bottom of the trench. Cobbles and boulders were encountered in this unit, with the largest boulder measuring 3 feet in diameter by 6 feet in length, though generally the largest boulder size was on the order of 2 feet. Perpendicular utility trenches were crossed in each of the three fault trenches.

No evidence of faulting was noted in any of the three trenches.

The trench logs are included in Attachment A. Photographs along the finished trenches are included below.

AM-T1 trench (looking west)

AM-T2A trench (looking west)

AM-T3A trench (looking north)

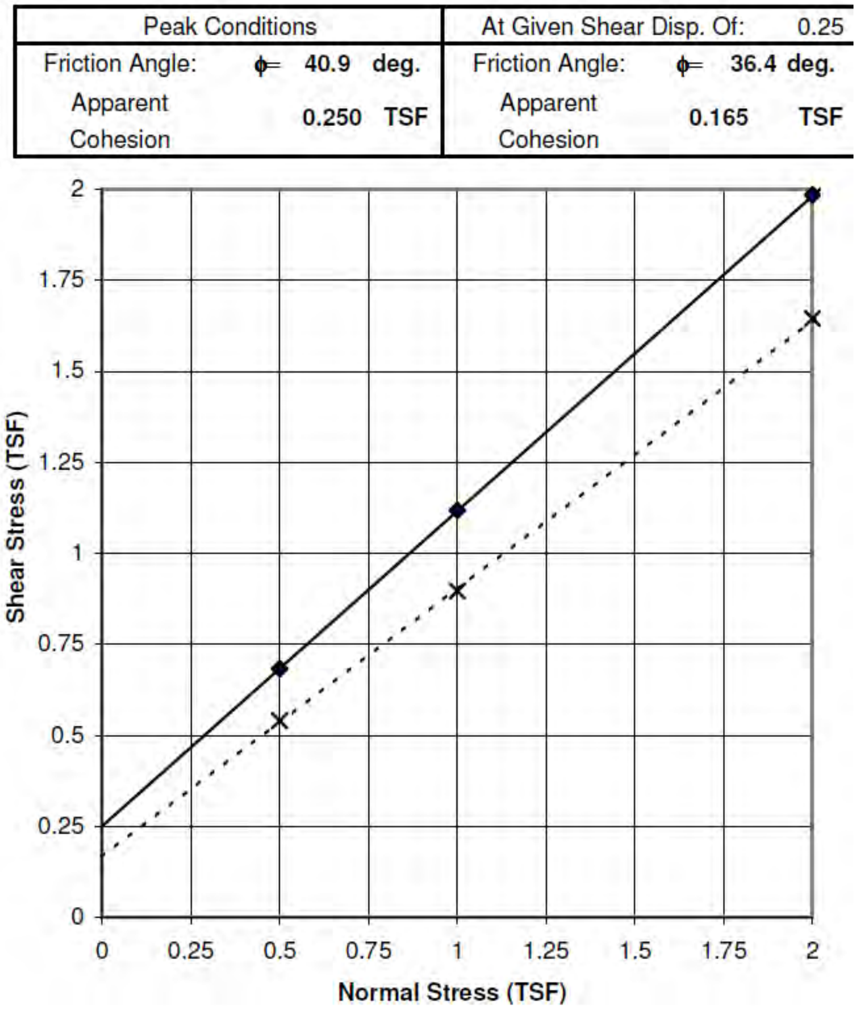
4. Provide static and psuedostatic (sp.) slope stability analyses for all slopes that are greater than 30 feet in height and/or steeper than 2:1 (horizontal:vertical), using site specific data of material strengths and structural orientations, as needed.

Barr response: Slope stability modeling has been carried out on cut and fill slopes at the Alta Mesa site based on civil design performed by Westwood. Two cross-sections were analyzed: turbines AM-T1 and AM-T7A, which represent the worst-case fill and cut slopes at Alta Mesa, respectively. These cross-sections are shown in Figure 1. The following guidance document was consulted to perform this analysis:

Technical Guidelines for Review of Geotechnical and Geologic Reports, 2000 (Edition), County of Riverside, Transportation and Land Management Agency, Building and Safety Department, Planning Department, Transportation Department
https://www.rctlma.org/Portals/5/Handouts/Grading/technical_guide_geotechnical_geologic_reports.pdf

The relevant portion of the document is Section III.1.G.h.1- Slope Stability Analysis on page 35. These guidelines refer to three types of slope stability analyses: seismic, static, and surficial stability. These are described in more detail below.

Shear strength parameters were established based on laboratory direct shear testing performed as part of Barr's 2020 geotechnical investigation (Barr, 2020). Three specimens from GEO-11 (AM-T2A turbine location, sample from 10-16.5 ft) were compacted to "medium dense" and then inundated with water before shearing at three normal loads. The resulting “peak” and “large displacement” shear strength envelopes are shown below.



Peak Conditions				At Given Shear Disp. Of:			0.25
Friction Angle:	ϕ=	40.9	deg.	Friction Angle:	ϕ=	36.4	deg.
Apparent Cohesion		0.250	TSF	Apparent Cohesion		0.165	TSF

GEO-11 Direct Shear Results

The guidance document states the following: “Strength parameters used in static analysis shall not exceed residual (ultimate) values. Dynamic strengths used in a pseudo-static analysis shall not exceed peak point static strengths unless supported by dynamic test results or other convincing physical evidence.” Thus, the peak strength was used for pseudo-static analyses while the “large displacement” strength (shear displacement of 0.25 in.) was used for static analyses. The document also states the following: “Shear strength parameters (cohesion and friction angle) used in surficial slope stability should be representative of the surficial material and shall not exceed residual (ultimate) value.” Thus, the “large displacement” strength (shear displacement of 0.25 in.) was used for the surficial stability analysis. Furthermore, for cut slopes, the linear envelope from the direct shear test was used, including the cohesion intercept, which was deemed appropriate due to the cementation encountered in these very old alluvial materials during the geotechnical investigation. It should be noted that the direct shear test was performed on reconstituted material, so any cementation would have been lost. For fill slopes, the same direct shear results were used but the cohesion intercept was dropped to zero such that a non-linear envelope was incorporated into the stability analysis.

For the pseudo-static analysis, the horizontal seismic acceleration coefficient used in the model was 0.285g, which was developed from a peak ground acceleration (PGA) and the f_{eq} parameter from the method of Stewart *et al.* (2013) (J.P. Stewart, T.F. Blake, R.A. Hollingsworth, A screen analysis procedure for seismic slope stability, Earthq. Spectra, 19 (3) (2003), pp. 697-712). The PGA was determined to be 0.5478g, which corresponds to a 475-year return period at lat: 33.944686, long: -116.683368 (https://earthquake.usgs.gov/hazards/interactive). The f_{eq} parameter was determined using a T_m value of 0.5 s, a height *H* of 50 ft, and a shear wave velocity V_s of 1,000 ft/s (Barr, 2020). The resulting f_{eq} was 0.52, which means that the horizontal seismic acceleration in the model is roughly half of the PGA.

The analysis was performed using the GeoStudio 2021 suite, which includes the SLOPE/W module. The modeling was carried out with the limit equilibrium approach using Spencer's method, which satisfies both force and moment equilibrium.

As stated above, two slopes were analyzed: 2.0H:1V for cut slopes and 2.5H:1V for fill slopes. These were based on the worst-case fill and cut slopes at Alta Mesa, which were located at turbines AM-T1 and AM-T7A, respectively. Other fill and cut slopes will be present on site but these two turbine locations were deemed to be representative of worst-case conditions, thus other turbine locations were not modeled explicitly.

The analysis results are shown in the table below. It can be seen that the static and pseudo-static limit equilibrium results meet the required factors of safety in addition to the saturated infinite slope case. The limit equilibrium outputs for this analysis are included in Attachment B.

Factor of Safety Summary for Alta Mesa Slope Stability Analyses

Turbine	Case	Strength	Envelope	Slope	Required Factor of Safety	Computed Factor of Safety
AM-T7A (Cut)	Static	Large Disp.	Linear	2.0H:1V	1.5	2.4
	Pseudo-static	Peak			1.1	1.7
	Infinite slope (sat.)	Large Disp.			1.5	2.3
AM-T1 (Fill)	Static	Large Disp.	Non-linear	2.5H:1V	1.5	2.9
	Pseudo-static	Peak			1.1	1.8
	Infinite slope (sat.)	Large Disp.			1.5	1.5

5. The consultant should be aware that there have been several previous geologic studies submitted for the project site, dating back to 1983. One of the studies was performed about a month after the 1986 Palm Springs Earthquake. Some of these studies have evaluated the geologic hazards of ridgetop spreading, debris flow, landslides, rock falls, and long-term bluff retreat and concluded that these hazards were documented onsite and should be anticipated in the future. The

consultant should review these previous reports and provide clarification of the potential for these geologic hazards to impact the project.

Barr response: The previous reports have been reviewed considering the possibility of ridgetop spreading, debris flow, landslides, rock falls, and long-term bluff retreat and their potential to impact the project. Based on two site visits and examination of aerial photographs, these phenomena may be present in some areas but they are not anticipated to adversely impact turbines.

Ridgetop Spreading

The three turbines where fault trenching occurred in January 2021 (AM-T1 [GEO-10], AM-T2A [GEO-02], AM-T3A [GEO-12]) did not encounter a fault within the proposed turbine footprint or within 20 feet of the edge of the foundation. Ridgetop spreading should manifest itself in a similar manner within a trench sidewall as a fault. Given that no faults or fault-like features were encountered in these trenches, it can be concluded that no ridgetop spreading has occurred at these locations in past earthquakes. At the turbines outside the A-P Zones where fault trenching did not occur, no evidence of ridgetop spreading was noted during the site visits nor during examination of aerial photographs.

Debris Flow

Debris flow was noted on site. An example of this, located in the bottom of the deep drainage east of AM-T2A, can be seen in the photo below. It should be noted that the debris flow locations are at the bottom of drainages and should not adversely impact turbines and ancillary structures, which are generally located on ridgetops.

Debris flow (looking southeast from AM-T2A area)

Landslides

Barr's report stated the following about landslides:

No evidence of slope failure as it relates to important infrastructure was noted during site reconnaissance.

The topography north of turbine AM-T3A, creating the north-facing slope along the south side of the deep east-west canyon associated with the Banning fault, exhibits hummocky features as shown in the photo below. This provides evidence of some historic slope instability. However, turbine AM-T3A is set back a sufficient distance from this potentially unstable slope.

Hummocky topography on slope south of east-west canyon (looking southwest)

Rockfall

No significant rockfall was observed during the two site visits, thus is it not considered a phenomenon that will adversely impact project infrastructure. It should be noted that project structures are located on ridgetops and are not likely to be susceptible to rockfall.

Long-Term Bluff Retreat

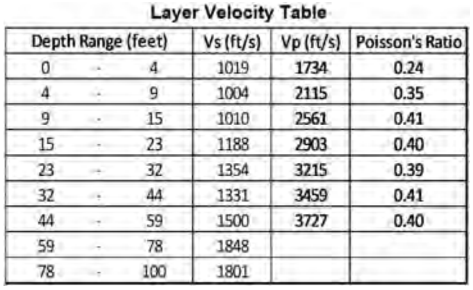
Many erosional surfaces are located at the heads of drainage courses on the alluvial materials south of the deep east-west canyon containing the Banning fault as shown in the photo below. These will be subject to long-term bluff retreat, but it is not anticipated to adversely impact project infrastructure during the design life of the facility.

Erosional surfaces at heads of drainages (looking east from AM-T2A)

6. Provide the estimated total and differential seismic settlement that can be anticipated.

Barr response: The shear wave velocities (V_s) measured on site were high such that total and differential seismic settlement is anticipated to be very small. However, seismic settlement was computed using the method proposed by Yi (2010) (Yi, F., 2010, "Procedure to Evaluate Liquefaction-Induced Settlement Based on Shear Wave Velocity", Proceedings: 9th U.S. National and 10th Canadian Conference on Earthquake Engineering (9USN/10CCEE), Toronto, Canada, July 25-29, 2010), which is based on the method proposed by Pradel (1998) (Pradel D., 1998). Procedure to evaluate earthquake-induced settlements in dry sandy soils, J. Geotech. & Geoenv. Engrg., ASCE, 124 (4), 364-368).

Using Multi-channel Analysis of Surface Waves (MASW) performed at the site, the recommended design shear wave velocity in the referenced geotechnical report prepared by Barr (2020) is 1,500 ft/s. Incorporating measured data from AM-T4A as representative of the alluvium on site, the following table shows the shear wave velocity profile used in the seismic settlement calculations.



Layer Velocity Table

Depth Range (feet)	Vs (ft/s)	Vp (ft/s)	Poisson's Ratio
0 - 4	1019	1734	0.24
4 - 9	1004	2115	0.35
9 - 15	1010	2561	0.41
15 - 23	1188	2903	0.40
23 - 32	1354	3215	0.39
32 - 44	1331	3459	0.41
44 - 59	1500	3727	0.40
59 - 78	1848		
78 - 100	1801		

Using these shear wave velocities and a PGA of 1.14g (at AM-T3A; closest turbine to Banning fault) for 2 percent chance of exceedance in 50 years, the resulting total seismic settlement was computed as 0.14 inches. The resulting differential settlement is anticipated to be 0.07 inches, which is typically taken as half the total settlement. This settlement is considered to be well within the tolerable range.

7. Provide a surface elevation for each of the boring logs.

Barr response: Surveyed surface elevations were not available at the time the boring logs were prepared in the referenced geotechnical report prepared by Barr. They have since been added to the boring logs and included in Attachment C.

Closure

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly licensed Certified Engineering Geologist under the laws of the State of California.

