California High-Speed Rail Authority
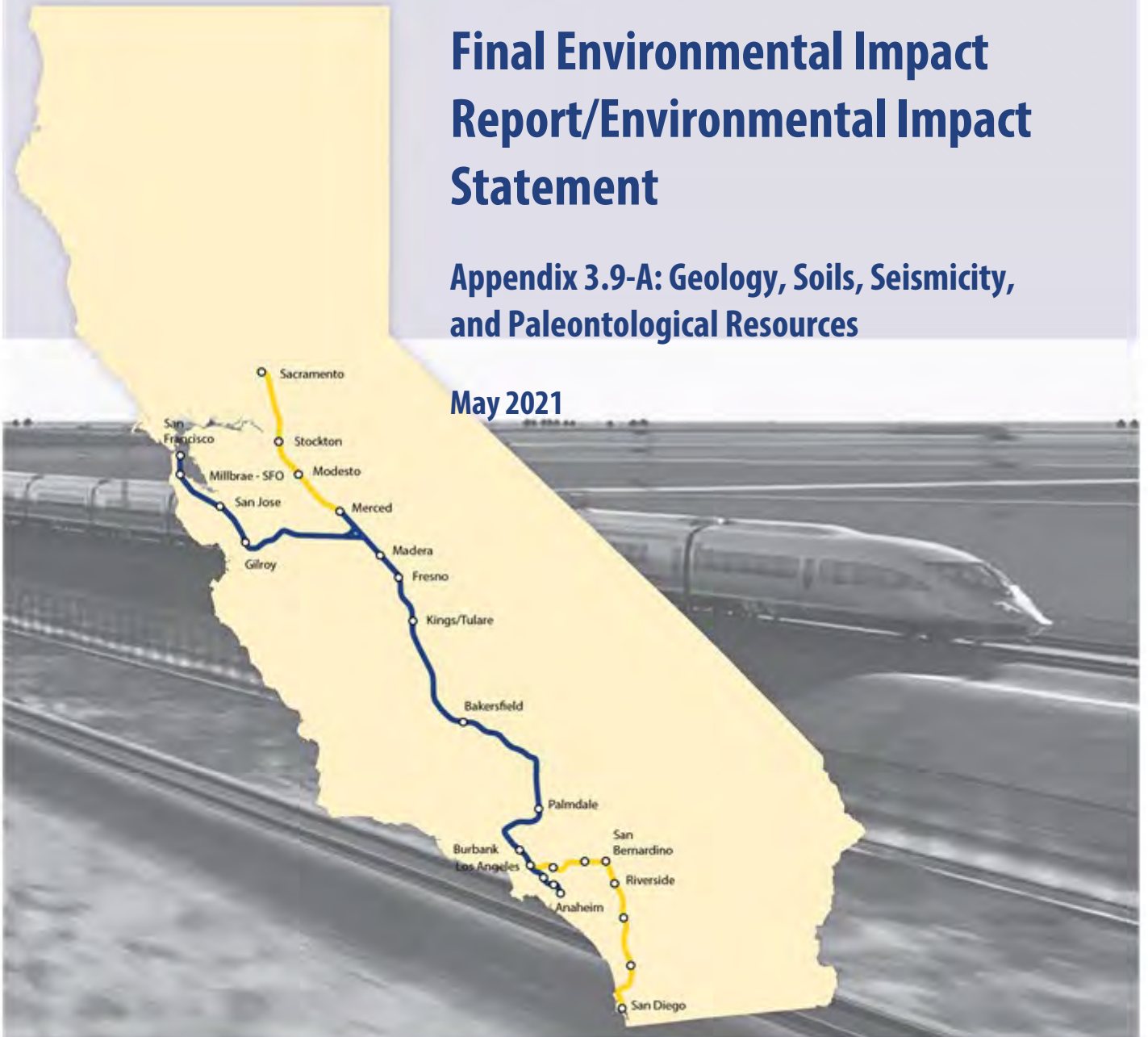
Bakersfield to Palmdale Project Section

Final Environmental Impact Report/Environmental Impact Statement

Appendix 3.9-A: Geology, Soils, Seismicity, and Paleontological Resources

May 2021

Sacramento
San Francisco
Stockton
Millbrae - SFO
Modesto
San Jose
Merced
Gilroy
Madera
Fresno
Kings/Tulare
Bakersfield
Palmdale
Burbank
San Bernardino
Los Angeles
Riverside
Anaheim
San Diego

CALIFORNIA
High-Speed Rail Authority

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APPENDIX 3.9-A: GEOLOGY, SOILS, SEISMICITY, AND PALEONTOLOGICAL RESOURCES

This appendix provides tables and figures pertaining to the paleontological resources that could affect or be affected by the Bakersfield to Palmdale Project Section of the California High-Speed Rail (HSR) System. The tables identify the geologic units and paleontological sensitivity along the project section within the paleontological resources study area. The figures identify the geologic units and paleontological sensitivity within the paleontological resources study area. Tables and figures are designed to elucidate the text and are referenced to portions of the text for accessible interpretation.