Jed Greenwood

JEDEDIAH D. GREENWOOD
No. 2558
CERTIFIED ENGINEERING GEOLOGIST

Exp. 6/30/2021

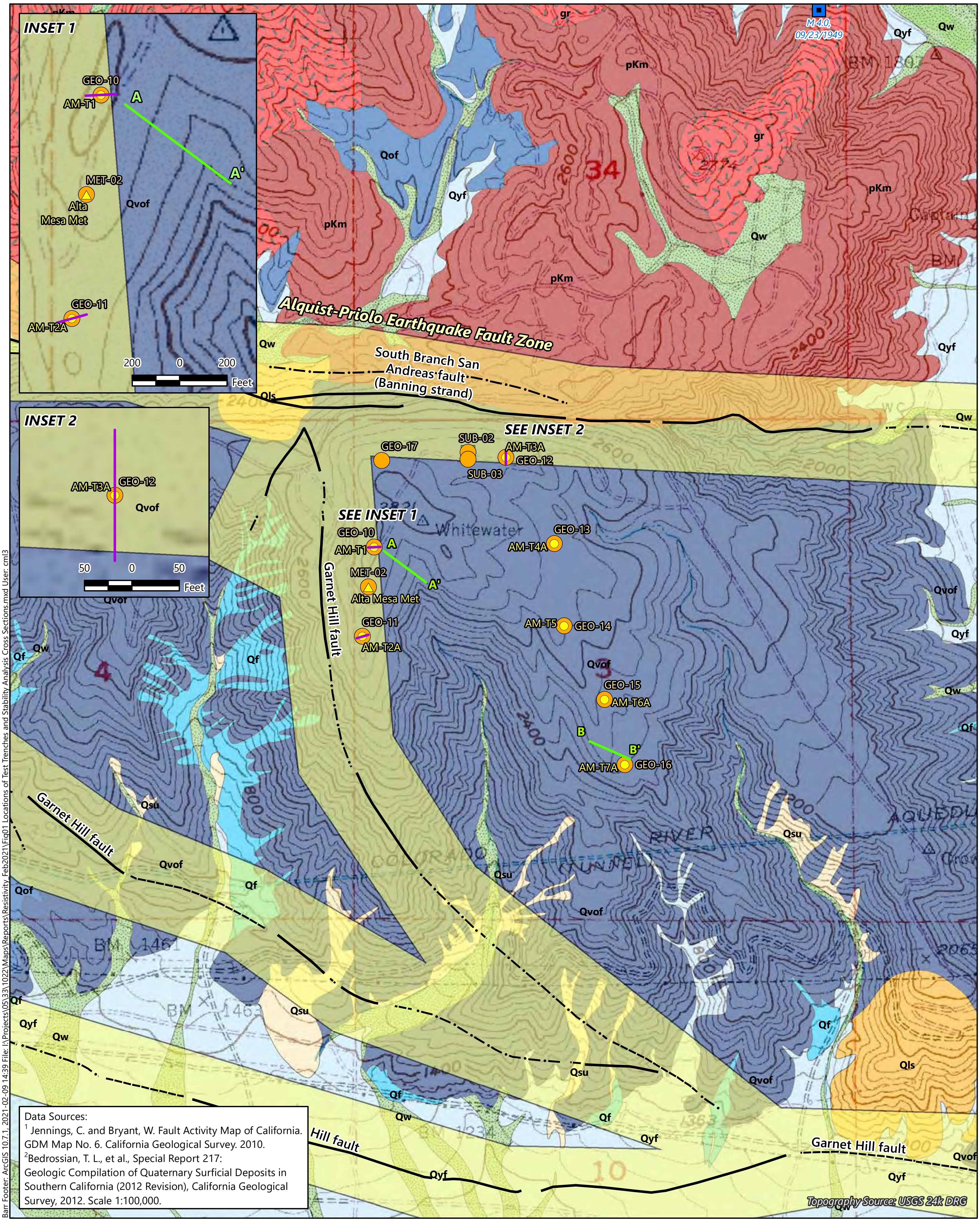
Jed Greenwood

Jedediah D. Greenwood
CEG #: 2558

February 9, 2021
Date

Attachments
Figure 1: Locations of Test Trenches and Stability Analysis Cross Sections
Attachment A: Trench logs
Attachment B: Limit equilibrium outputs
Attachment C: Boring logs with elevations

Figure 1: Locations of Test Trenches and Stability Analysis Cross Sections



Data Sources:
[1] Jennings, C. and Bryant, W. Fault Activity Map of California. GDM Map No. 6. California Geological Survey. 2010.
[2] Bedrossian, T. L., et al., Special Report 217: Geologic Compilation of Quaternary Surficial Deposits in Southern California (2012 Revision), California Geological Survey, 2012. Scale 1:100,000.

- ● Turbine Location (8/31/2020)
- ▲ Met Tower Location (8/31/2020)
- ● Geotechnical Boring Location
- 🟩 Substation Location
- ■ Earthquake Epicenter (>M 4.0, Date)
- — Test Trench
- — Slope Stability Analysis

Active Quaternary Faults[1]
- — Alquist-Priolo Earthquake Fault Zone
- -·- Fault, approximately located
- - - Fault, concealed
- ▭ Fault Zone

Surficial Geology[2]
- Qyf - Young Alluvial Fan Deposits
- Qf - Alluvial Fan Deposits
- Qof - Old Alluvial Fan Deposits
- Qvof - Very Old Alluvial Fan Deposits
- Qw - Alluvial Wash Deposits
- Qls - Landslide Deposits; may include debris flows and older landslides
- Qsu - Undifferentiated Surficial Deposits; includes colluvium, slope wash, talus deposits, and other surface deposits of all ages
- gr - Granitic and other intrusive crystalline rocks of all ages
- pKm - Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin

N

Feet
500 0 500

Meters
150 0 150

Figure 1

LOCATIONS OF TEST TRENCHES AND STABILITY ANALYSIS CROSS SECTIONS
Alta Mesa Wind Project
M.A. Mortenson Company
Riverside County, California

Barr Footer: ArcGIS 10.7.1, 2021-02-09 14:39 File: I:\Projects\05\33\1022\Maps\Reports\Resistivity_Feb2021\Fig01 Locations of Test Trenches and Stability Analysis Cross Sections.mxd User: cml3

Attachment A: Trench logs

Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T1	Elevation: 2792 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.943589°	Azimuth (left to right): 87 deg.
Date: 1/13/2021	Contractor: BL Wilson Excavating	Longitude: -116.666596°	Sheet: 1 of 2

GEOLOGIC DESCRIPTIONS

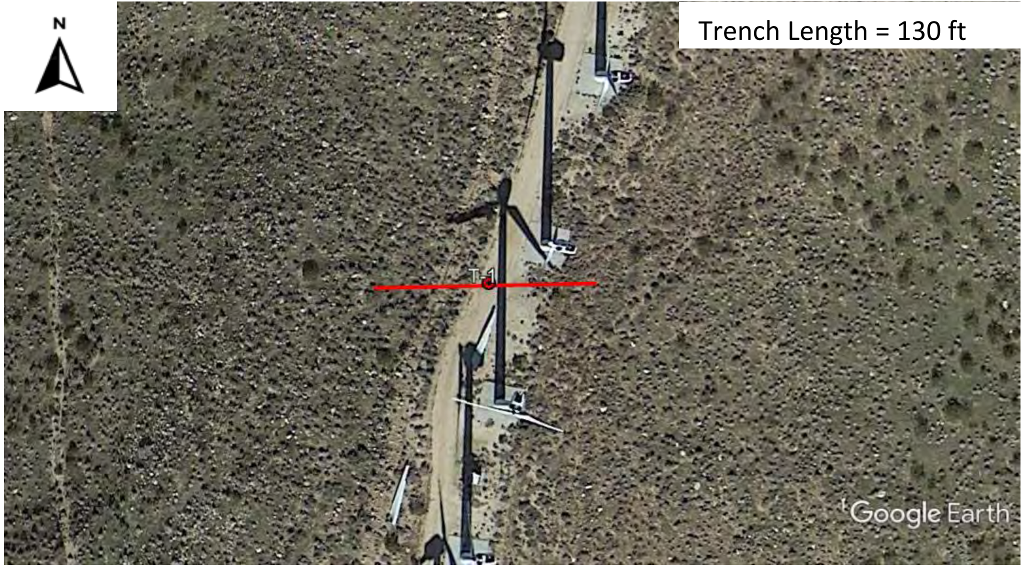
Material A: SILTY SAND (SM): fine to coarse grained; trace fine to medium gravel; tan; dry to moist; ranging from 1' to 2' in depth across length of trench; distinct lower contact

Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 24" long and 18" in diameter; reddish tan; dry to moist; partially to well cemented

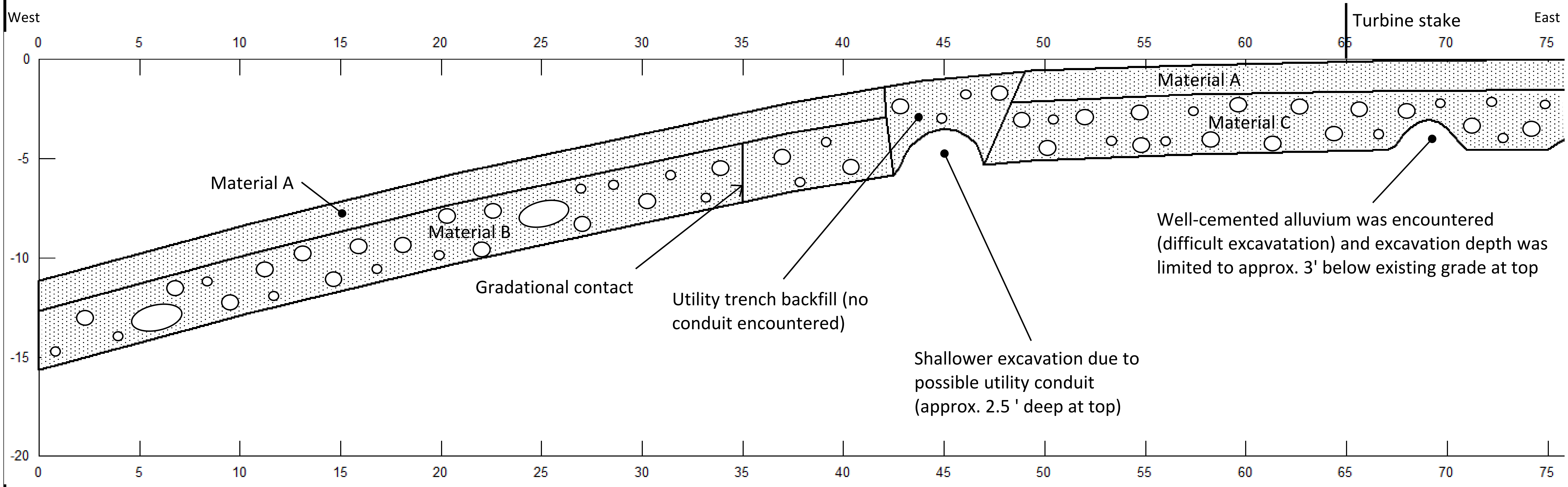
Material C: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles up to 12" in diameter; reddish tan; dry to moist; partially to well cemented

*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



GRAPHICAL REPRESENTATION	Wall: North	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Gradational contact

Utility trench backfill (no conduit encountered)

Shallower excavation due to possible utility conduit (approx. 2.5 ' deep at top)

Well-cemented alluvium was encountered (difficult excavatation) and excavation depth was limited to approx. 3' below existing grade at top

Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T1	Elevation: 2792 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.943589°	Azimuth (left to right): 87 deg.
Date: 1/13/2021	Contractor: BL Wilson Excavating	Longitude: -116.666596°	Sheet: 2 of 2

GEOLOGIC DESCRIPTIONS

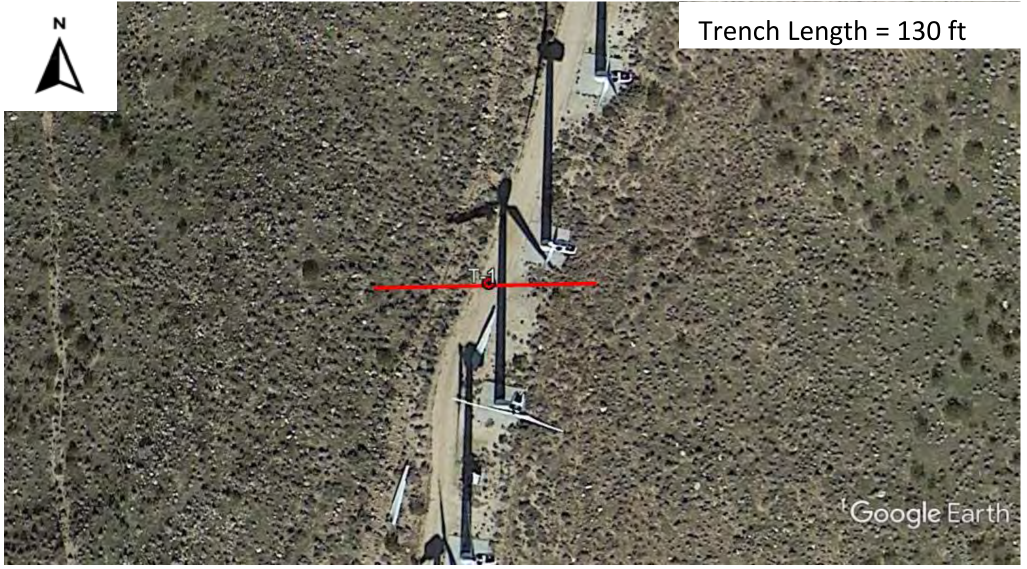
Material A: SILTY SAND (SM): fine to coarse grained; trace fine to medium gravel; tan; dry to moist; ranging from 1' to 2' in depth across length of trench; distinct lower contact

Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 24" long and 18" in diameter; reddish tan; dry to moist; partially to well cemented

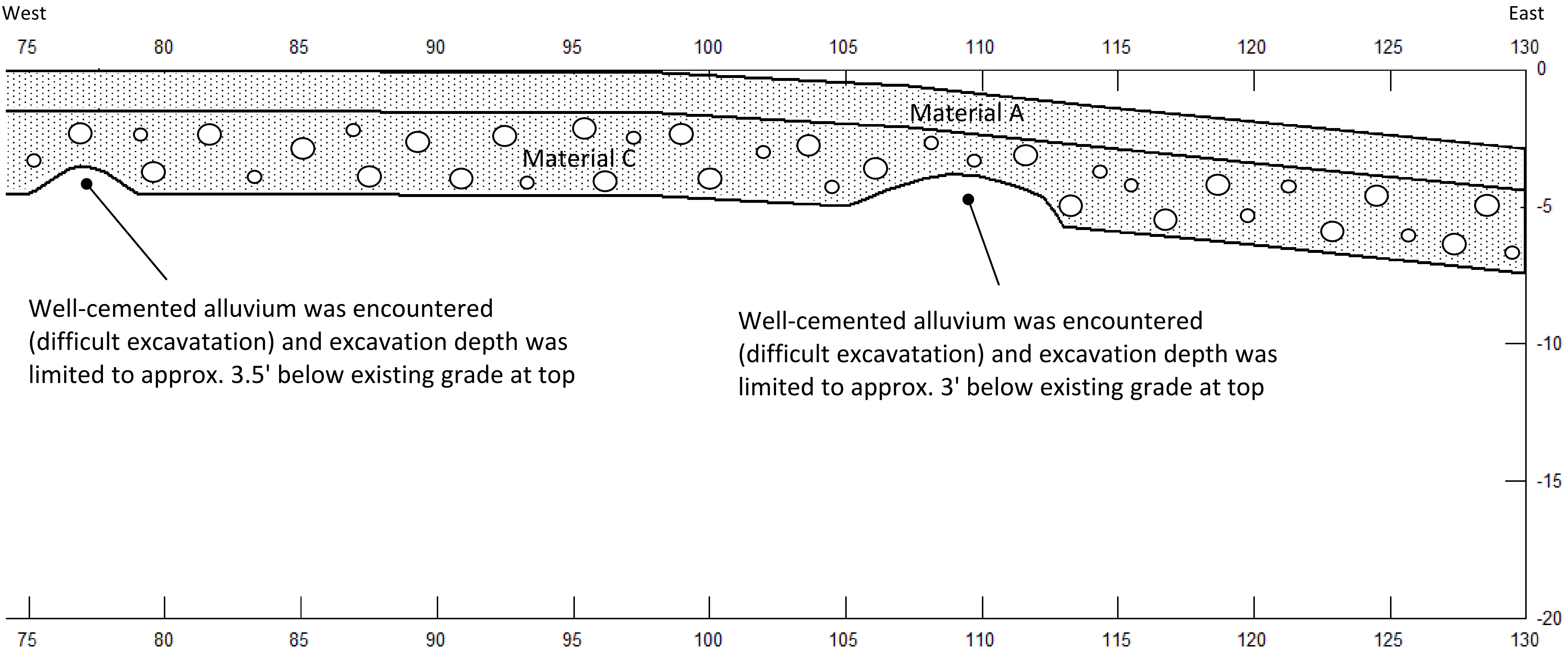
Material C: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles up to 12" in diameter; reddish tan; dry to moist; partially to well cemented

*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



GRAPHICAL REPRESENTATION	Wall: North	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Well-cemented alluvium was encountered (difficult excavatation) and excavation depth was limited to approx. 3.5' below existing grade at top

Well-cemented alluvium was encountered (difficult excavatation) and excavation depth was limited to approx. 3' below existing grade at top

Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T2A	Elevation: 2737 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.940998°	Azimuth (left to right): 75 deg.
Date: 1/13/2021	Contractor: BL Wilson Excavating	Longitude: -116.666932°	Sheet: 1 of 2

GEOLOGIC DESCRIPTIONS

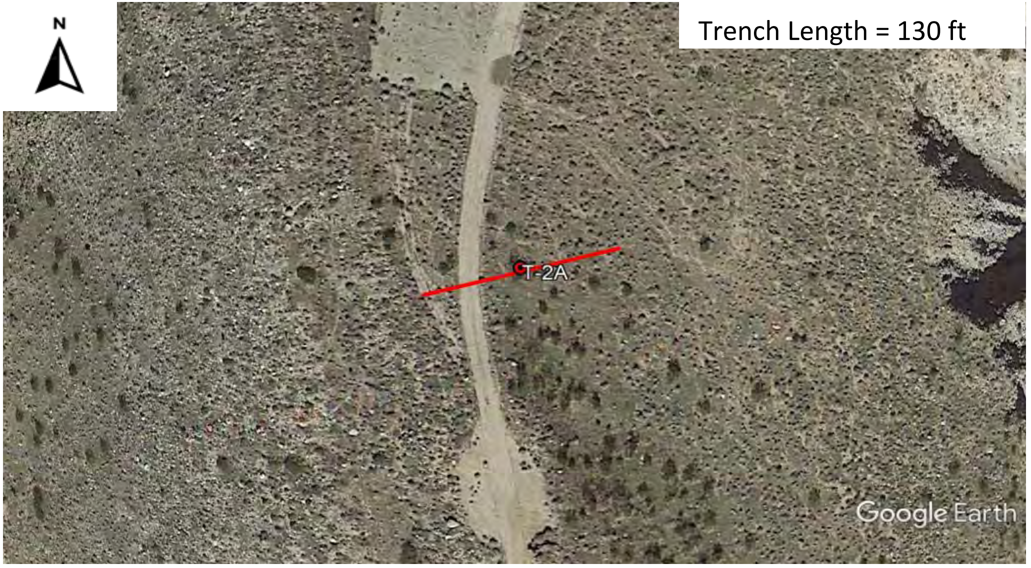
Material A: SILTY SAND (SM): fine to coarse grained; trace fine to medium gravel; tan; dry to moist; ranging from 1' to 2' in depth across length of trench; distinct lower contact

Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 6' long and 3' in diameter; reddish tan; dry to moist; partially to well cemented

Material C: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles up to 12" in diameter; reddish tan; dry to moist; partially to well cemented

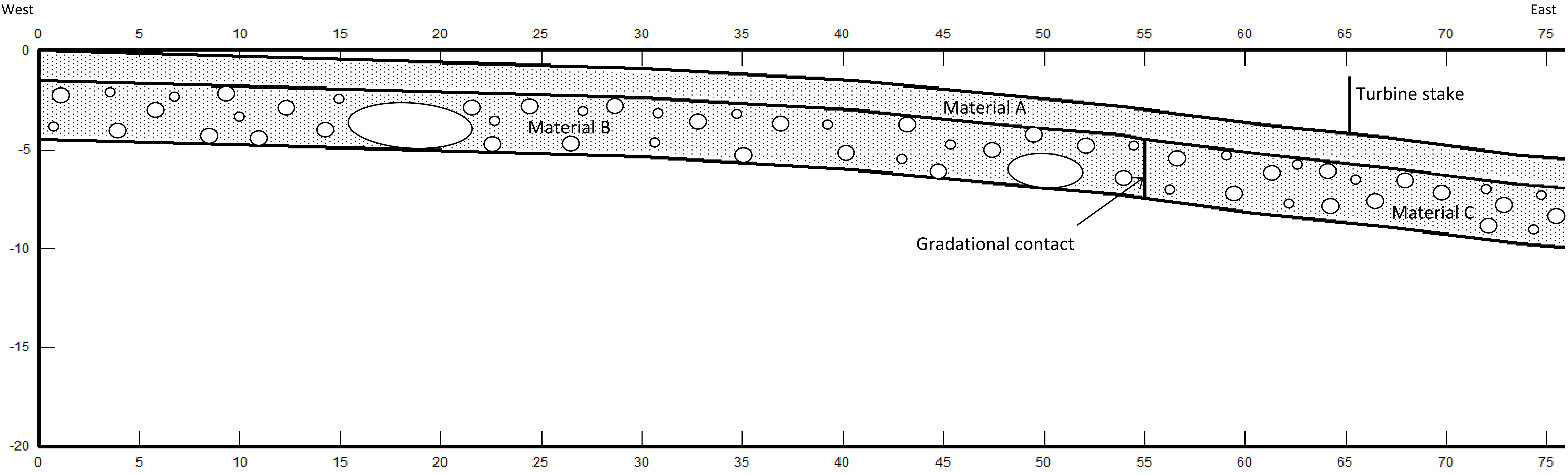
*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



Trench Length = 130 ft

GRAPHICAL REPRESENTATION	Wall: North	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T2A	Elevation: 2737 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.940998°	Azimuth (left to right): 75 deg.
Date: 1/13/2021	Contractor: BL Wilson Excavating	Longitude: -116.666932°	Sheet: 2 of 2

GEOLOGIC DESCRIPTIONS

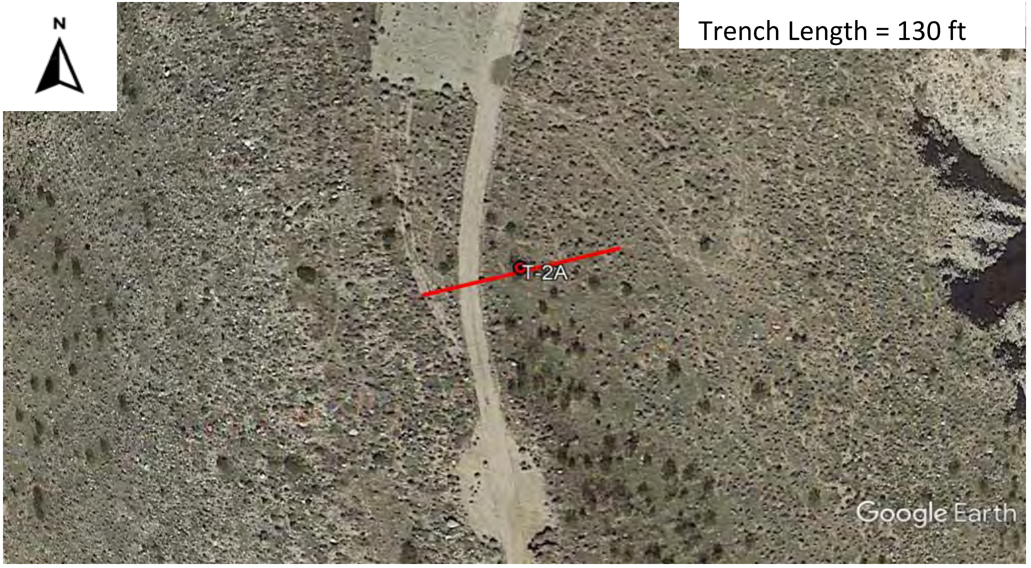
Material A: SILTY SAND (SM): fine to coarse grained; trace fine to medium gravel; tan; dry to moist; ranging from 1' to 2' in depth across length of trench; distinct lower contact

Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 6' long and 3' in diameter; reddish tan; dry to moist; partially to well cemented

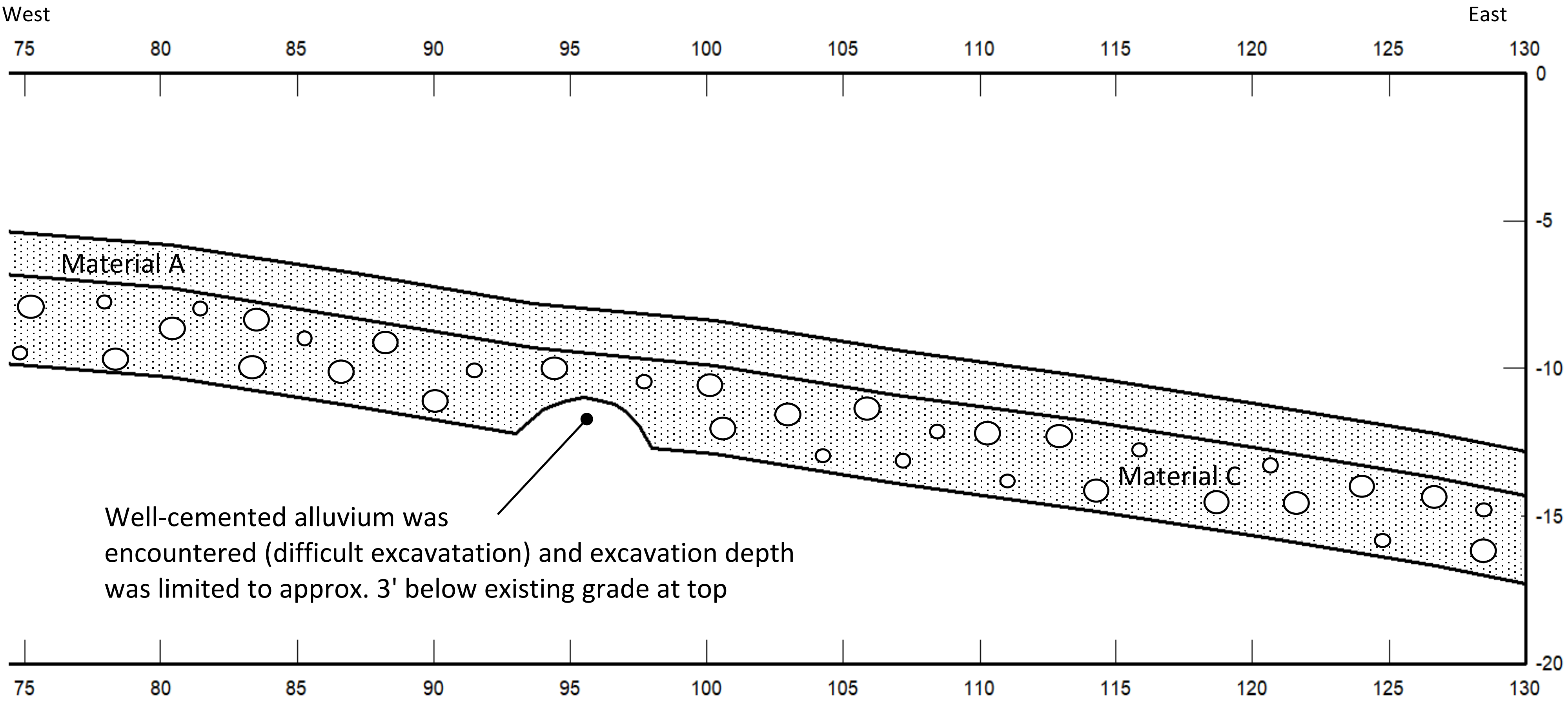
Material C: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles up to 12" in diameter; reddish tan; dry to moist; partially to well cemented

*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



GRAPHICAL REPRESENTATION	Wall: North	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Well-cemented alluvium was encountered (difficult excavation) and excavation depth was limited to approx. 3' below existing grade at top

Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T3A	Elevation: 2721 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.946160°	Azimuth (left to right): 180 deg.
Date: 1/14/2021	Contractor: BL Wilson Excavating	Longitude: -116.661947°	Sheet: 1 of 2

BARR

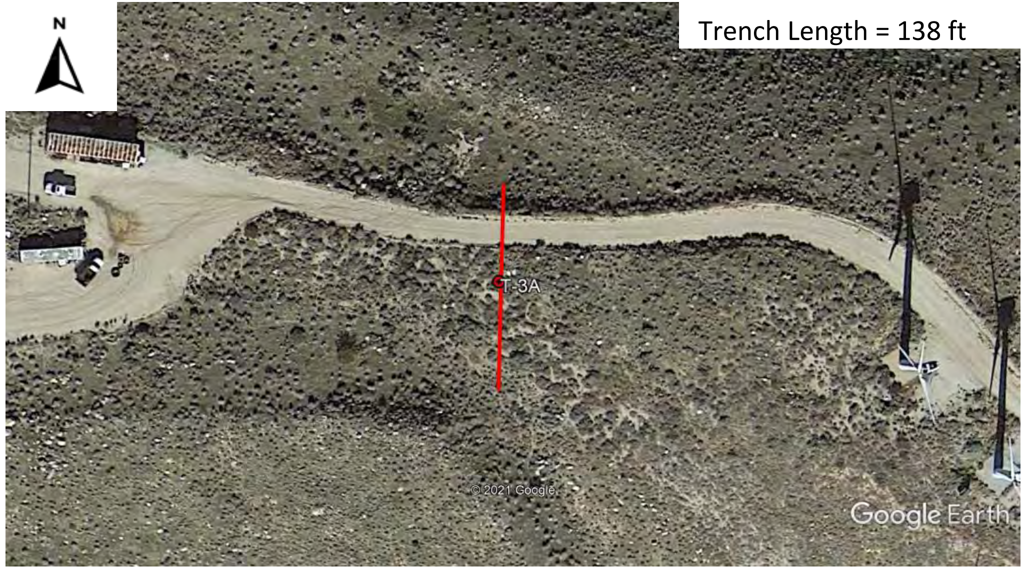
GEOLOGIC DESCRIPTIONS

Material A: SILTY SAND (SM): fine to coarse grained; trace fine to coarse gravel; tan; dry to moist; distinct lower contact

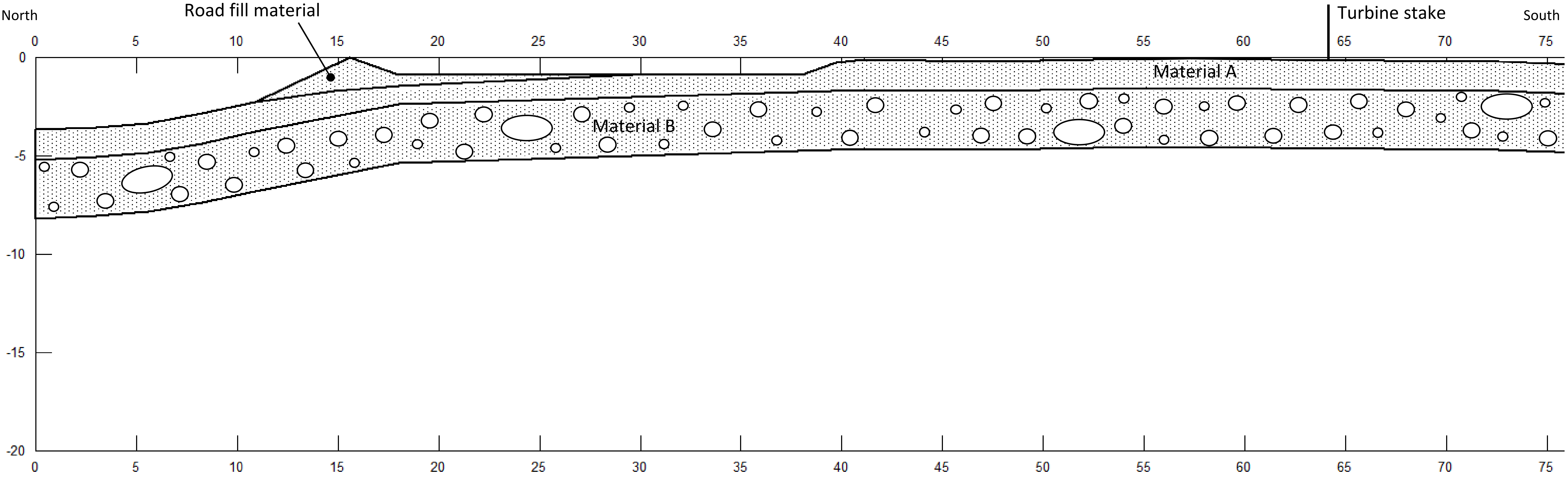
Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 30" long and 18" in diameter; reddish tan; dry to moist; partially to well cemented