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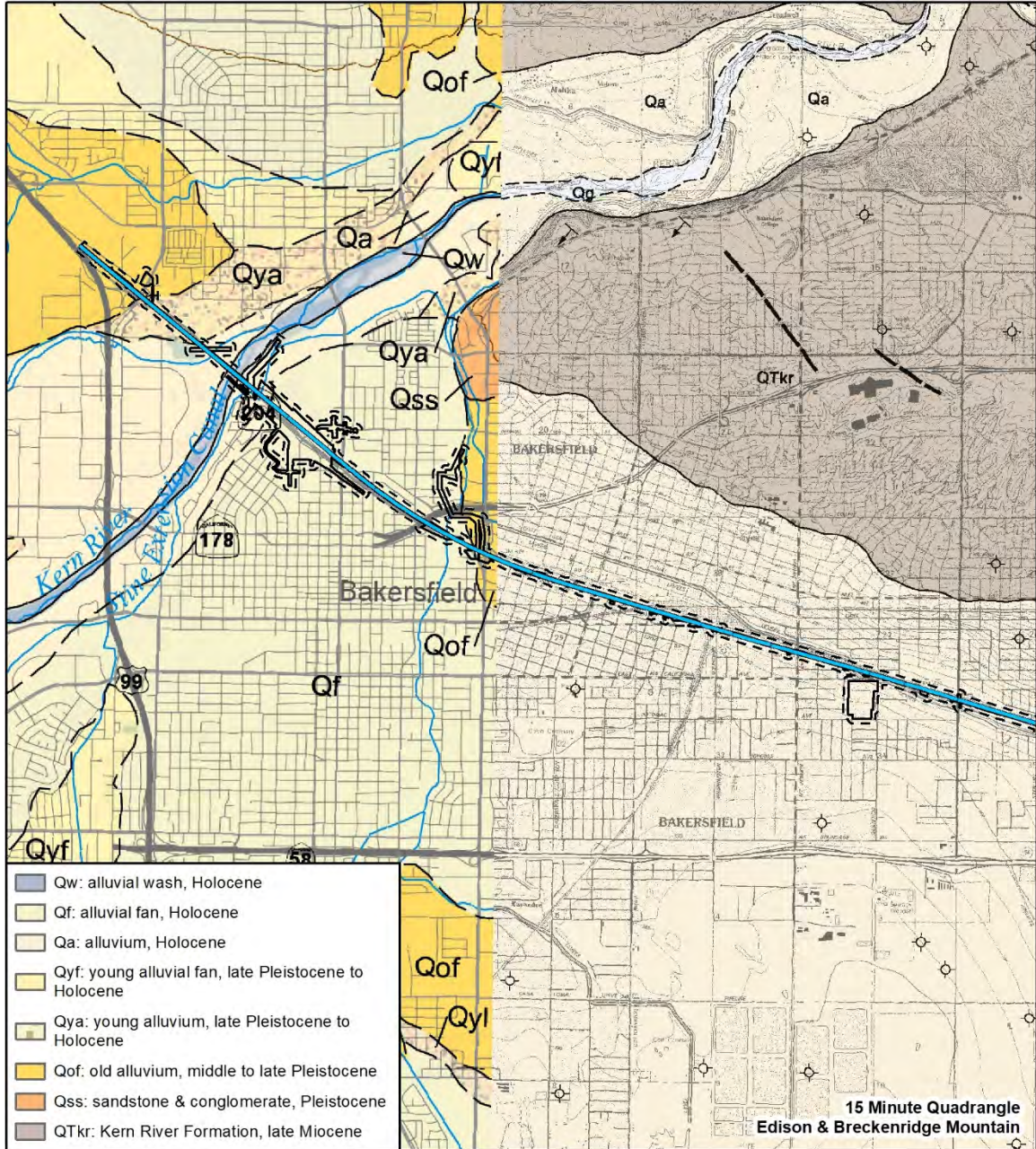
SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008b); Hayden and Hayhurst (2011).
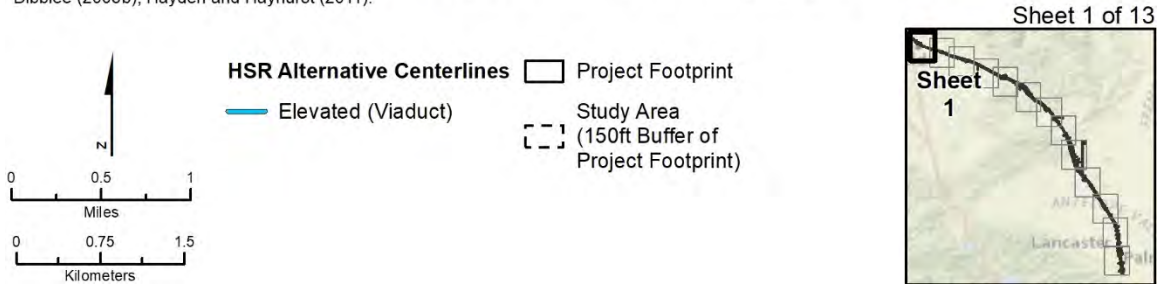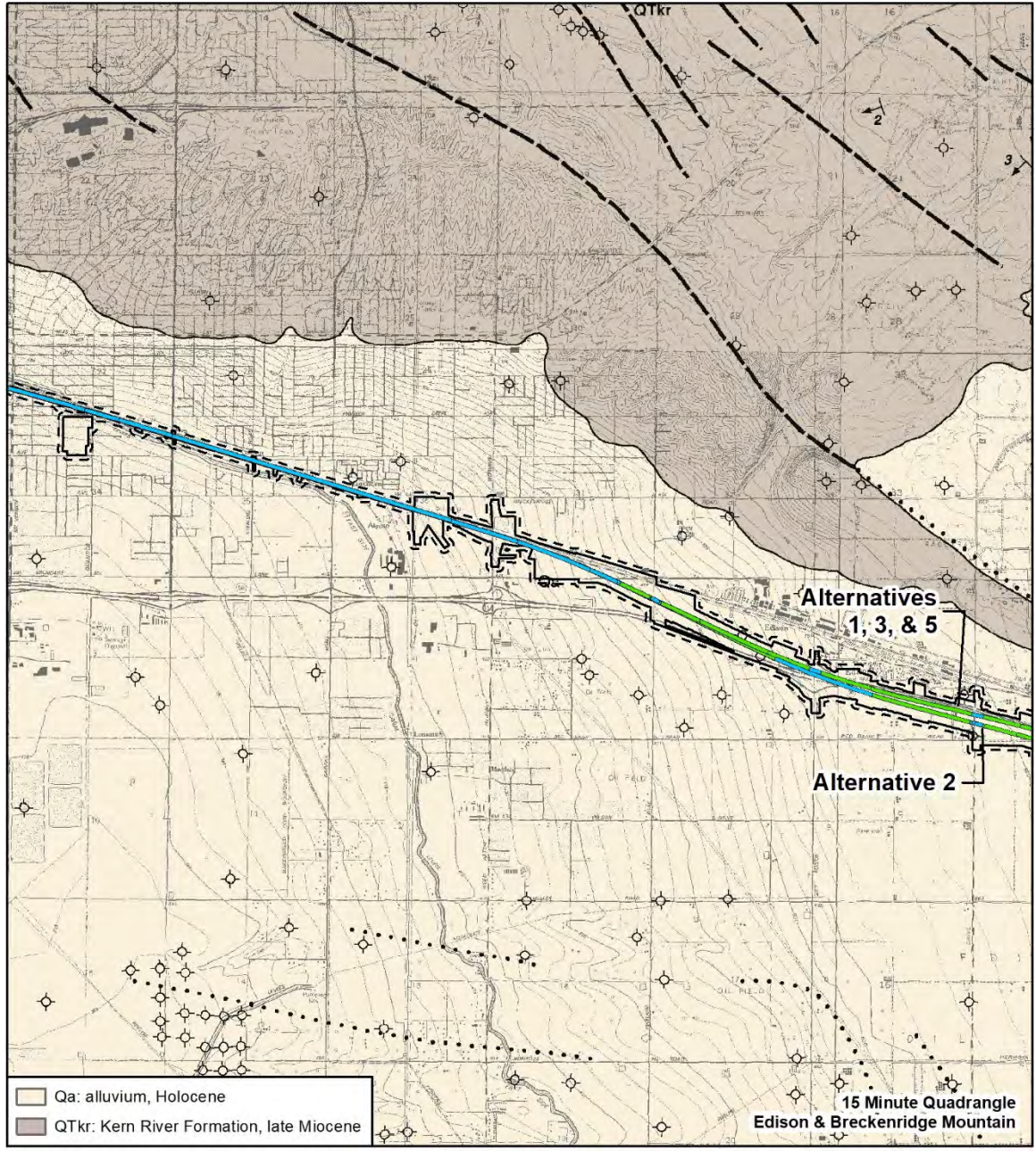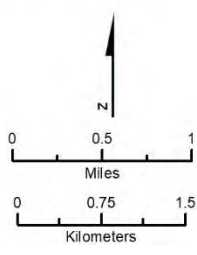
Figure 3.9-A-1 Geologic Map (Sheet 1)

Qa: alluvium, Holocene
QTkr: Kern River Formation, late Miocene

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008b).
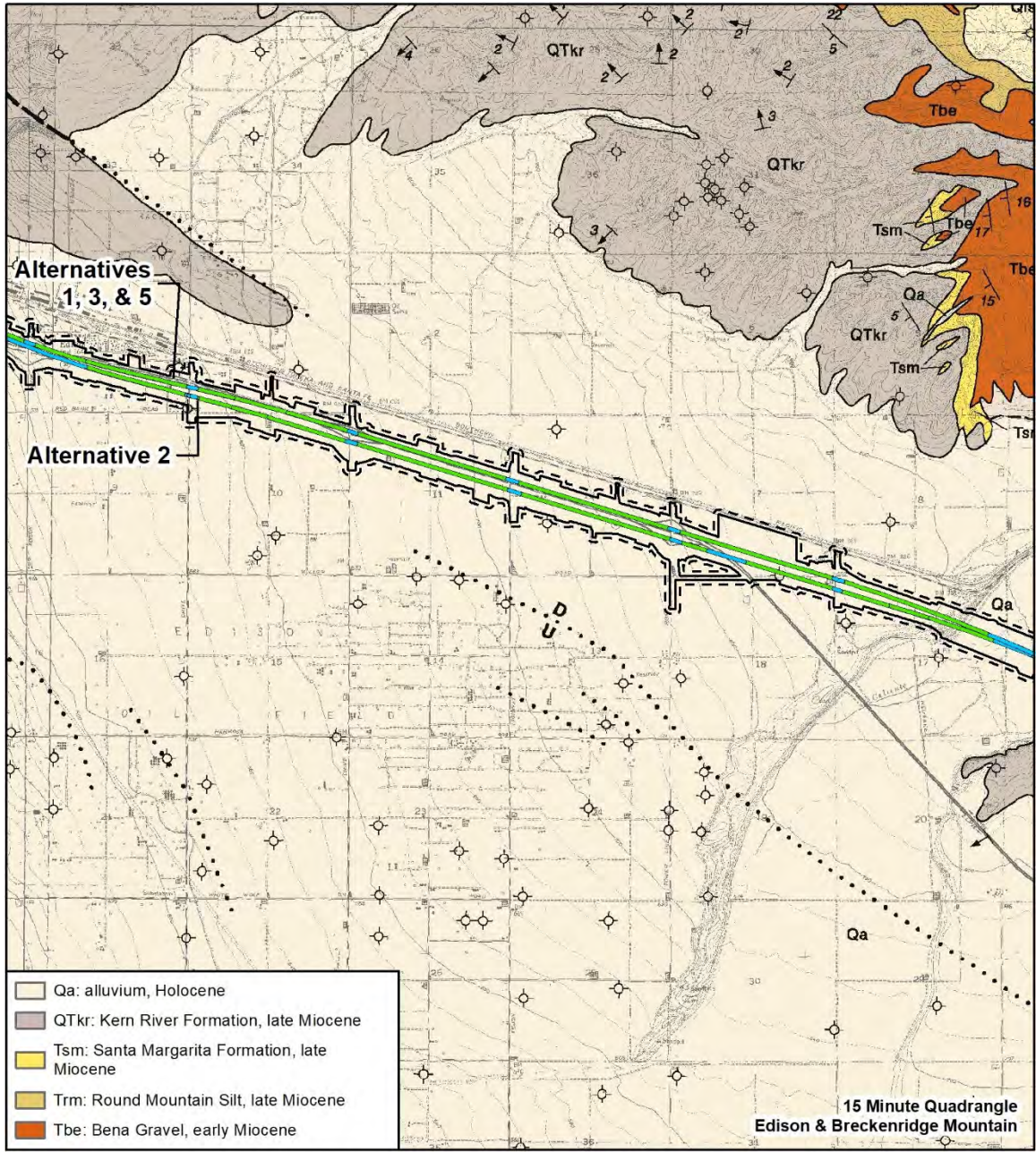
HSR Alternative Centerlines
Surface
Elevated (Viaduct)

Project Footprint
Study Area
(150ft Buffer of
Project Footprint)