*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



GRAPHICAL REPRESENTATION	Wall: East	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Project Name: Alta Mesa Wind Project	Logged By: Jed Greenwood, CEG	Location: Turbine AM-T3A	Elevation: 2721 ft AMSL
Project Number: 05331022	Equipment: New Holland B95	Latitude: 33.946160°	Azimuth (left to right): 180 deg.
Date: 1/14/2021	Contractor: BL Wilson Excavating	Longitude: -116.661947°	Sheet: 2 of 2

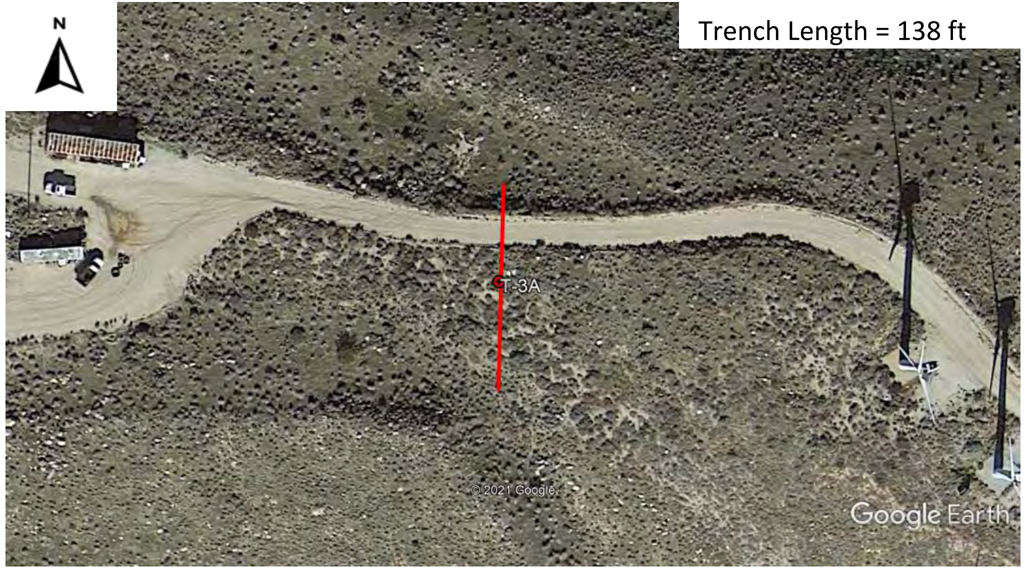
GEOLOGIC DESCRIPTIONS

Material A: SILTY SAND (SM): fine to coarse grained; trace fine to coarse gravel; tan; dry to moist; distinct lower contact

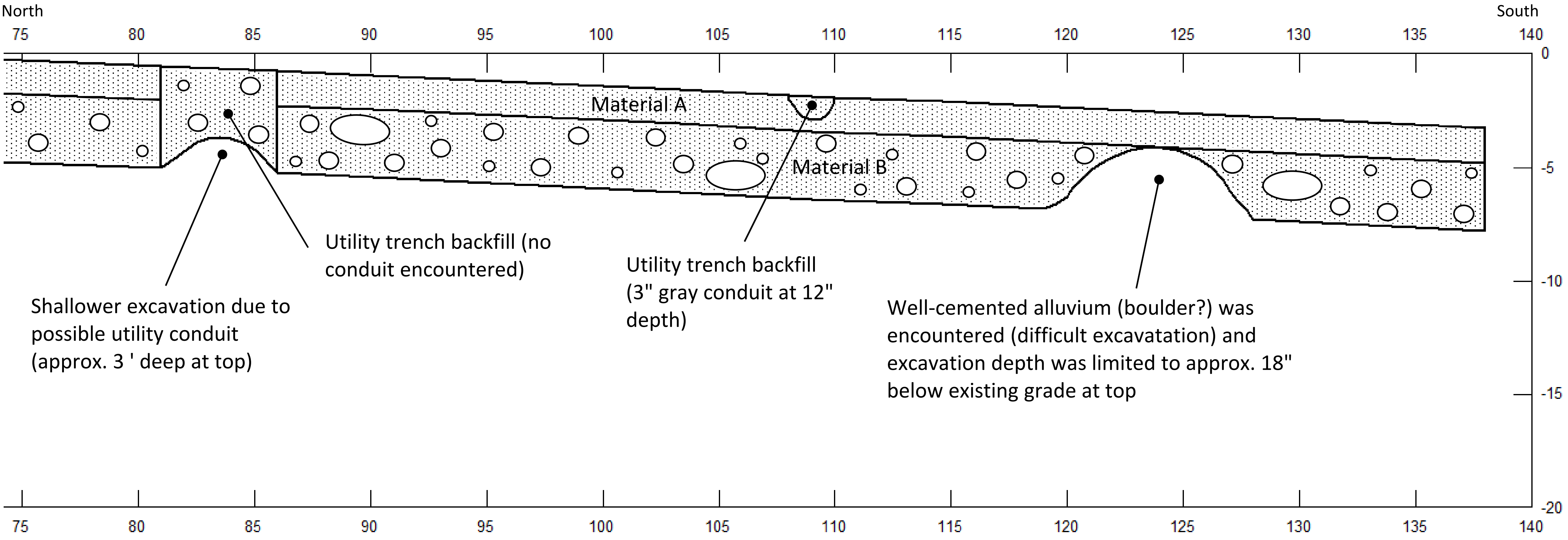
Material B: SAND WITH SILT (SP-SM): fine to coarse grained; with fine to coarse gravel; with cobbles and boulders up to 30" long and 18" in diameter; reddish tan; dry to moist; partially to well cemented

*NO EVIDENCE OF FAULTING IN TRENCH

TRENCH LOCATION



GRAPHICAL REPRESENTATION	Wall: East	Scale: 1"=5'	Units: feet; vertical axis is relative elevation



Shallower excavation due to possible utility conduit (approx. 3 ' deep at top)

Utility trench backfill (no conduit encountered)

Utility trench backfill (3" gray conduit at 12" depth)

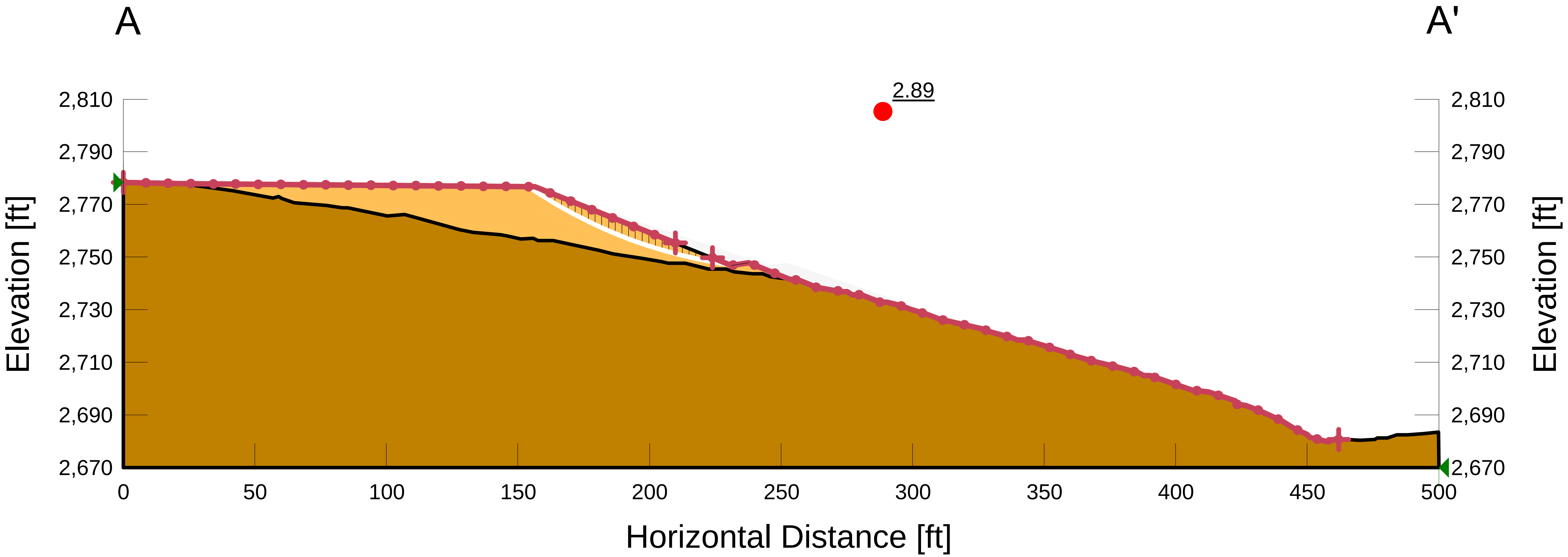
Well-cemented alluvium (boulder?) was encountered (difficult excavatation) and excavation depth was limited to approx. 18" below existing grade at top

Attachment B: Limit equilibrium outputs

Mesa-Alta Mesa Slope Stability Analysis
Turbine AM-T1 (Fill Slope)
1.2 Slope Stability, Static, ESSA, 2.5H:1V

FS: 2.89

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Strength Function
🟧	Compacted Alluvium (Large Disp.)	Shear/Normal Fn.	132.6			Compacted Alluvium, Large Disp. (GEO-11)
🟫	Native Alluvium (Large Disp.)	Mohr-Coulomb	132.6	330	36.4	



1.2 Slope Stability, Static, ESSA, 2.5H:1V

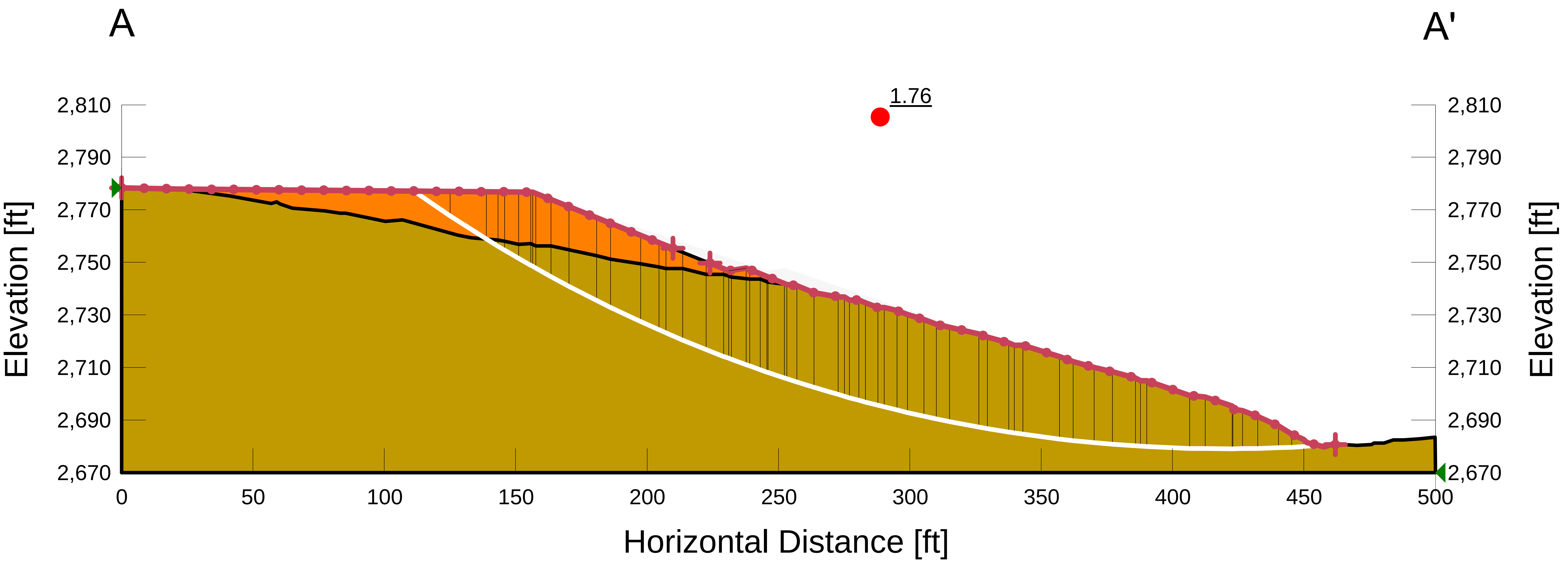
Mesa-AltaMesa_AM-T1.gsz

02/01/2021

Mesa-Alta Mesa Slope Stability Analysis
Turbine AM-T1 (Fill Slope)
2.2 Slope Stability, Pseudo-static, ESSA, 2.5H:1V

FS: 1.76

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Strength Function
🟧	Compacted Alluvium (Peak)	Shear/Normal Fn.	132.6			Compacted Alluvium, Peak (GEO-11)
🟨	Native Alluvium (Peak)	Mohr-Coulomb	132.6	500	40.9	



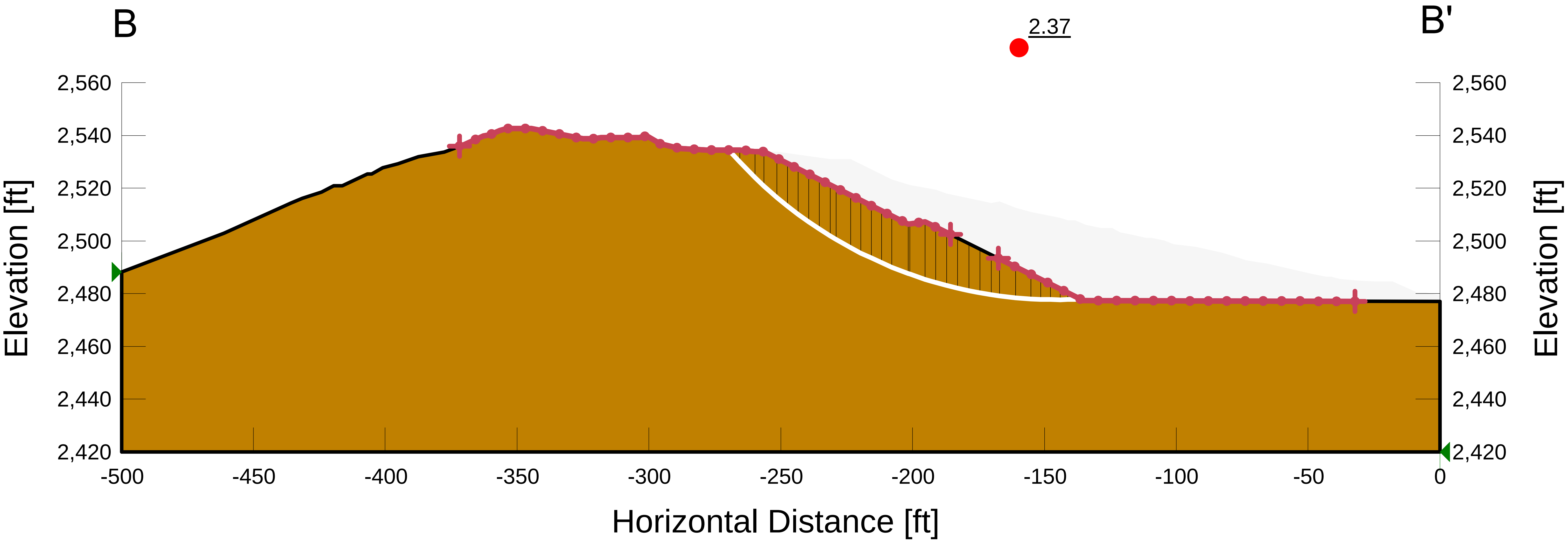
2.2 Slope Stability, Pseudo-static, ESSA, 2.5H:1V
Mesa-AltaMesa_AM-T1.gsz
02/01/2021