N

0   0.5   1
Miles

0   0.75   1.5
Kilometers

Sheet 2 of 13
Sheet 2

Figure 3.9-A-1 Geologic Map (Sheet 2)

Figure 3.9-A-1 Geologic Map (Sheet 3)

Figure 3.9-A-1 Geologic Map (Sheet 4)

Qa: alluvium, Holocene

Qt: terrace deposits, granitic gravel and sand, Pleistocene

Tbf: Bealville Fanglomerate, early Miocene

Tw: Walker Formation, early Oligocene to Miocene

Twf: Walker Formation, tuff, Oligocene to early Miocene

h: hornblendite, Mesozoic

hqd: hornblende-biotite quartz diorite, Mesozoic

p: pegmatite dikes, Mesozoic

qd: biotite quartz diorite, Mesozoic

dg: diorite gneiss, Paleozoic to Mesozoic

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008a, b).
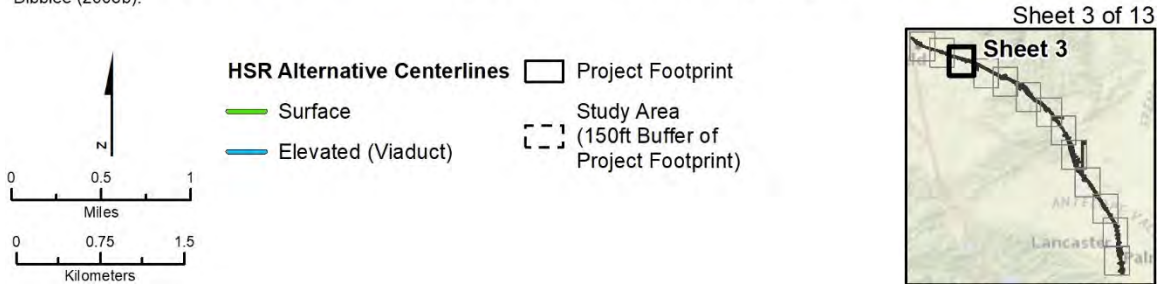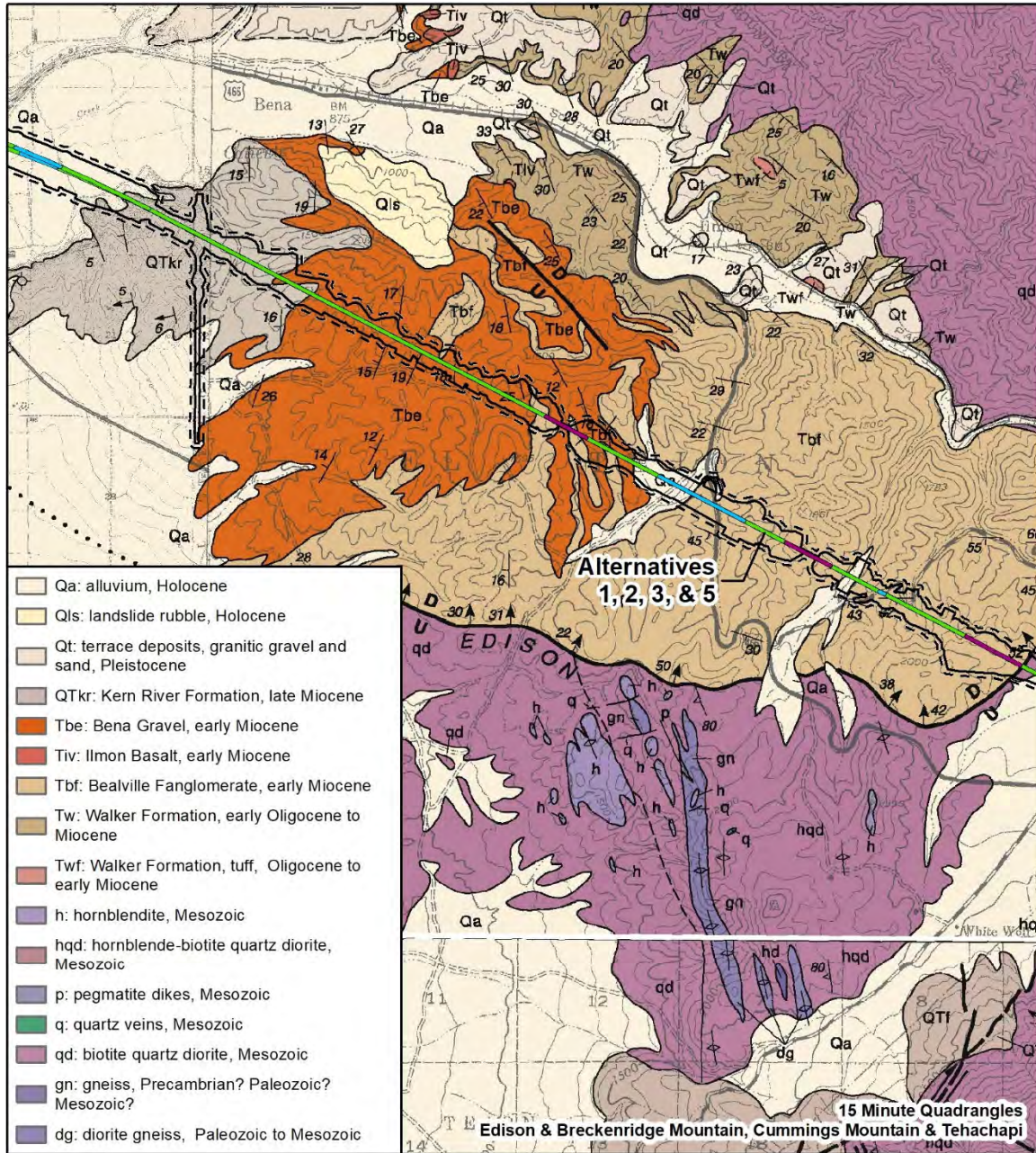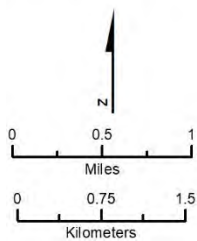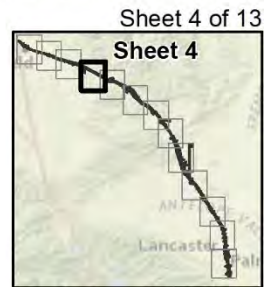
HSR Alternative

Surface
Elevated (Viaduct)
Underground (Tunnel);

Project Footprint

Study Area
(150ft Buffer of
Project Footprint)

N

0   0.5   1
Miles

0   0.75   1.5
Kilometers

Sheet 5 of 13
Sheet 5

Figure 3.9-A-1 Geologic Map (Sheet 5)

Legend:

- ☐ Qa: alluvium, Holocene
- ☐ Qoa: older alluvium, Pleistocene
- ☐ QTf: Tehachapi Formation, Pleistocene
- ☐ Tb: volcanics, basalt, late Miocene
- ☐ Td: volcanics, dacite, late Miocene
- ☐ Tk: Kinnick Formation, late Miocene
- ☐ aqd: altered quartz diorite, Mesozoic
- ☐ hd: hornblende diorite, Mesozoic
- ☐ hqd: hornblende-biotite quartz diorite, Mesozoic
- ☐ p: pegmatite dikes, Mesozoic
- ☐ qd: biotite quartz diorite, Mesozoic
- ☐ ml: metasedimentary rocks, schist, Precambrian? to Mesozoic?
- ☐ mq: metasedimentary rocks, quartzite, Precambrian? to Mesozoic?
- ☐ ms: metasedimentary rocks, schist, Precambrian? to Mesozoic?