BARR

Mesa-Alta Mesa Slope Stability Analysis
Turbine AM-T7A (Cut Slope)
1.4 Slope Stability, Static, ESSA, 2.0H:1V

FS: 2.37

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
🟫	Native Alluvium (Large Disp.)	Mohr-Coulomb	132.6	330	36.4

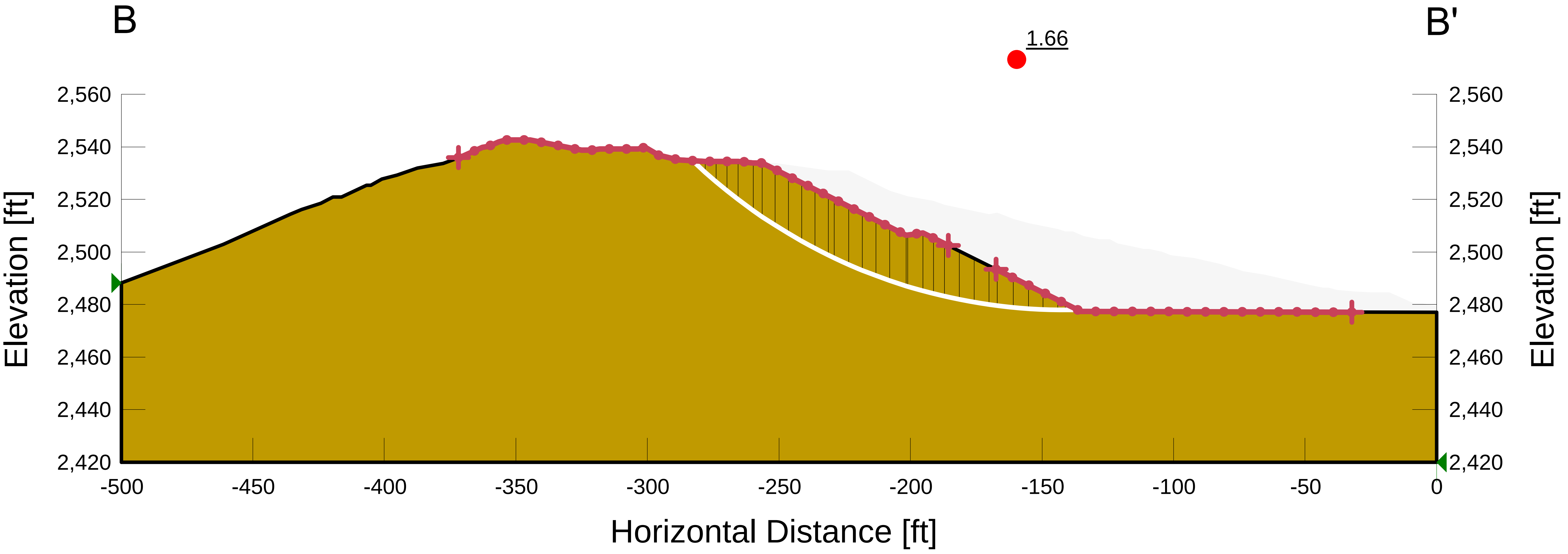


BARR	1.4 Slope Stability, Static, ESSA, 2.0H:1V
	Mesa-AltaMesa_AM-T7A.gsz
	02/01/2021

Mesa-Alta Mesa Slope Stability Analysis
Turbine AM-T7A (Cut Slope)
2.4 Slope Stability, Pseudo-static, ESSA, 2.0H:1V

FS: 1.66

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
🟨	Native Alluvium (Peak)	Mohr-Coulomb	132.6	500	40.9



2.4 Slope Stability, Pseudo-static, ESSA, 2.0H:1V
Mesa-AltaMesa_AM-T7A.gsz
02/01/2021

Attachment C: Boring logs with elevations

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Telephone: 952-832-2600

LOG OF BORING GEO-10

Associated Boring #: AM-T1

Sheet 1 of 1

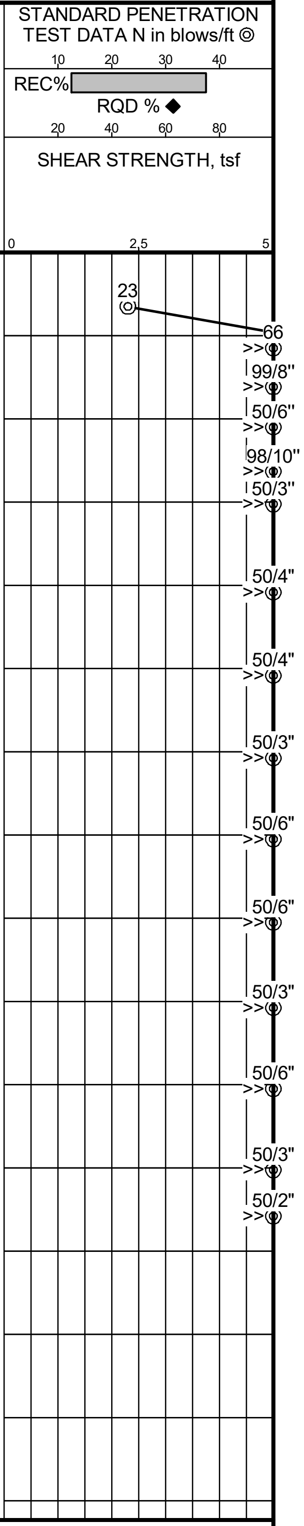
Project:	Alta Mesa Wind Project	Surface Elevation:	2793.1 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94358° Long: -116.66653°	Completion Depth:	58.3 ft
Datum:	NAD83		

Surface Elev.: 2793.1 ft

MATERIAL DESCRIPTION	Bottom Elevation	Bottom Depth
TOPSOIL (SP-SM): fine to medium grained; reddish brown; dry to moist.	2792.7 ft	0.4ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; reddish brown; dry to moist; medium dense.	2788.1 ft	5.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; light brown to gray; dry to moist; very dense.	2780.6 ft	12.5ft
POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; very dense.	2768.1 ft	25.0ft
SILTY SAND (SM): very fine to fine grained; light brown; dry to moist; very dense.	2743.1 ft	50.0ft
POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; very dense.	2734.8 ft	58.3ft

Bottom of Boring at 58.3 feet

Sample No.	% Recovery	SPT, N value or RQD %
1	100	23
2	100	66
3	100	99/8"
4	100	50/6"
5	62	98/10"
6	100	50/3"
7	100	50/4"
8	100	50/4"
9	100	50/3"
10	100	50/6"
11	100	50/6"
12	100	50/3"
13	100	50/6"
14	100	50/3"
15	100	50/2"



Date Boring Started:	9/10/20 7:30 am
Date Boring Completed:	9/10/20 11:00 am
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 77°F, Sunny

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LOG OF BORING GEO-11

Associated Boring #: AM-T2A

Sheet 1 of 1

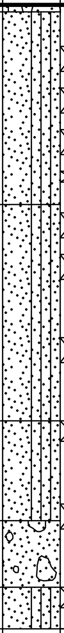
Project:	Alta Mesa Wind Project	Surface Elevation:	2737.9 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94098° Long: -116.66694°	Completion Depth:	37.5 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

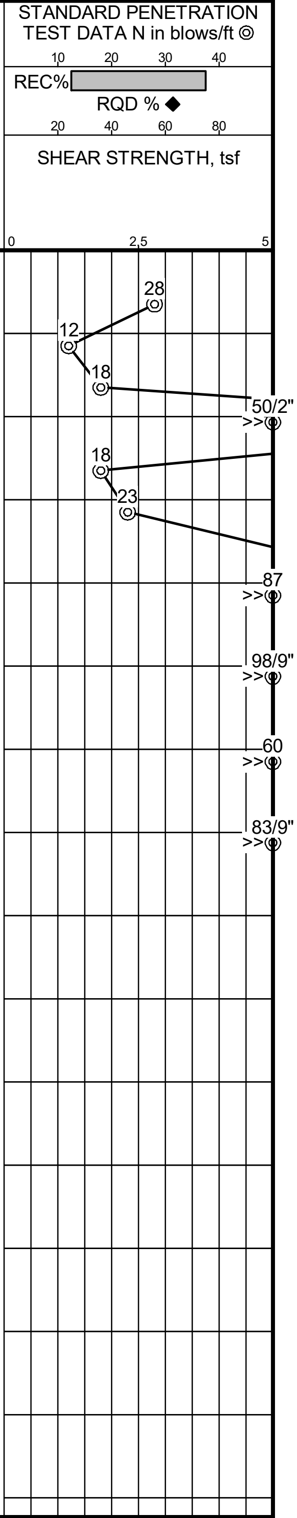
Surface Elev.: 2737.9 ft

Elevation, feet	Material Description	Depth
2737.5 ft	TOPSOIL (SP): fine to medium grained; brown to light brown; dry to moist.	0.4ft
2725.9 ft	POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; light brown; dry to moist; medium dense to very dense. 5': increase in grain size.	12.0ft
2712.9 ft	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): fine to coarse grained; brown to gray; dry to moist; medium dense to very dense; with gravel.	25.0ft
2706.9 ft	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown to gray; dry to moist; very dense.	31.0ft
2702.9 ft	POORLY GRADED SAND WITH GRAVEL (SP): fine to coarse grained; gray; dry to moist; very dense.	35.0ft
2700.4 ft	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; very dense.	37.5ft

Bottom of Boring at 37.5 feet



Sample No.	% Recovery	SPT, N value or RQD %
1	100	28
2	100	12
3	45	18
4	100	50/ 2"
5	17	18
6	100	23
7	83	87
8	96	98/ 9"
9	100	60
10	80	83/ 9"
11	100	REF



		Water Levels (ft)
Date Boring Started:	9/9/20 8:00 am	▼ End of Drilling Dry
Date Boring Completed:	9/9/20 11:45 am	▽ At Time of Drilling Dry
Logged By:	KSB	
Drilling Contractor:	Cascade	
Drill Rig:	CME	

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 80°F, Sunny

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LOG OF BORING GEO-12

Associated Boring #: AM-T3A

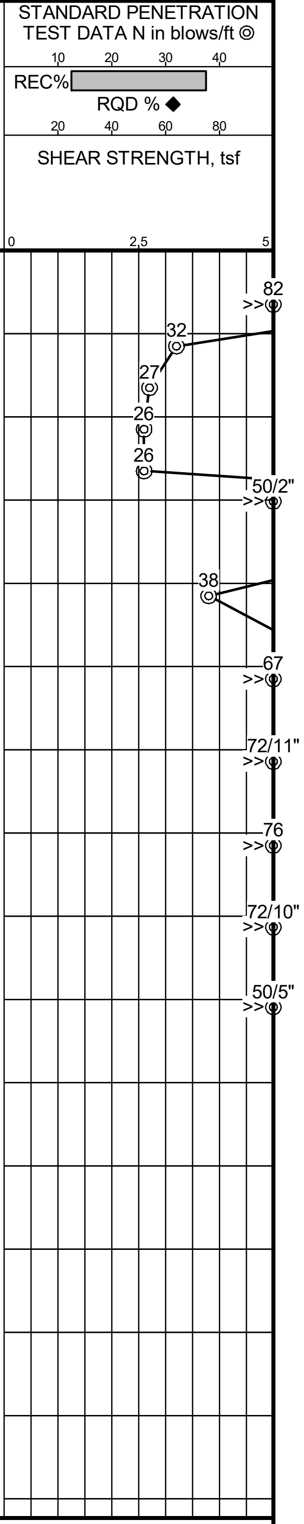
Sheet 1 of 1

Project: Alta Mesa Wind Project
Job No.: 05331021.00
Location: Riverside County, California
Coordinates: Lat: 33.94616° Long: -116.66194°
Datum: NAD83

Surface Elevation: 2723.7 ft
Drilling Method: HSA
Sampling Method: SS
Completion Depth: 50.0 ft

Surface Elev.: 2723.7 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION		Sample No.	% Recovery	SPT, N value or RQD %
	0	TOPSOIL (SP): fine to medium grained; brown; dry to moist. 2723.3 ft	0.4ft			
2720		POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; reddish brown; dry to moist; dense to very dense.		1	100	82
	5	5': trace gravel.		2	100	32
2715		2716.2 ft	7.5ft	3	100	27
	10	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown to gray; dry to moist; medium dense.		4	100	26
2710		2708.7 ft		5	100	26
	15	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; very dense.	15.0ft	6	47	50/ 2"
2705		2703.7 ft				
	20	SILTY SAND (SM): very fine to fine grained; brown to gray; dry to moist; dense.	20.0ft	7	22	38
2700		2698.7 ft				
	25	POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; brown to gray; dry to moist; very dense.	25.0ft	8	53	67
2695						
	30	30': color change to light brown.		9	70	72/ 11"
2690						
	35	35': trace gravel.		10	33	76
2685		2683.7 ft				
	40	POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; brown; dry to moist; very dense.	40.0ft	11	75	72/ 10"
2680		42.5': trace gravel.				
	45			12	98	50/ 5"
2675		2673.7 ft				
	50	Bottom of Boring at 50.0 feet	50.0ft	13	100	REF



Date Boring Started: 9/11/20 11:00 am
Date Boring Completed: 9/11/20 4:00 pm
Logged By: KSB
Drilling Contractor: Cascade
Drill Rig: CME

Water Levels (ft)
End of Drilling: Dry
At Time of Drilling: Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 90°F, Sunny

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LOG OF BORING GEO-13

Associated Boring #: AM-T4A

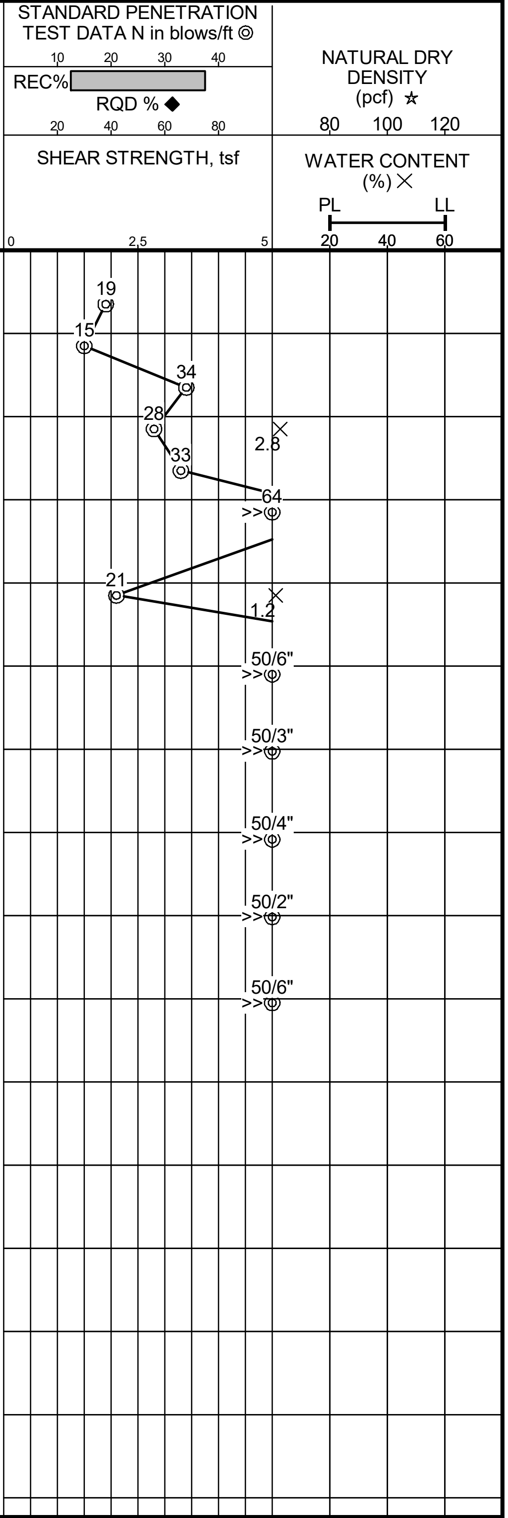
Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2648.9 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94365° Long: -116.66027°	Completion Depth:	50.0 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2648.9 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION		Sample No.	% Recovery	SPT, N value or RQD %
	0	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; reddish brown; dry to moist; medium dense.		1	100	19
2645	5			2	89	15
		2641.9 ft	7.0ft			
2640		POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; brown; dry to moist; medium dense to very dense; no cementation; trace fine gravel. 10': fine to medium grained.		3	100	34
	10			4	83	28
2635				5	100	33
	15			6	100	64
2630	20			7	100	21
		2625.9 ft	23.0ft			
2625	25	SILTY SAND (SM): very fine to fine grained; light brown; dry to moist; very dense; with gravel; no cementation. 25': fine gravel in split spoon.		8	100	50/ 6"
2620	30	31' to 33': moderate cementation.		9	68	50/ 3"
2615	35	35': fine to medium grained.		10	100	50/ 4"
2610	40			11	100	50/ 2"
2605	45			12	16	50/ 6"
2600		2598.9 ft				
	50	Bottom of Boring at 50.0 feet	50.0ft	13	100	REF



		Water Levels (ft)
Date Boring Started:	9/16/20 3:45 pm	End of Drilling Dry
Date Boring Completed:	9/17/20 9:45 am	At Time of Drilling Dry
Logged By:	AJF3	
Drilling Contractor:	Cascade	
Drill Rig:	CME	

Remarks: Boring offset approximately 35 feet south-southeast of surveyed location. Elevation data provided by Westwood on September 3, 2020.

Weather: 95°F, Sunny

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LOG OF BORING GEO-14

Associated Boring #: AM-T5

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2636.3 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94127° Long: -116.65993°	Completion Depth:	35.0 ft
Datum:	NAD83		

Surface Elev.: 2636.3 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎
2636.3	0	FILL (SP-SM): fine grained; reddish brown; dry to moist; very dense; no cementation.				
			1	83	66	66 >>◎
			2	74	50/ 5"	50/5" >>◎
2628.3 ft	8.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense; weak to moderate cementation.	3	50	50/ 6"	50/6" >>◎
			4	94	50/ 3"	50/3" >>◎
			5	100	91/ 11"	91/11" >>◎
			6	100	75	75 >>◎× 2.8
2618.3 ft	18.0ft	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): medium grained; light brown; dry to moist; very dense. 20': fine gravel in split spoon.				
			7	92	50/ 5"	50/5" >>◎
			8	90	50/ 4"	50/4" >>◎
			9	63	50/ 5"	50/5" >>◎
2601.3 ft			10	33	94/ 12"	94/12" >>◎
	35.0ft	Bottom of Boring at 35.0 feet				

Date Boring Started:	9/17/20 11:00 am
Date Boring Completed:	9/17/20 5:00 pm
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
End of Drilling Dry
At Time of Drilling Dry

Remarks: Boring offset approximately 25 feet south of surveyed location. Elevation data provided by Westwood on September 3, 2020.

Weather: 100°F, Sunny

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LOG OF BORING GEO-15

Associated Boring #: AM-T6A
Sheet 1 of 1

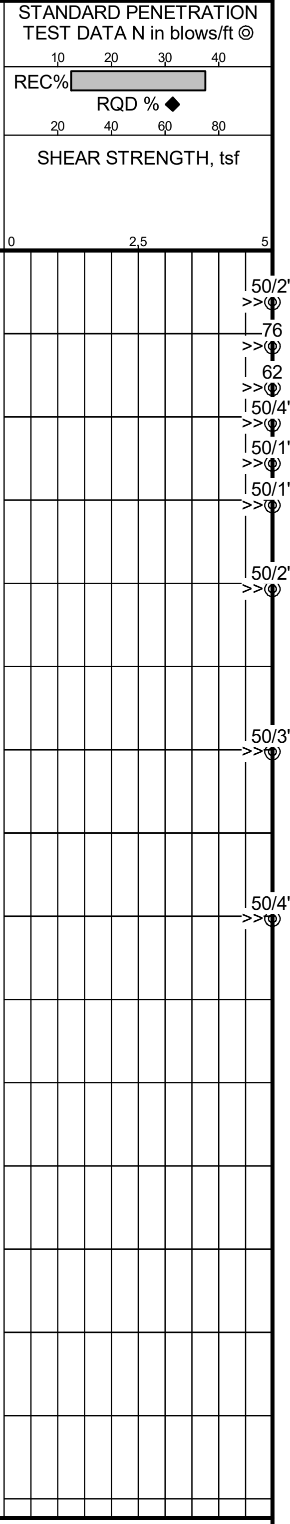
Project:	Alta Mesa Wind Project	Surface Elevation:	2556.1 ft
Job No.:	05331021.00	Drilling Method:	HSA / MRO
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.93914° Long: -116.65853°	Completion Depth:	50.0 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2556.1 ft

Elevation, feet	Depth, feet	Material Description	Depth
2556.1	0	FILL (SP-SM): fine to medium grained; brown; dry to moist.	
2555.1 ft		SILTY SAND (SM): fine to medium grained; reddish brown; dry to moist; very dense; trace gravel; weak cementation.	1.0ft
2549.1 ft		SILTY SAND (SM): very fine to fine grained; reddish brown; dry to moist; very dense; no cementation.	7.0ft
2546.6 ft		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): medium grained; dry to moist; very dense; weak cementation. 10 to 14': medium coarse grained; trace to with gravel.	9.5ft
2534.1 ft		POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; white; dry to moist; very dense; moderate cementation. 25': switch to mud rotary.	22.0ft
2506.1 ft	50	Bottom of Boring at 50.0 feet	50.0ft

Sample No.	% Recovery	SPT, N value or RQD %
1	90	50/ 2"
2	100	76
3	100	62
4	84	50/ 4"
5	83	50/ 1"
6	97	50/ 1"
7	100	50/ 2"
8	0	REF
9	40	50/ 3"
10	0	REF
11	67	50/ 4"
12	0	REF
13	0	REF



Date Boring Started:	9/15/20 12:40 pm
Date Boring Completed:	9/16/20 11:16 am
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
End of Drilling Dry
At Time of Drilling Dry

Remarks: Boring offset approximately 50 feet south of surveyed location. Elevation data provided by Westwood on September 3, 2020.

Weather: 100°F, Sunny

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LOG OF BORING GEO-16

Associated Boring #: AM-T7A

Sheet 1 of 1

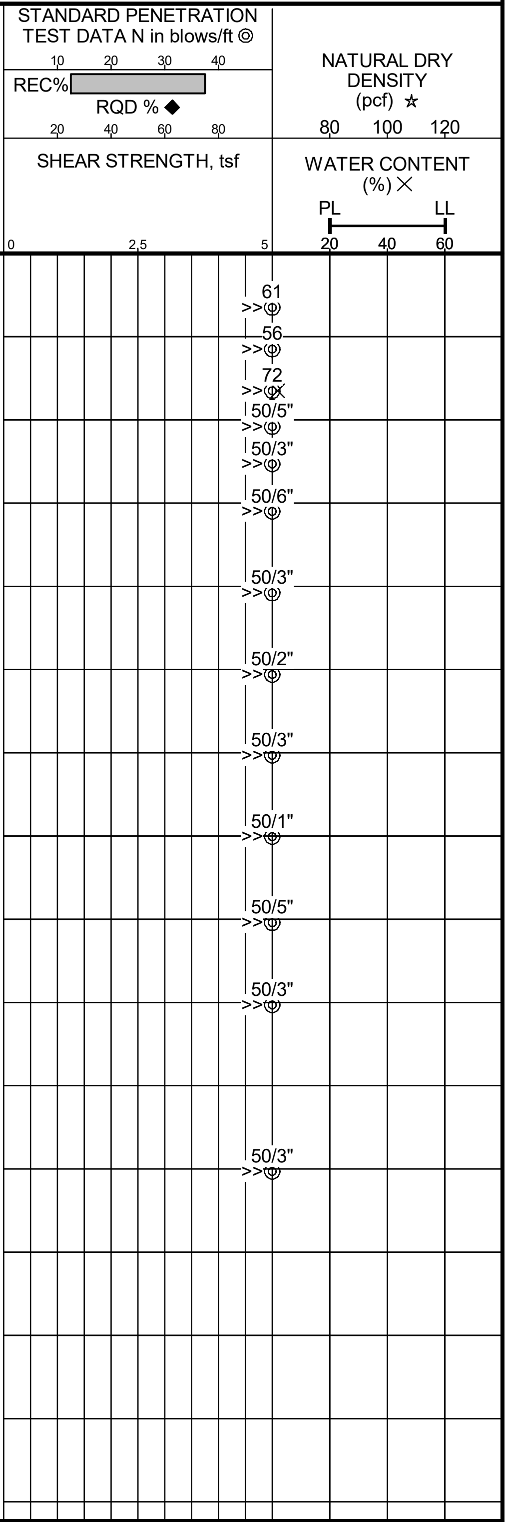
Project:	Alta Mesa Wind Project	Surface Elevation:	2487.5 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.93725° Long: -116.65784°	Completion Depth:	55.3 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2487.5 ft

Depth / Elevation	Material Description
0 – 1.0ft (2486.5 ft)	FILL (SP-SM): fine to medium grained; light brown; dry to moist.
1.0 – 9.5ft (2478.0 ft)	SILTY SAND (SM): fine grained; reddish brown; dry to moist; very dense; no cementation.
9.5 – 55.3ft (2432.2 ft)	SILTY SAND (SM): fine grained; light brown; dry to moist; very dense; weak cementation. 20': trace gravel.
55.3ft	Bottom of Boring at 55.3 feet

Sample No.	% Recovery	SPT, N value or RQD %
1	89	61
2	100	56
3	100	72
4	71	50/ 5"
5	83	50/ 3"
6	58	50/ 6"
7	63	50/ 3"
8	83	50/ 2"
9	57	50/ 3"
10	0	50/ 1"
11	0	50/ 5"
12	83	50/ 3"
13	0	REF
14	83	50/ 3"



Date Boring Started:	9/15/20
Date Boring Completed:	9/15/20 10:15 am
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
End of Drilling Dry
At Time of Drilling Dry

Remarks: Elevation data provided by Westwood on September 3, 2020.

Weather: 90°F, Sunny

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LOG OF BORING GEO-17

Associated Boring #: AM-T13A

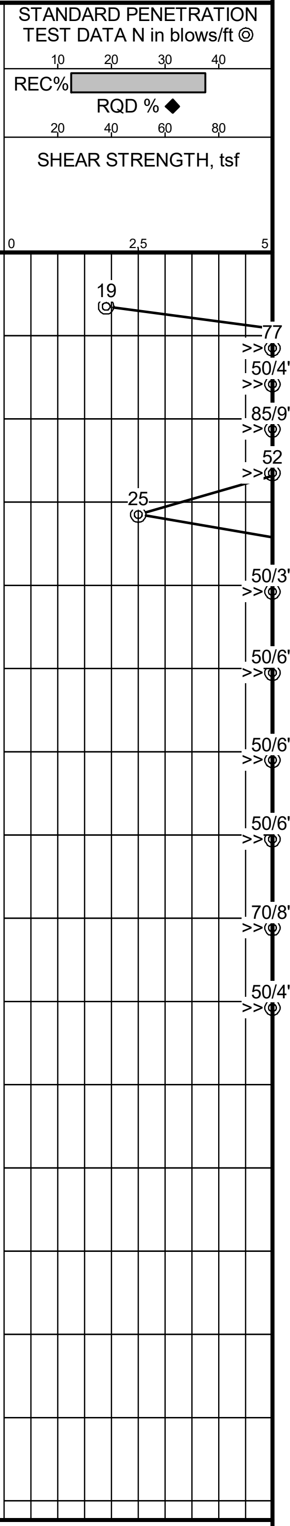
Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2761.1 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94608° Long: -116.66625°	Completion Depth:	50.0 ft
Datum:	NAD83		

Surface Elev.: 2761.1 ft

MATERIAL DESCRIPTION	
TOPSOIL (SM): brown; dry to moist. 2760.8 ft	0.3ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; reddish brown; dry to moist; medium dense; with gravel. 2756.1 ft	5.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine to coarse grained; gray; dry to moist; very dense; with gravel. 2754.1 ft	7.0ft
POORLY GRADED SAND (SP): fine to medium grained; brown; dry to moist; very dense. 2751.1 ft	10.0ft
POORLY GRADED SAND (SP): very fine to fine grained; light brown; dry to moist; very dense; trace silt. 2746.1 ft	15.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; brown; dry to moist; medium dense. 2741.1 ft	20.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray; dry to moist; very dense. 2731.1 ft	
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray to brown; dry to moist; very dense. 2726.1 ft	30.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense. 2721.1 ft	35.0ft
POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray to brown; dry to moist; very dense. 2711.1 ft	40.0ft
Bottom of Boring at 50.0 feet	50.0ft

Sample No.	% Recovery	SPT, N value or RQD %
1	33	19
2	67	77
3	100	50/ 4"
4	80	85/ 9"
5	100	52
6	100	25
7	67	50/ 3"
8	0	50/ 6"
9	100	50/ 6"
10	100	50/ 6"
11	57	70/ 8"
12	67	50/ 4"
13	100	REF



Date Boring Started:	9/10/20 1:00 pm	Water Levels (ft)	Remarks: Elevation data provided by Westwood on September 3, 2020.
Date Boring Completed:	9/11/20 10:30 am	▼ End of Drilling Dry	
Logged By:	KSB	▽ At Time of Drilling Dry	
Drilling Contractor:	Cascade		
Drill Rig:	CME		Weather: 98°F, Sunny

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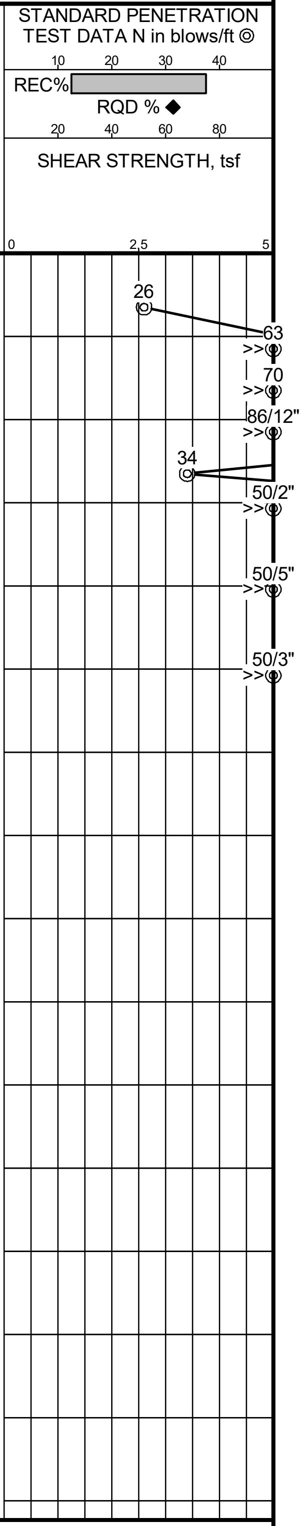
LOG OF BORING MET-02

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2667.0 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94242° Long: -116.66673°	Completion Depth:	25.8 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 2667.0 ft				
2666.6 ft	0.4ft	TOPSOIL (SM): brown; dry to moist.				
2662.0 ft	5.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; reddish brown; dry to moist; medium dense.	☒	1	100	26
			☒	2	100	63
2652.0 ft	15.0ft	SILTY SAND (SM): fine to medium grained; light brown; dry to moist; very dense.	☒	3	100	70
			☒	4	100	86/ 12"
			☒	5	100	34
2647.0 ft	20.0ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense.	☒	6	100	50/ 2"
2641.2 ft	25.8ft	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; light brown; dry to moist; very dense.	☒	7	100	50/ 5"
			☒	8	100	50/ 3"
		Bottom of Boring at 25.8 feet				

Elevation, feet: 2665, 2660, 2655, 2650, 2645
Depth, feet: 0, 5, 10, 15, 20, 25



Date Boring Started:	9/9/20 12:30 pm
Date Boring Completed:	9/9/20 2:30 pm
Logged By:	KSB
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
End of Drilling Dry
At Time of Drilling Dry

Remarks: Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).