15 Minute Quadrangles
Edison & Breckenridge Mountain, Cummings Mountain & Tehachapi
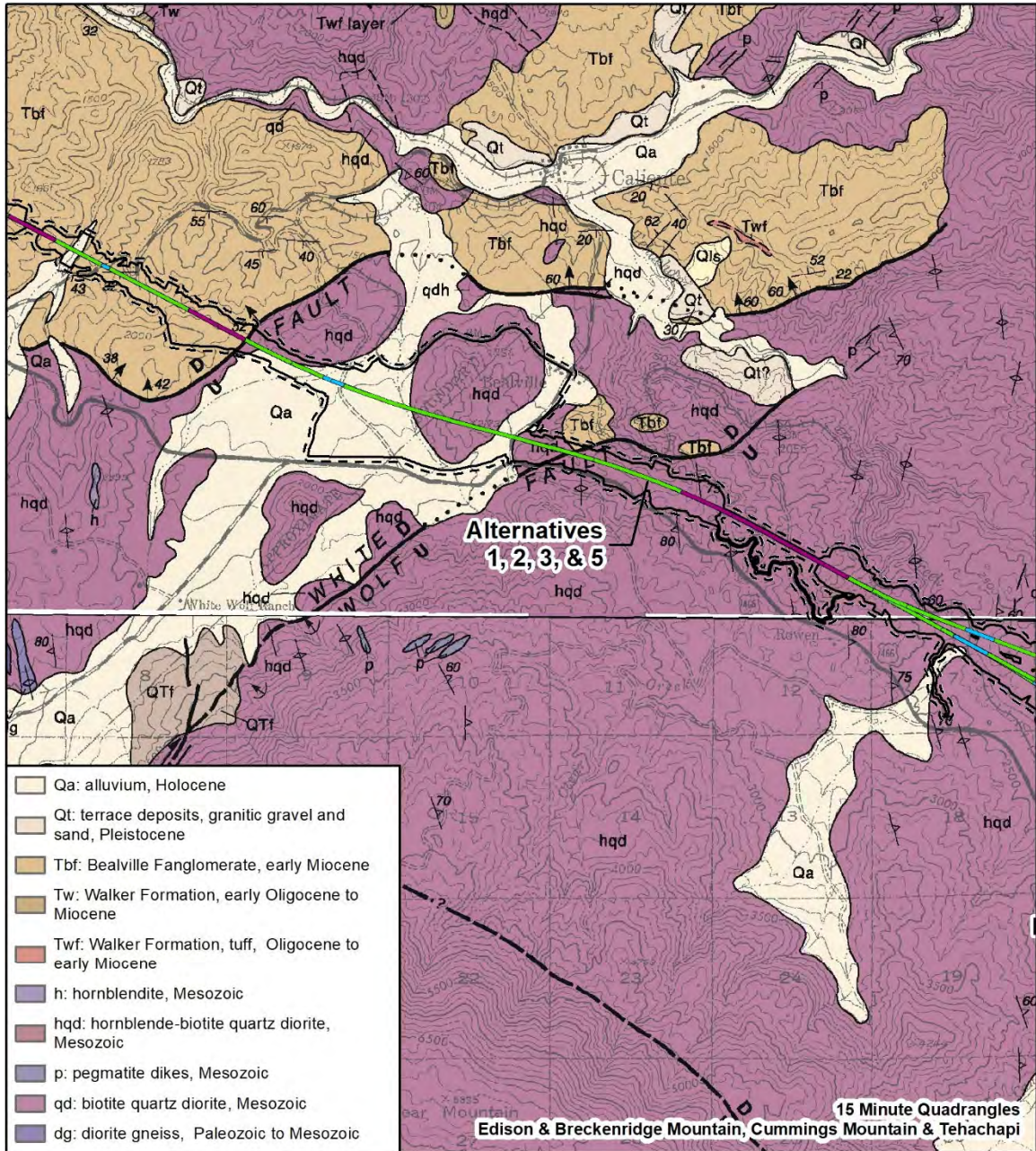
SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008a, b).
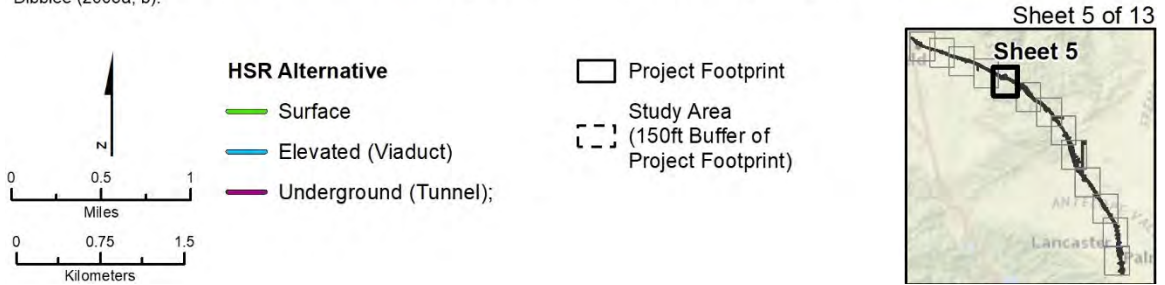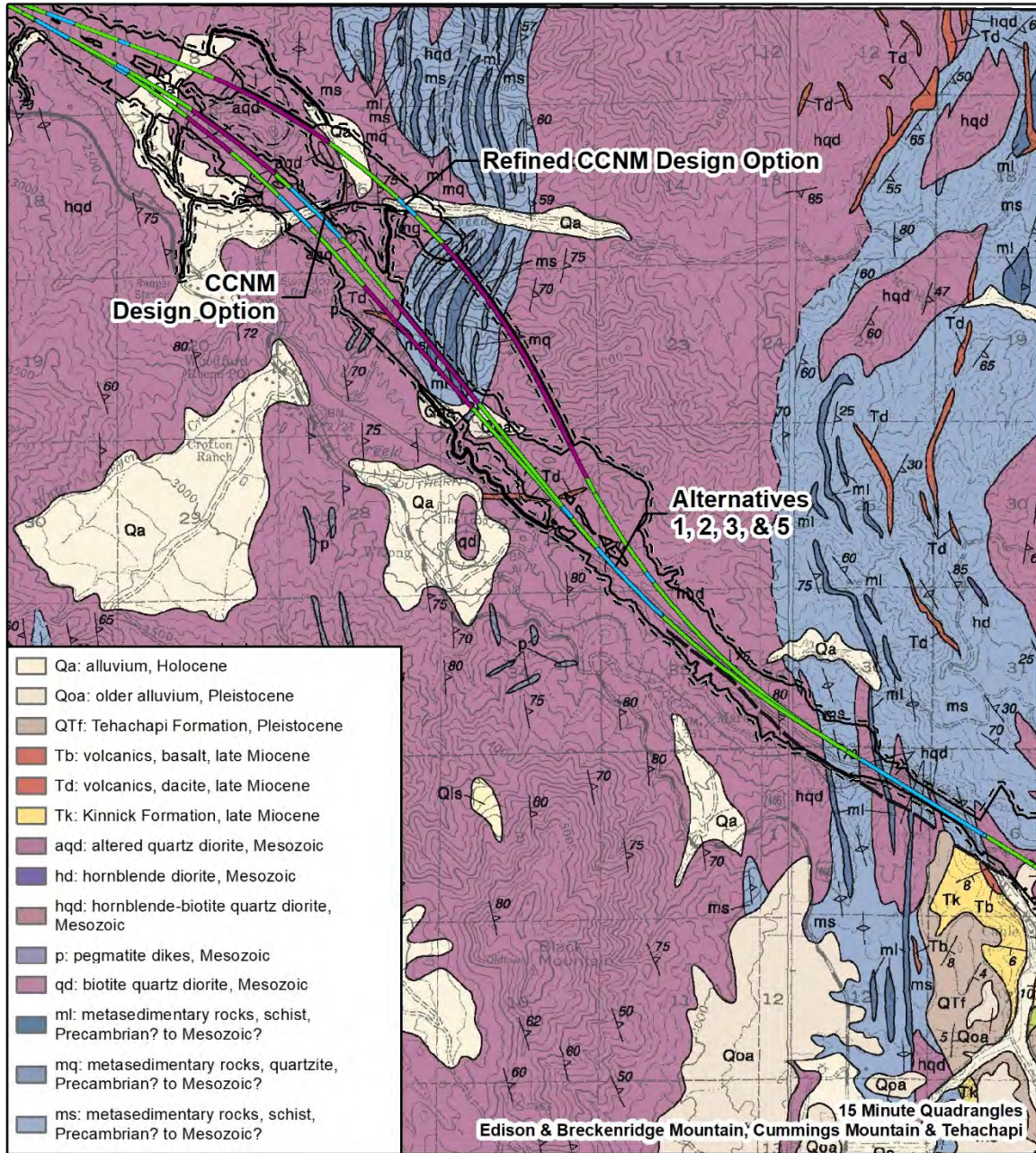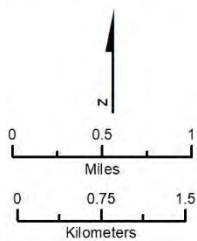
HSR Alternative
- —— Surface
- —— Elevated (Viaduct)
- —— Underground (Tunnel);

☐ Project Footprint

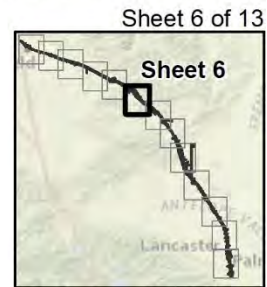┌ ┐ Study Area
└ ┘ (150ft Buffer of Project Footprint)

Sheet 6 of 13

Sheet 6

Figure 3.9-A-1 Geologic Map (Sheet 6)

Figure 3.9-A-1 Geologic Map (Sheet 7)

Figure 3.9-A-1 Geologic Map (Sheet 8)

Legend:

Qa: alluvium, Holocene
Qc: clay of Proctor Lake, Holocene
Qls: landslide rubble, Holocene
Qoa: older alluvium, Pleistocene
Tf: volcanics, felsite, late Miocene
Tk: Kinnick Formation, late Miocene
Tw: Witnet Formation, Paleocene
hd: hornblende diorite, Mesozoic
qm: quartz monzonite, Mesozoic
ml: metasedimentary rocks, schist, Precambrian? to Mesozoic?
ms: metasedimentary rocks, schist, Precambrian? to Mesozoic?

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008a).