Weather: 88°F, Sunny

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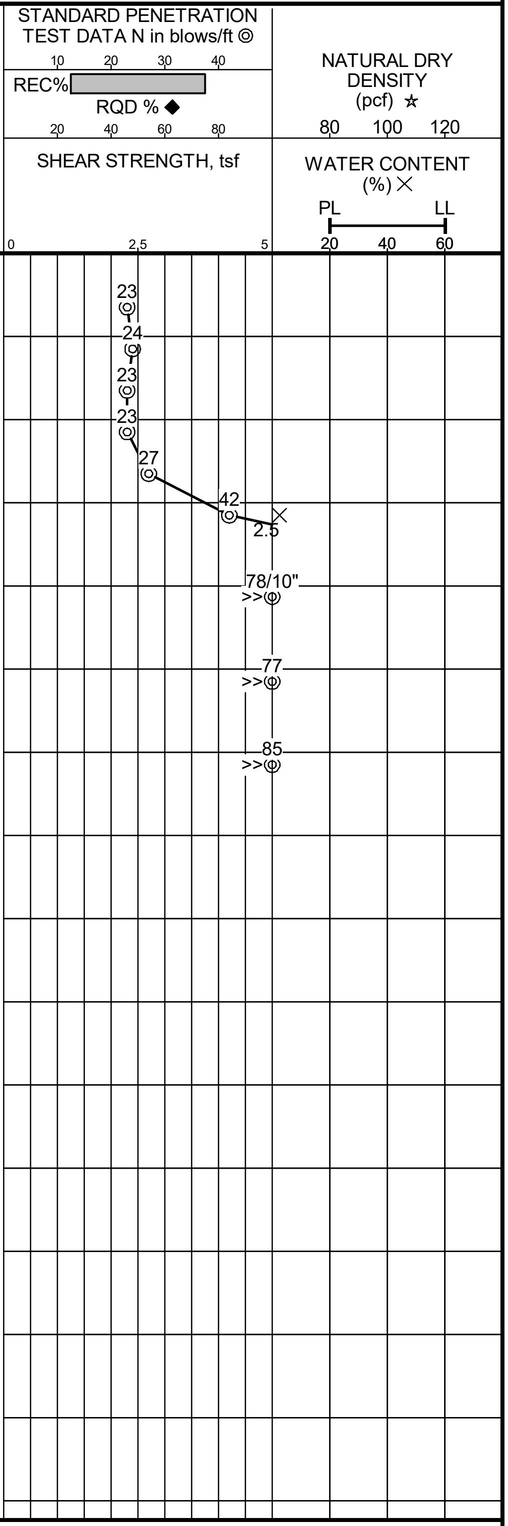
Telephone: 952-832-2600

LOG OF BORING SUB-02

Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2628.0 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94631° Long: -116.66325°	Completion Depth:	31.5 ft
Datum:	NAD83		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION Surface Elev.: 2628.0 ft	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	SILTY SAND (SM): fine to medium grained; light brown; dry to moist; medium dense; no cementation.				
2625			☒	1	83	23
	5	4': increasing fines content.	☒	2	100	24
2620		7.5': trace gravel; color change to light brown and gray.	☒	3	100	23
	10		☒	4	100	23
2615		2613.5 ft	☒	5	89	27
	15	POORLY GRADED SAND WITH SILT (SP-SM): very fine to fine grained; light brown; dry to moist; dense to very dense; no cementation. 14.5ft	☒	6	83	42
2610						
	20	19' to 22': weak cementation.	☒	7	90	78/ 10"
2605						
	25	25': trace to with gravel.	☒	8	100	77
2600						
	30	2596.5 ft	☒	9	100	85
		Bottom of Boring at 31.5 feet 31.5ft				



Date Boring Started:	9/14/20 9:35 am	Water Levels (ft)	Remarks: Boring offset approximately 85 feet east-northeast of surveyed location. Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).
Date Boring Completed:	9/14/20 10:50 am	▼ End of Drilling Dry	
Logged By:	AJF3	▽ At Time of Drilling Dry	
Drilling Contractor:	Cascade		
Drill Rig:	CME		Weather: 95°F, Sunny

M:\GINT\PROJECTS\05331022.00_MESA-ALTA MESA.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

Barr Engineering Company
4300 MarketPointe Drive Suite 200
Minneapolis, MN 55435
Telephone: 952-832-2600

LOG OF BORING SUB-03

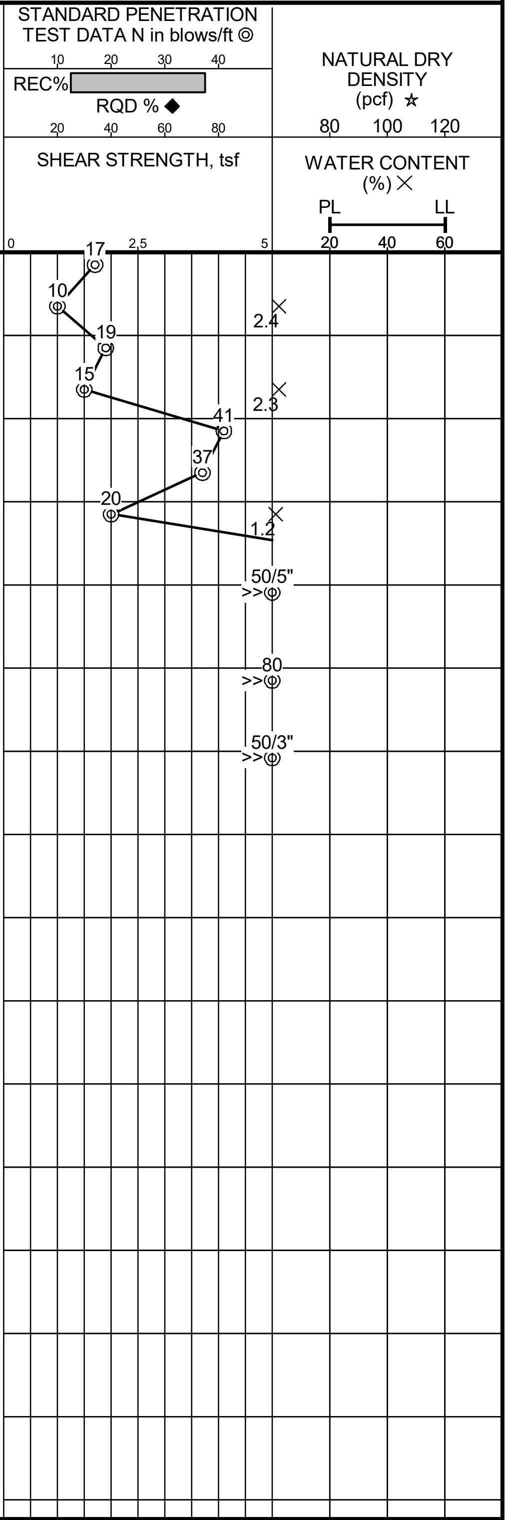
Sheet 1 of 1

Project:	Alta Mesa Wind Project	Surface Elevation:	2628.0 ft
Job No.:	05331021.00	Drilling Method:	HSA
Location:	Riverside County, California	Sampling Method:	SS
Coordinates:	Lat: 33.94611° Long: -116.66326°	Completion Depth:	30.8 ft
Datum:	NAD83		

MATERIAL DESCRIPTION

Surface Elev.: 2628.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %
	0	SILTY SAND (SM): fine grained; reddish brown; dry to moist; loose to medium dense.	1	78	17
2625			2	100	10
	5	2620.5 ft	3	100	19
2620	7.5ft	POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; white; dry to moist; medium dense to very dense; weak cementation.	4	89	15
	10		5	100	41
2615			6	89	37
	15		7	100	20
2610	20		8	92	50/ 5"
2605	25	25 to 30': with fine gravel.	9	22	80
2600	30	2597.2 ft	10	63	50/ 3"
	30.8ft	Bottom of Boring at 30.8 feet			



Date Boring Started:	9/14/20 11:35 am
Date Boring Completed:	9/14/20 1:50 pm
Logged By:	AJF3
Drilling Contractor:	Cascade
Drill Rig:	CME

Water Levels (ft)
▼ End of Drilling Dry
▽ At Time of Drilling Dry

Remarks: Boring offset approximately 65 feet southeast of surveyed location. Elevation estimated from LiDAR, Bevis, M. and Hudnut, K. (2005).

Weather: 100°F, Sunny

Appendix H

Paleontological Assessment

Paleontological Assessment: Alta Mesa Re-Power Project

This paleontological assessment was developed by Joe Stewart, Principal Paleontologist for Aspen Environmental Group. His resume is provided in Appendix A.

Project Location:

The Project is located in section 3 of Township 3 South, Range 3 East, as shown on the Whitewater 7.5 minute quadrangle (Figure 1). This is located on the north side of the San Gorgonio Pass in Riverside County, California. It is also on the north side of Interstate 10 and just west of the Whitewater River.

The Project is approximately 8 miles east of the Morongo Casino and 10 miles west of Palm Springs.

The parcel on which the Project will be built is privately owned land. The Project footprint is approximately 297 acres.

Project Description

Brookfield Renewable proposes to repower the existing Alta Mesa Wind Project. Alta Mesa is an existing 17 megawatt (MW) wind project with 159 turbines located in Riverside County, 11 miles northwest of the City of Palm Springs, on land zoned as Wind Energy (W-E). W-E zoning allows the development of wind energy subject to the approval of a Commercial WECS application. The original project was approved in 1986 and was installed in three phases between 1987 and 1997. Alta Mesa plans to repower the project for up to 39 MW. ,

The Alta Mesa repower would remove the legacy turbines and install 8 new wind turbine generators. The new wind turbine generators would have a maximum tip height (top of foundation to blade tip at apex) of up to 499 feet. The repower would remain within the existing project boundaries. The transmission line that ties into Southern California Edison's PanAera Substation can accommodate the repower project, and therefore would not need to be upgraded. The Project plan is shown in Figure 2.

Jurisdiction

The Lead Agency for the Project under the California Environmental Quality Act (CEQA) is the County of Riverside, California.

Regulatory Framework

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value that are afforded protection under state laws and regulations. The following section summarizes the applicable state and local laws and regulations, as well as professional standards provided by the Society for Vertebrate Paleontology (SVP).

State

California Environmental Quality Act

The CEQA Guidelines (Title 14, Chapter 3 of the California Code of Regulations, Section 15000 *et seq*.), define the procedures, types of activities, individuals, and public agencies required to comply with CEQA. As part of CEQA's Initial Study process, one of the questions that must be answered by the lead agency relates to paleontological resources: "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (CEQA Guidelines, Appendix G, Section VII, Part f).

The loss of a significant paleontological resources which includes any identifiable fossil that is unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and/or those that add to an existing body of knowledge in specific areas – stratigraphically, taxonomically, and/or regionally, would be a significant environmental impact. Direct impacts to paleontological resources primarily concern the potential destruction of nonrenewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information.

The CEQA threshold of significance for a significant impact to paleontological resources is reached when a project is determined to "directly or indirectly destroy a significant paleontological resource or unique geologic feature" (CEQA Guidelines Appendix G, Section VII, Part f). In general, for project sites that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for significant impacts to paleontological resources

Public Resources Code Section 5097.5 and Section 30244

Other state requirements for paleontological resource management are included in PRC Section 5097.5 and Section 30244. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, district) lands.

Local

County of Riverside

The County of Riverside's General Plan (County of Riverside, 2015) recognizes the CEQA Guidelines Section 15064.5 as a threshold for the identification and protection of historic resources, archaeological and paleontological resources as well as the determination of significant impacts on those resources. In addition, the County's General Plan includes several Multipurpose Open Space policies to reduce or minimize the effects of development on historic, archaeological and paleontological resources (County of Riverside, 2015). Among them are:

OS 19.8. "Whenever existing information indicates that a site proposed for development may contain biological, paleontological, or other scientific resources, a report shall be filed stating the extent and potential significance of the resource that may exist within the proposed development and appropriate measures through which the impacts of development may be mitigated."

> *OS 19.9. "This policy requires that when existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor grading activities with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report*

> *with the Planning Department documenting and paleontological resources that are found during the course of site grading."*

The County of Riverside has provided a paleontological sensitivity map to assist in determining a property's sensitivity. It shows most of the Project area rated low with some High B paleontological sensitivity near the hills. A rating of High B indicates that there is a high likelihood that a project could disturb significant paleontological resources, but that they are a few feet beneath the ground surface. It is reproduced in Figure 3 and the Project footprint is outlined.

Society for Vertebrate Paleontology

The Society for Vertebrate Paleontology (SVP) has established standard guidelines (SVP, 1995; 2010) that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological resource-specific Laws, Ordinances, Regulations, and Standards (LORS) accept and use the professional standards set forth by the SVP.

As defined by the SVP (2010:11), significant nonrenewable paleontological resources are:

> *Fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).*

Based on the significance definitions of the SVP (2010), all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate fossils are relatively uncommon, and only rarely will a fossil locality yield a statistically significant number of specimens of the same genus. Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment, and/or its distribution. Furthermore, all geologic units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by project paleontologists, specialists, or local government agencies.

A geologic unit known to contain significant fossils is considered to be "sensitive" to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either directly or indirectly disturb or destroy fossil remains. Paleontological sites indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case (SVP, 1995).

Fossils are contained within surficial sediments or bedrock, and are therefore not observable or detectable unless exposed by erosion or human activity. In summary, paleontologists cannot know either the quality or quantity of fossils prior to natural erosion or human-caused exposure. As a result, even in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce significant fossils elsewhere within the same geologic unit (both within and outside of the study area), a similar geologic unit, or based on whether the unit in question was deposited in a type of environment that is known to be favorable for fossil preservation. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if these remains are significant, successful mitigation and salvage efforts may be undertaken in order to prevent adverse impacts to these resources.

Paleontological Potential

Paleontological potential is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological potential is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its “Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources,” the SVP (2010) defines four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential:

- **High Potential.** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols (fossil soils), cross-bedded point bar sandstones, fine-grained marine sandstones, etc.).
- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
- **Undetermined Potential.** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist (see “definitions” section in this document) to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
- **No Potential.** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous

rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources. [SVP, 2010; 1-2]

For geologic units with high potential, full-time monitoring is generally recommended during any project-related ground disturbance. For geologic units with low potential, monitoring will not generally be required. For geologic units with undetermined potential, field surveys by a qualified vertebrate paleontologist should be conducted to specifically determine the paleontological potential of the rock units present within the study area.

Paleontological Resources Significance Criteria

Numerous paleontological studies have developed criteria for the assessment of significance for fossil discoveries (e.g. Murphey and Daitch, 2007; Scott and Springer, 2003, etc.). In general, these studies assess fossils as significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

In summary, significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, stratigraphically important, and/or those that add to an existing body of knowledge in specific areas – stratigraphically, taxonomically, and/or regionally (Murphey and Daitch, 2007; Scott and Springer, 2003). Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy, assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, and organic evolution.

Project Geology

The project lies in a curious geologic position. The San Gorgonio pass is the major geologic divide between the igneous batholithic Peninsular Ranges and the Transverse Ranges, which is a massive fault block composed of diverse forms of rock. According to Yule (2009), the pass is the "largest discontinuity along the San Andreas fault." The geologic mapping being used for this report is that of Dibblee and Minch, 2004. The project is bounded on the east by the Whitewater River and on the west by the Cottonwood Canyon (Figure 4). The Banning Branch of the San Andreas Fault bounds the project to the north, and the Garnet Hill Fault bounds it on the south (Figure 4). The entirety of the Project footprint is mapped as Qcf, alluvial fanglomerate, light gray weakly indurated, crudely bedded, of unconsolidated boulders, cobbles, and pebbles of detritus mostly quartz diorite derived from San Jacinto Mountains

Richard Heermance of California State University, Northridge, was so kind as to send me a copy of the masters thesis of Brittany Huerta (2017). It was devoted to geologic mapping and geomorphological analysis of the area where the Project is situated, West Whitewater Hill. Huerta names the alluvial fan on which the Project is situated Qf1. The paleosol at the surface of Qf1 is named PS1 (paleosol 1). She relates, "Preliminary burial age data from PS1 (Paleosol atop unit Qf1) suggest that it is 330-510 ka (Lifton, personal comm.)." Heermance communicated to me (2020) that he expects the date of the Qf1 surface is 125 ka (thousand years), 200-240 ka, or 290-320 ka.

Literature Search

Jefferson's compendium of Pleistocene non-mammalian vertebrate fossil localities in California (1991a) listed one locality to the east in Palm Springs. That locality produced the remains of a tortoise. His compendium of Pleistocene mammal fossil localities in California (1991b) listed a locality to the west in Beaumont, and another to the southwest in San Jacinto Valley. The Beaumont locality produced an extinct species of bison, and the San Jacinto Valley locality produced and extinct species of horse. There is a substantial body of literature on the paleontology and geology of exposures of the Imperial Formation just east of the Whitewater River (Murphy, 1986; Powell, 1986; McDougall, 2008; McDougall et al., 2009; LaFollette, 2012). That formation, however, does not occur within the Project footprint.

Literature on vertebrate fossils from California Pleistocene palesols (fossil soils) of the Chuckwalla Valley includes: Fisk, 2004; Stewart et al., 2012; URS, 2013; Raum, 2014; Paleo Solutions, Inc., 2015; AECOM, 2016 No equivalent literature exists for the Coachella Valley. Three reasons explain for the substantial literature on Pleistocene paleosol fossils from the Chuckwalla Valley compared to the non-existent literature on those of the Coachella Valley.

1. The numerous photoelectric project started or built between the San Gorgonio Valley and the Colorado River were in lowland settings. These provided low-gradient alluvial fans where paleosols could develop during the Pleistocene Epoch.
2. The photoelectric projects in the Coachella Valley have been built in areas covered by ancient Lake Cahuilla into Holocene times. This flooding covered or eroded away paleosols that might have developed between flooding events.
3. The proposed project, like many of the previous wind projects, will be built in an upland setting with fairly steep gradients, where alluvial fans are often thin and generally made of coarse grained sediments. This is not the ideal topography in which to discover paleosol fossils.

Records Search

A request for a paleontological records search for an adjacent project was sent to the Western Science Center (WSC) in Hemet. Darla Radford, the collections manager of the WSC replied on March 3. She related that the WSC has no localities within a 1 mile radius of the project area, but does have numerous fossil localities from similarly mapped old alluvial fan deposits within the region. The report is included as Appendix B of this report.

Pedestrian Survey

Joe Stewart surveyed the Project footprint on April 20, 2020. He accessed the site with the assistance of Rowland Griese and Tony Dean of Brookfield.

The actual surfaces on which the former wind turbines were sited and the replacement turbines will be sited is an alluvial fan being composed of Cabezon Fanglomerate truncated by erosion (Figures 5 and 6). The slope dips to the south at approximately 10 degrees. The surface of the alluvial fan (Qf1 of Huerta,

2017) parallels the bedding planes of the alluvium. The grain size of the alluvium is coarse and is described by Dibblee and Minch (2004) as a fanglomerate. A paleosol (technically a relict soil because it is not buried) has formed in the uppermost layers of the alluvial fan, indicating an extended period of stasis. This is the paleosol is PS1 of Huerta, 2017). Moreover, pedogenic calcium carbonate (caliche) can be found in partings between the sediment peds in some areas. The presence of caliche in these partings guarantees a date in excess of 10,000 years, given the known rate of accumulation in nearby parts of the desert (see Table 1). However, age estimates for the paleosol, given above, are a degree of magnitude greater than that. The paleosol contains large quantities of dark red-brown silt mixed with the coarser alluvium, often containing large clasts (Figure 7). That figure also shows that many of the clasts in the paleosol retain their original dip. The oxidized silt can attain a depth of at least 10 feet. The existence of paleosols in the area has been noted, and attempts have been made to date the time of burial of two of them (Lifton et al., 2016). That publication described efforts to date paleosols on Whitewater Hill. This is not the Whitewater Hill west of Whitewater River on the 1955 Desert Hot Springs topographic map just west of the intersection of SR-62 and Interstate 10. It is West Whitewater Hill of the Project footprint.

Table 1. Literature on Minimum Age for Rhizoliths or Caliche in Desert Areas of California

Schlesinger 1984 radiocarbon years	Caliche, Chuckwalla Valley	15,040 + 1500 to 23,000 + 3,000
Schlesinger 1984 radiocarbon years	Caliche, Chuckwalla Valley	19,260 ± 80 to 28,250 ± 5,000
Schlesinger 1984 radiocarbon years	Caliche, Chuckwalla Valley	19,090± 90 to 23,000 ± 2,000
Schlesinger 1984 radiocarbon years	Caliche, Chuckwalla Valley	20,140 ± 150 to 31,000 ± 4,000
Schlesinger 1984 radiocarbon years	Caliche, Chuckwalla Valley	19,770 ± 320 to 32,000 ± 4,000
Fisk 2004 radiocarbon years	Capping caliche, Colorado River terrace west of Blythe	16,340 ±100
Fisk 2004 radiocarbon years	Rhizolith below capping caliche, same location	22,930 ±170

No rhizoliths or other paleontological resources were noted in exposures of the paleosol within section 3. In section 4, a short distance west of the Project, the same paleosol can be seen at the eroding edge of the alluvial fan surface, and rhizoliths do occur there. The coarseness of the alluvium in the alluvial fan makes it unlikely that any organisms but the largest mammals could leave any trace within it. The Paleontological Potential of the Cabezon Fanglomerate is rated at Low Potential. As for the paleosol developed at the exposed surface of the fan, it is conceivable that small fossorial vertebrate organisms could have utilized the soil as habitat. No indications of such remains were detected, but vertebrate microfauna are usually detected through screening bulk sediment samples. Sampling and screening the paleosol were beyond the scope of the survey. Indications of recent *Thomomys* burrowing were seen in the Project area, so they might have been living there during formation of the paleosol. The Paleontological Potential of the paleosol is rated as Unknown at this time.

Recommendtions

There are some records of Pleistocene vertebrate fossils in paleosols within desert areas west of Indio (Stewart et al., 2012; Raum et al., 2014). None are known in the immediate area of the Project. It seems appropriate that 600 pound samples of the paleosol be tested (screened) for microvertebrate fossils. If none are found, then Project monitoring for paleontological resources is not required. Either way, a

Paleontological Resources Impact Mitigation Program (PRIMP) should discuss the development and presentation of a Worker Environmental Appreciation Program, protocols for the unexpected discovery of fossils, and dating of pedogenic calcium carbonate from the Project footprint, if such can be found. If microvertebrate fossils are located in the testing effort, then monitoring would be warranted, and the PRIMP should describe procedures for unexpected discovery protocols, monitoring, sediment sampling and processing, identification, reporting and curation of fossils found on the project, as well as radiocarbon dating of pedogenic carbonate from the Project footprint. If microvertebrate fossils are not located during pre-construction testing, then the PRIMP will consist only of a Worker Environmental Appreciation Program, an unexpected discovery of fossils plan, and a radiocarbon date on pedogenic calcium carbonate from the Project footprint, if such can be found.

The data presented in Table 1 shows that area caliches have been radiocarbon dated and have yielded dates of 15,040 to 32,000 radiocarbon years before present. These must be considered as minimum dates for the soils that produced them.

References

AECOM. 2016. Recurrent Energy Crimson Solar Project Paleontological Analysis. Prepared for: Sonoran West Holdings LLC and Recurrent Energy LLC, 300 California Street, 7th Floor, San Francisco, CA 94101. Prepared by: Joe Stewart, AECOM, 401 West A Street, Suite 1200, San Diego, CA 92101.

Dibblee, T.W., and Minch, J.A. 2004. Geologic map of the Whitewater quadrangle, Riverside County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-120, scale 1:24,000.

Fisk, L. H. 2004. Blythe Energy Project: Final Report on the results of the Paleontological Resources Monitoring and Mitigation Program. Prepared for: Graystone Environmental Consultants, Inc., 10470 Old Placerville Rd., Suite #110, Sacramento, CA 95827. Prepared by: PaleoResource Consultants, 5325 Elkhorn Boulevard, #294, Sacramento, CA 95842.

Huerta, B. E. 2017. Structure and Geomorphology of West Whitewater Hill, a Compressive Stepover between the Banning and Garnet Hill Strands of the San Andreas Fault, Whitewater, CA. Unpublished masters thesis, California State University, Northridge. 64 p.

Jefferson, G. T. 1991a. A catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa. Natural History Museum of Los Angeles County Technical Reports 5:1-60.

Jefferson, G. T. 1991b. A catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals. Natural History Museum of Los Angeles County Technical Reports 7:1-129.

LaFollette, P. I. 2019. Shell rubble beds of the mollusk *Thylacodes* (Gastropoda: Vermetidae) in the upper Miocene Imperial Formation near Whitewater, Riverside County, California, previously called the “worm tube bed.” Desert Symposium Field Guide and Proceedings 2012:65-68.

Lifton, N., Heermance, R. V., D. Yule, & B. Huerta. 2016. Isochron burial dating of paleosols within the Whitewater Fan, northern Coachella Valley, California. Poster Presentation at 2016 Southern California Earthquake Center Annual Meeting. Link: https://www.scec.org/publication/6755

McDougall, K. 2008. Late Neogene marine incursions and the ancestral Gulf of California. p. 353-371 *In*: Reheis, M. C., R. Hershler, and D. Miller, eds. Late Cenozoic Drainage History of the Southwestern Great Basin and Lower Colorado River Region: Geologic and biotic perspectives. Geological Society of America, Special Papers 439.

McDougall, K. A., R. Z. Poore, and J. C. Matti. 1999. Age and Paleoenvironment of the Imperial Formation near San Gorgonio Pass, Southern California. Journal of Foraminiferal Research 29:4-25.

Murphey, P. C. and D. Daitch. 2007. Paleontological overview of oil shale and tar sands areas in Colorado, Utah and Wyoming: U.S. Department of Energy, Argonne National Laboratory Report Prepared for the U.S. Department of Interior Bureau of Land Management, 468 p. and 6 maps (scale 1:500,000).

Murphy, M. A. 1986. The Imperial Formation at Painted Hill, near Whitewater, California. pp. 63-69 In: Kooser, M. A. and R. E. Reynolds, eds. Geology Around the Margins of the Eastern San Bernardino Mountains. Publications of the Inland Geological Society 1.

Paleo Solutions, Inc. 2015. Final Paleontological Monitoring Report: Desert Sunlight Solar Farm, near the Community of Desert Center, Riverside County, California. Prepared for: Bureau of Land Management, Palm Springs–South Coast Field Office, 1201 Bird Center Drive, Palm Springs, CA 92262. Prepared by: Paleo Solutions, Inc., 911 S Primrose Avenue, Unit J, Monrovia, CA 91016. 37 p.

Powell, C. L., II. 1986. Stratigraphy and bivalve molluscan paleontology of the Neogene Imperial Formation in Riverside County, California. San Jose, CA. San Jose State University, 323 pp.

Raum, J., G. L. Aron, and R. E. Reynolds. 2014. Vertebrate fossils from Desert Center, Chuckwalla Valley, California. Desert Symposium Field Guide and Proceedings 2014:68-70.

County of Riverside. 2015. General Plan, Multipurpose Open Space Element (OS). Link: https://planning.rctlma.org/Portals/14/genplan/general_Plan_2017/elements/OCT17/Ch05_MOSE_120815.pdf?ver=2017-10-11-102103-833

Schlessinger, W. H. 1984. The formation of caliche in soils of the Mojave Desert, California. Geochimica et Gosmochimica Acta 49:57-66.

Scott, E. and K. Springer. 2003. CEQA and fossil preservation in southern California. The Environmental Monitor 2003: 4-10.

CEQA and fossil preservation in southern California. The Environmental Monitor, Fall 2003, p. 4-10, 17.

Stewart, J. D., M. Williams, M. Hakel, and S. Musick. 2012. Was it washed in? New evidence for the genesis of Pleistocene fossil vertebrate remains in the Mojave Desert of southern California. Desert Symposium Field Guide and Proceedings 2012:140-143.

URS. 2013a. Paleontological Resources Recovered from the Rio Mesa Solar Energy Generating Facility Project, Riverside County, CA. Prepared for: BrightSource Energy, 1999 Harrison Street, Suite 2150, Oakland, CA 94612. Prepared by: Joe Stewart, URS Corporation, 4225 Executive Square, Suite 1600, La Jolla, CA 92037.

Yule, D. 2009. The enigmatic San Gorgonio Pass. Geology.37(2): 191.

I, Joe Stewart, a qualified paleontologist by the criteria of the Society of Vertebrate Paleontology, am responsible for the contents of this report.

Signed: Joe D. Stewa____________________________ Date: __December 3, 2020__

Joe D. Stewart. Ph.D.