HSR Alternative
Surface
Elevated (Viaduct)
Underground (Tunnel);

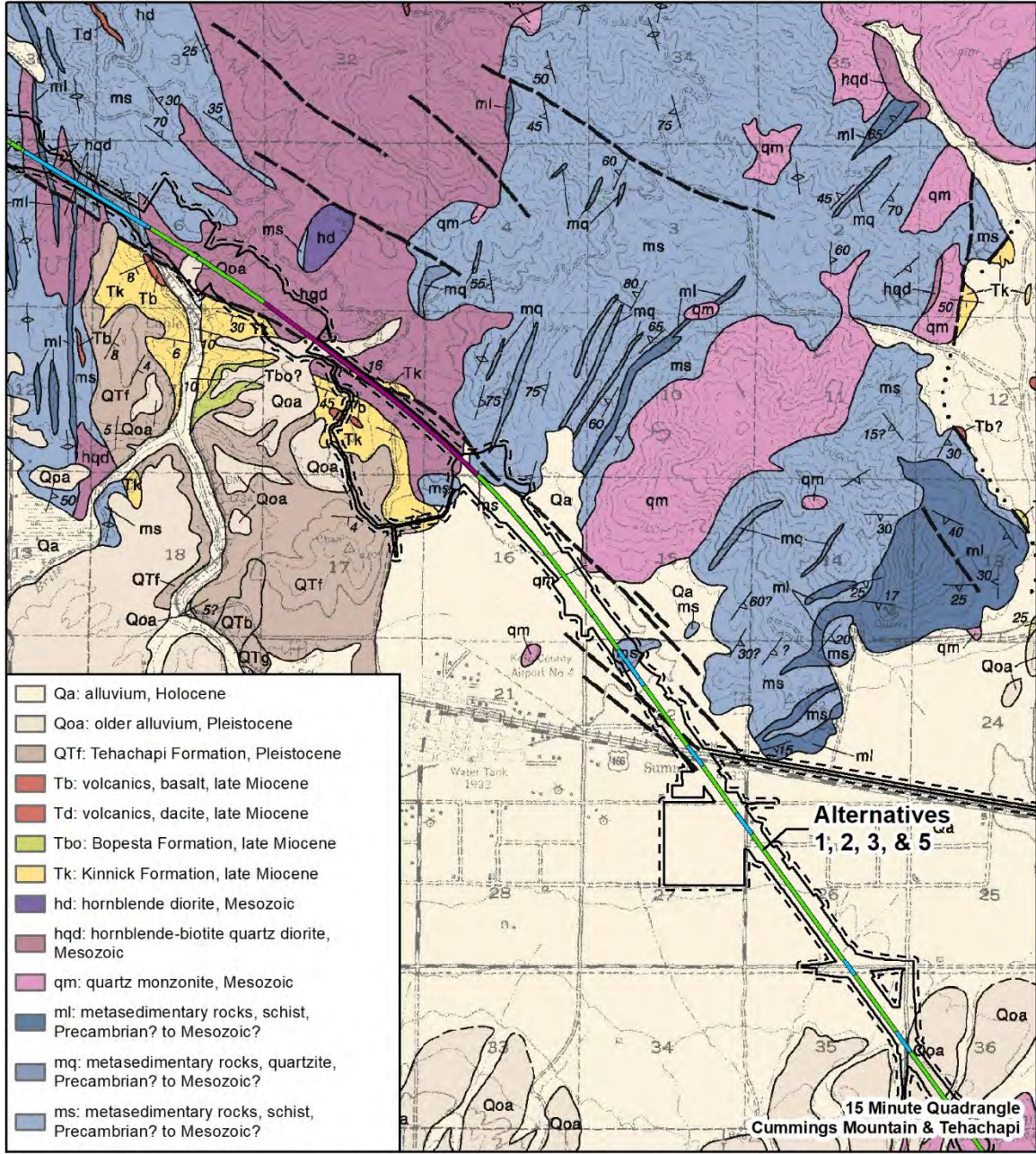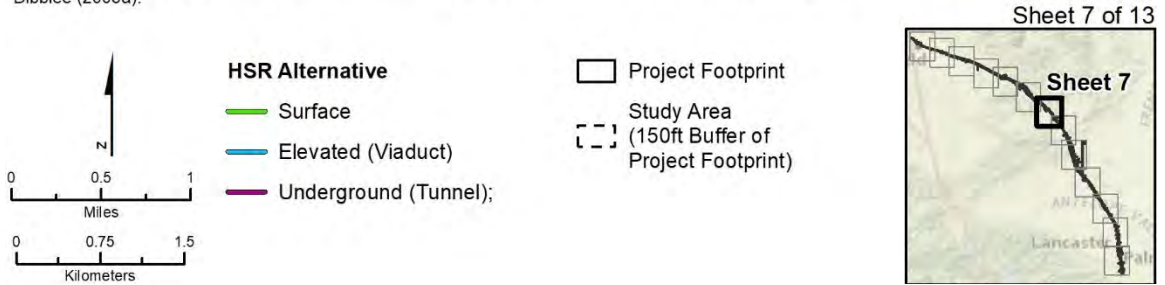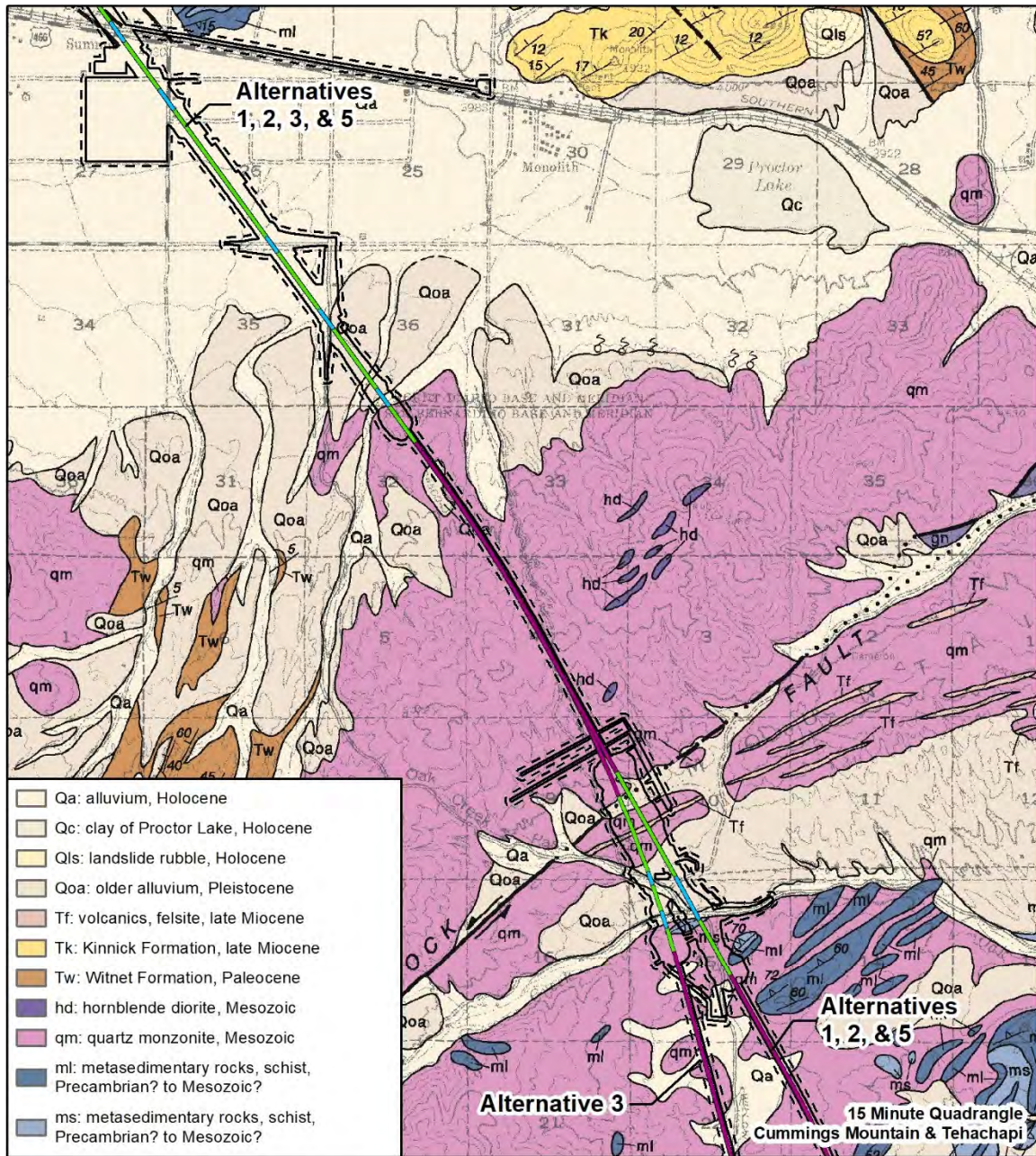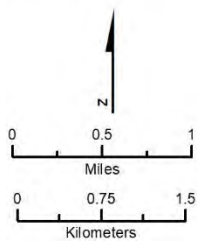Project Footprint
Study Area
(150ft Buffer of Project Footprint)

Sheet 8 of 13
Sheet 8

Figure 3.9-A-1 Geologic Map (Sheet 9)

Legend

- Qa: alluvium, Holocene
- Qs: sand, Holocene
- Qoa: older alluvium, Pleistocene
- Tf: Fiss Fanglomerate, early to middle Miocene
- Tgf: Gem Hill Formation, felsite, early to middle Miocene
- Tgo: Gem Hill Formation, obsidian, early to middle Miocene
- Tgp: Gem Hill Formation, porphyry, early to middle Miocene
- Tgba: Gem Hill Formation, basalt flows, early to middle Miocene
- Tgt: Gem Hill Formation, tuff, early to middle Miocene
- q: quartz veins, Mesozoic
- qm: quartz monzonite, Mesozoic

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008d, e).

HSR Alternative
- Surface
- Elevated (Viaduct)

Project Footprint

Study Area (150ft Buffer of Project Footprint)
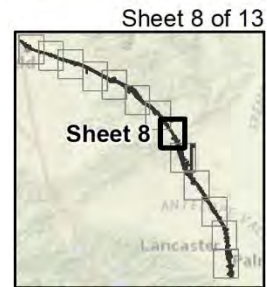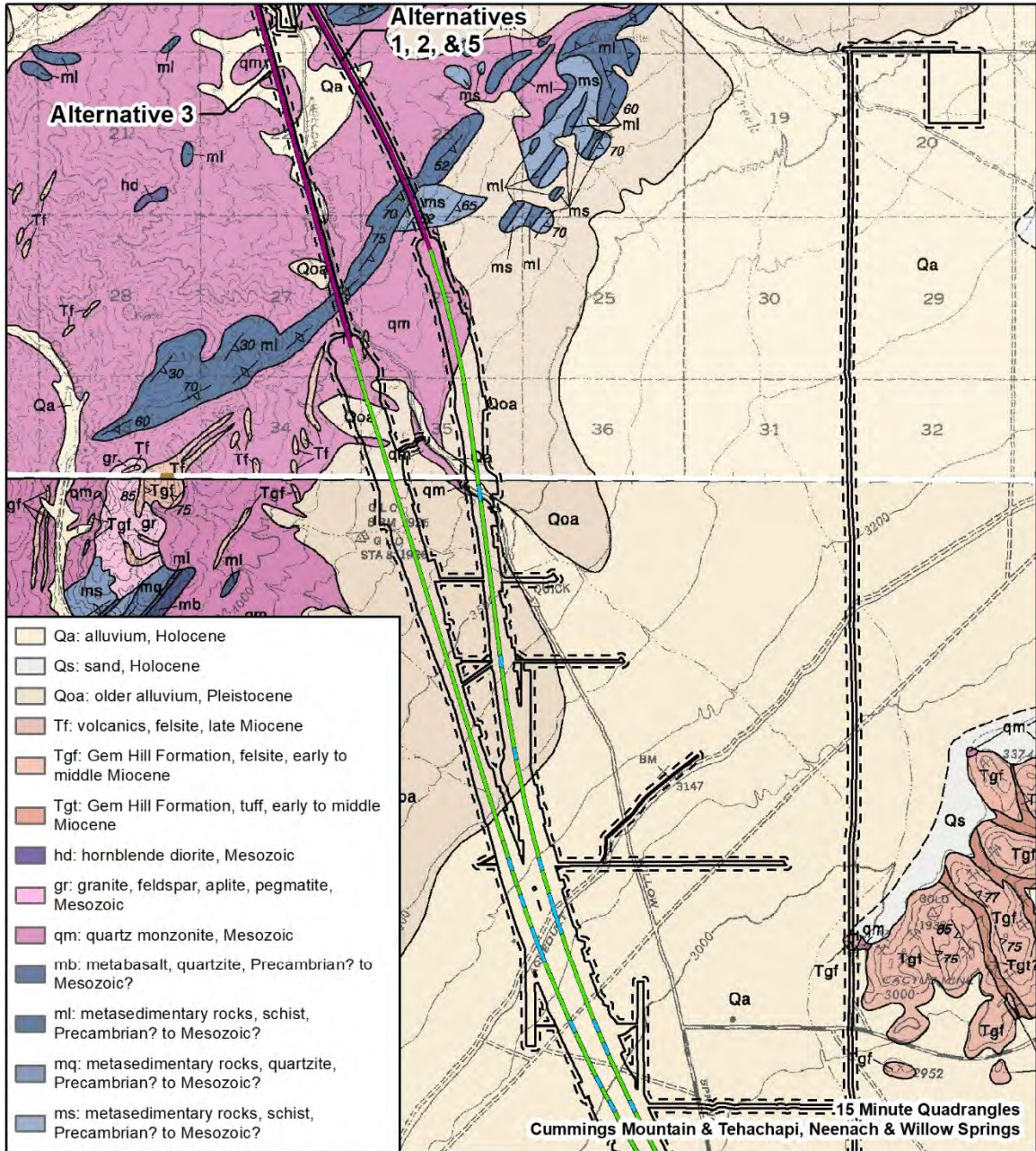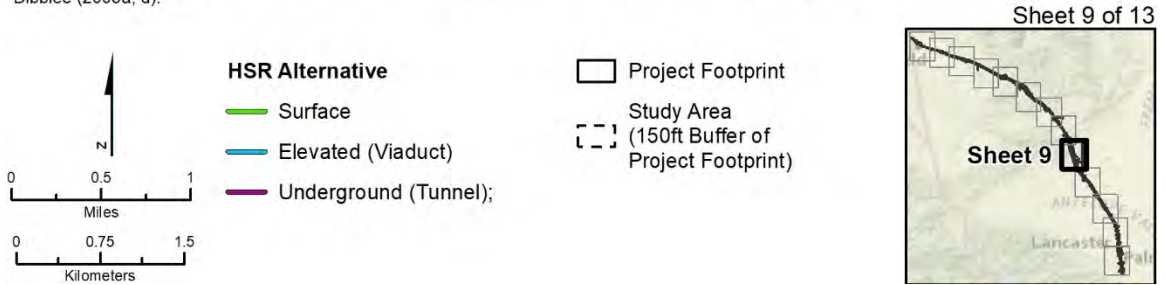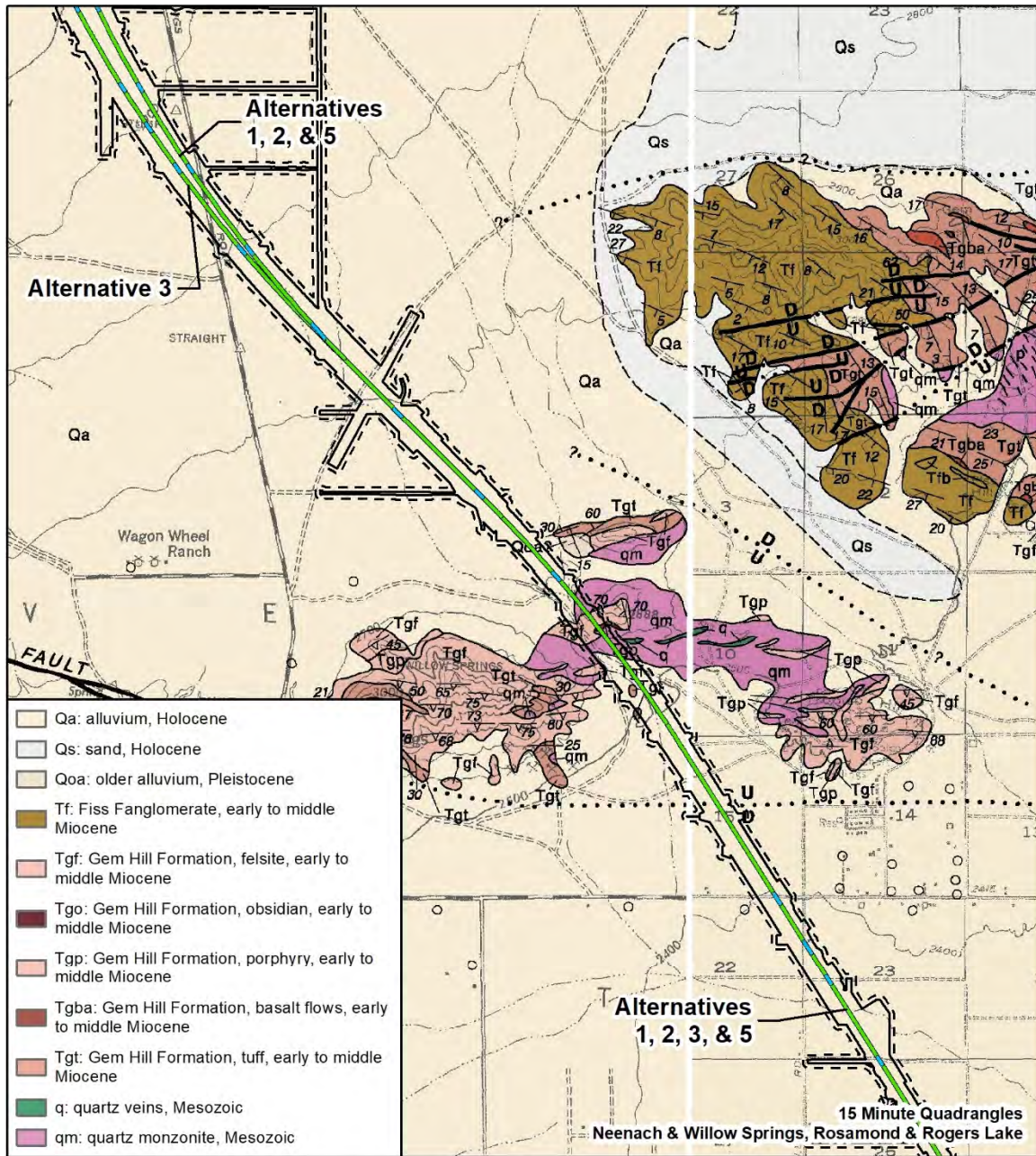
Sheet 10 of 13

Sheet 10

Figure 3.9-A-1 Geologic Map (Sheet 10)

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008e).

HSR Alternative

— Surface
— Elevated (Viaduct)

☐ Project Footprint

⌐ ⌐ Study Area
(150ft Buffer of
Project Footprint)
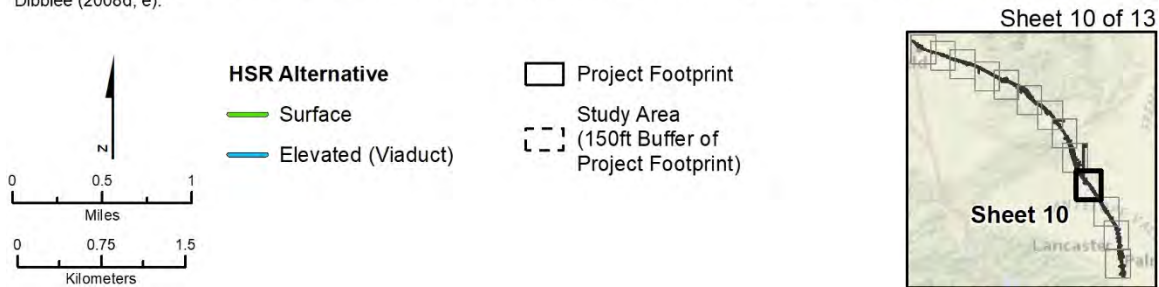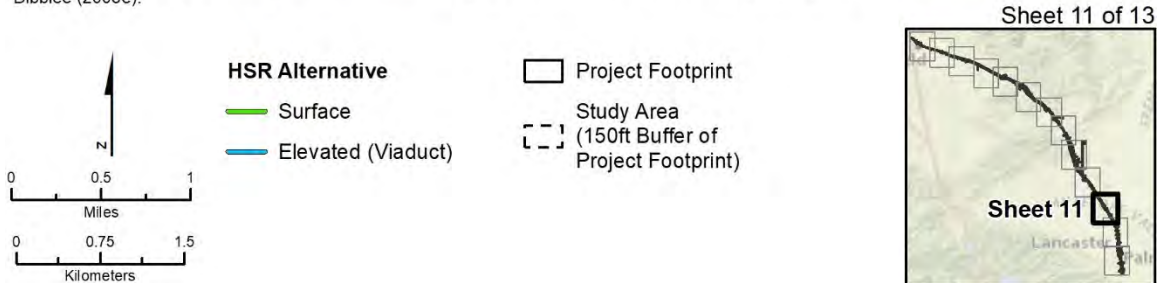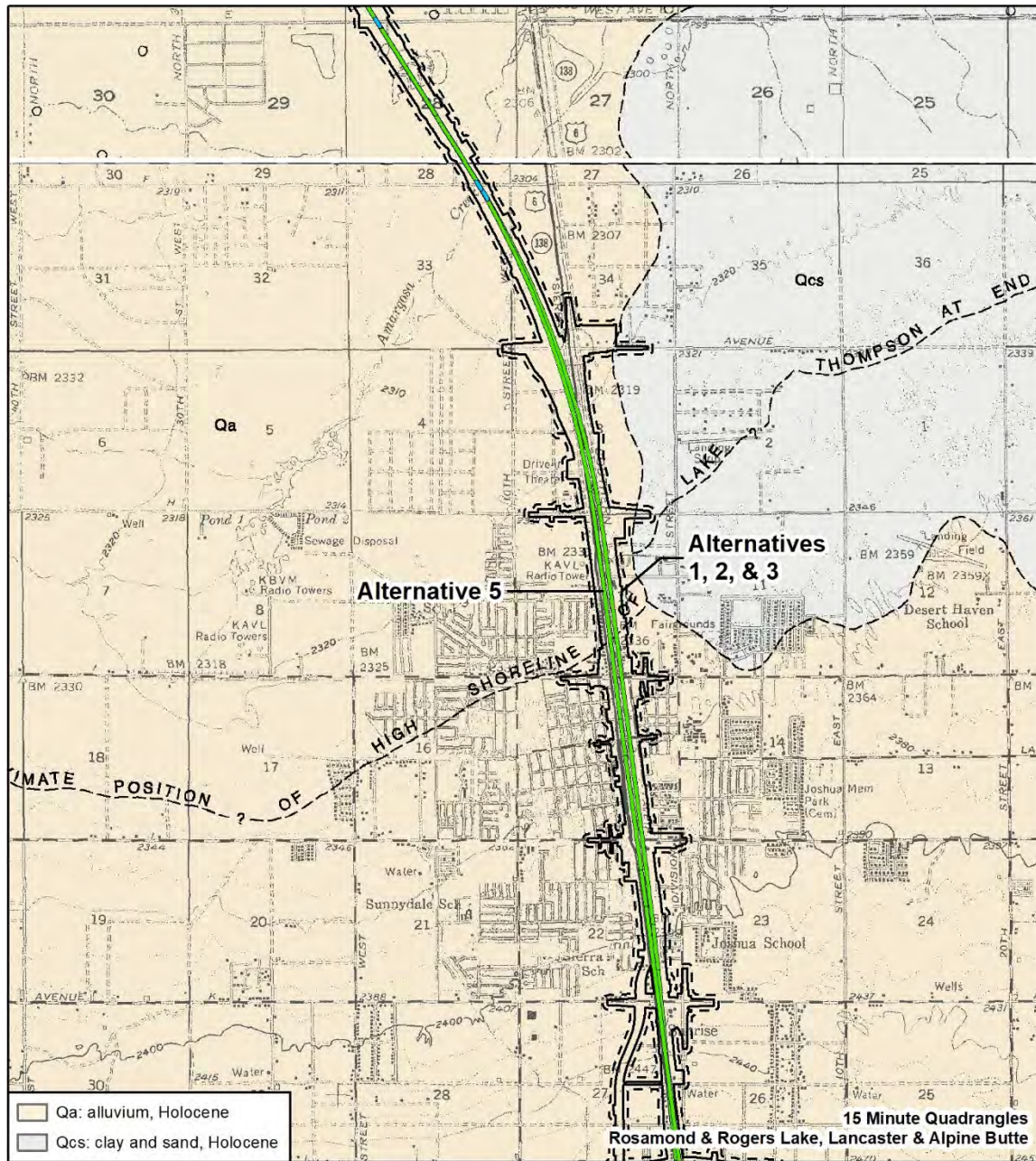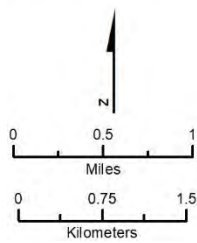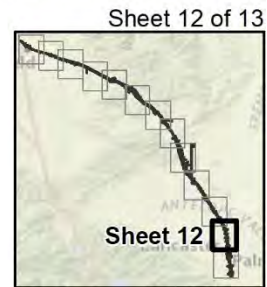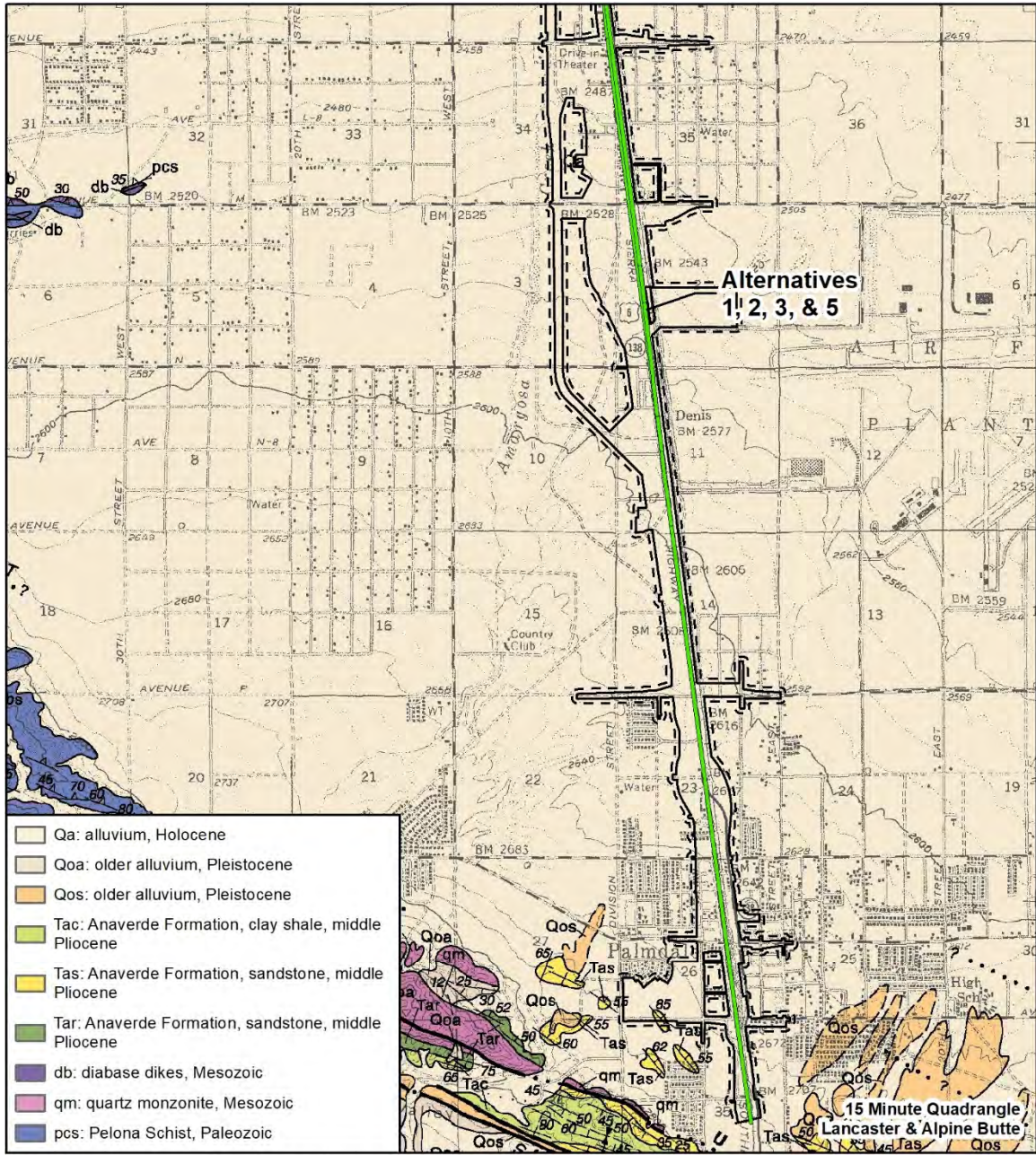
Sheet 11 of 13

Sheet 11

Figure 3.9-A-1 Geologic Map (Sheet 11)

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008c, e).

Figure 3.9-A-1 Geologic Map (Sheet 12)

Qa: alluvium, Holocene
Qoa: older alluvium, Pleistocene
Qos: older alluvium, Pleistocene
Tac: Anaverde Formation, clay shale, middle Pliocene
Tas: Anaverde Formation, sandstone, middle Pliocene
Tar: Anaverde Formation, sandstone, middle Pliocene
db: diabase dikes, Mesozoic
qm: quartz monzonite, Mesozoic
pcs: Pelona Schist, Paleozoic

SOURCE: Inset Background image from Esri/National Geographic (2019); Phase 4B CCNM Engineering data from CHSR (07/2020); Dibblee (2008c).

Sheet 13 of 13

HSR Alternative
Surface

Project Footprint
Study Area
(150ft Buffer of Project Footprint)

Sheet 13
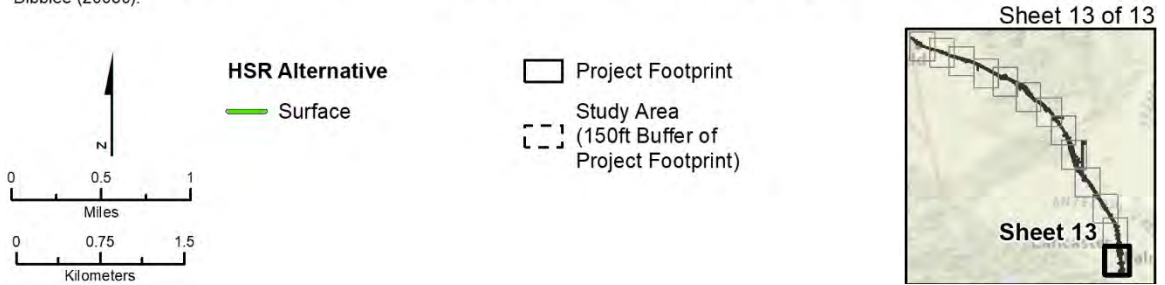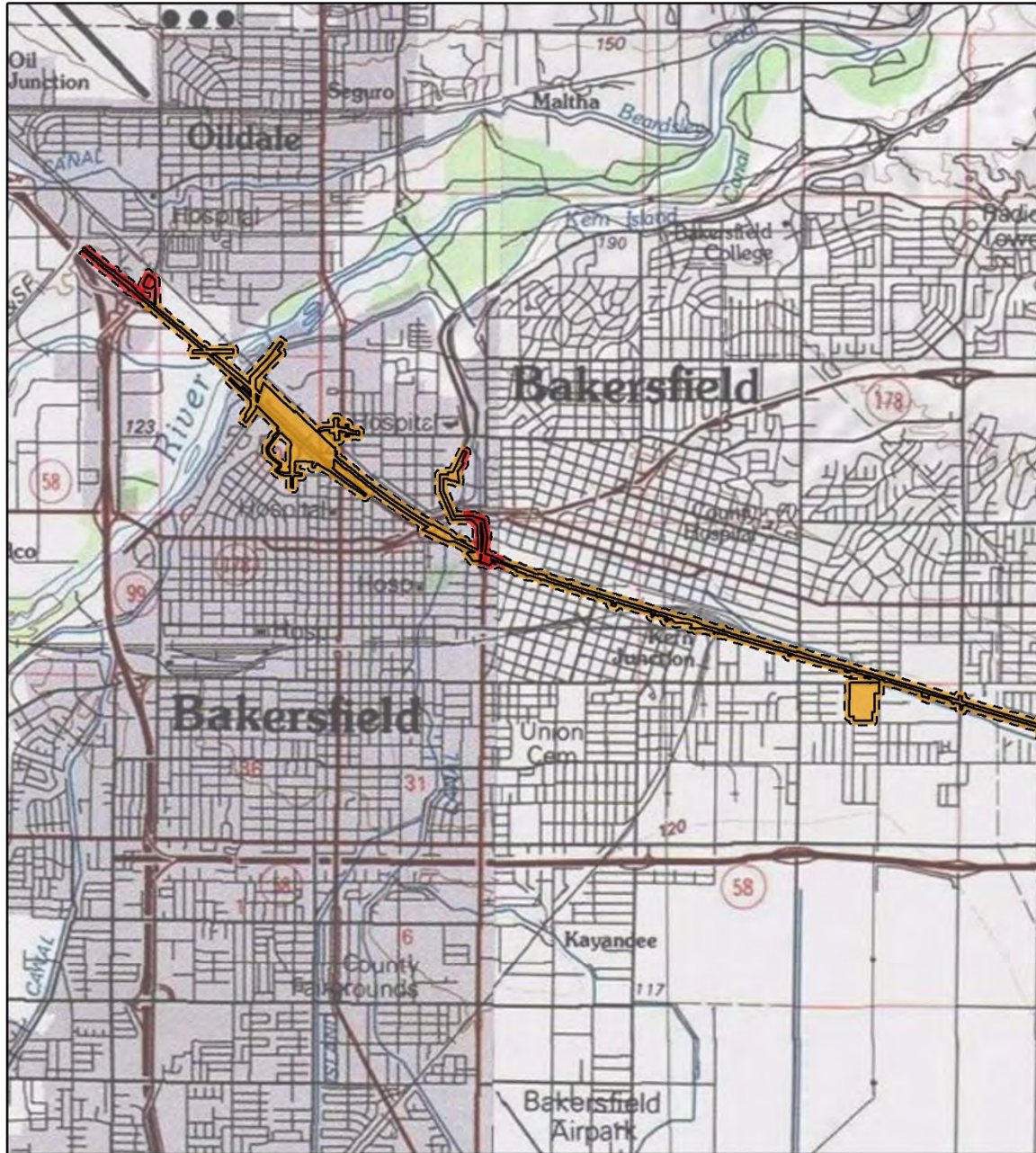
N

0   0.5   1
Miles

0   0.75   1.5
Kilometers

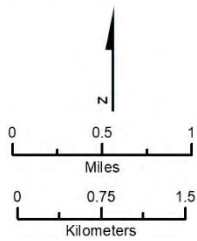**Figure 3.9-A-1 Geologic Map (Sheet 13)**

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 1 of 13

Paleontological Sensitivity

High Sensitivity

High Sensitivity Below 5-Foot Depth

Project Footprint

Study Area
(150ft Buffer of Project Footprint)

Sheet 1

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 1)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 2 of 13

Paleontological Sensitivity

High Sensitivity Below 5-Foot Depth

Project Footprint

Study Area (150ft Buffer of Project Footprint)

Sheet 2

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 2)
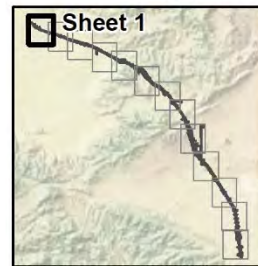
SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
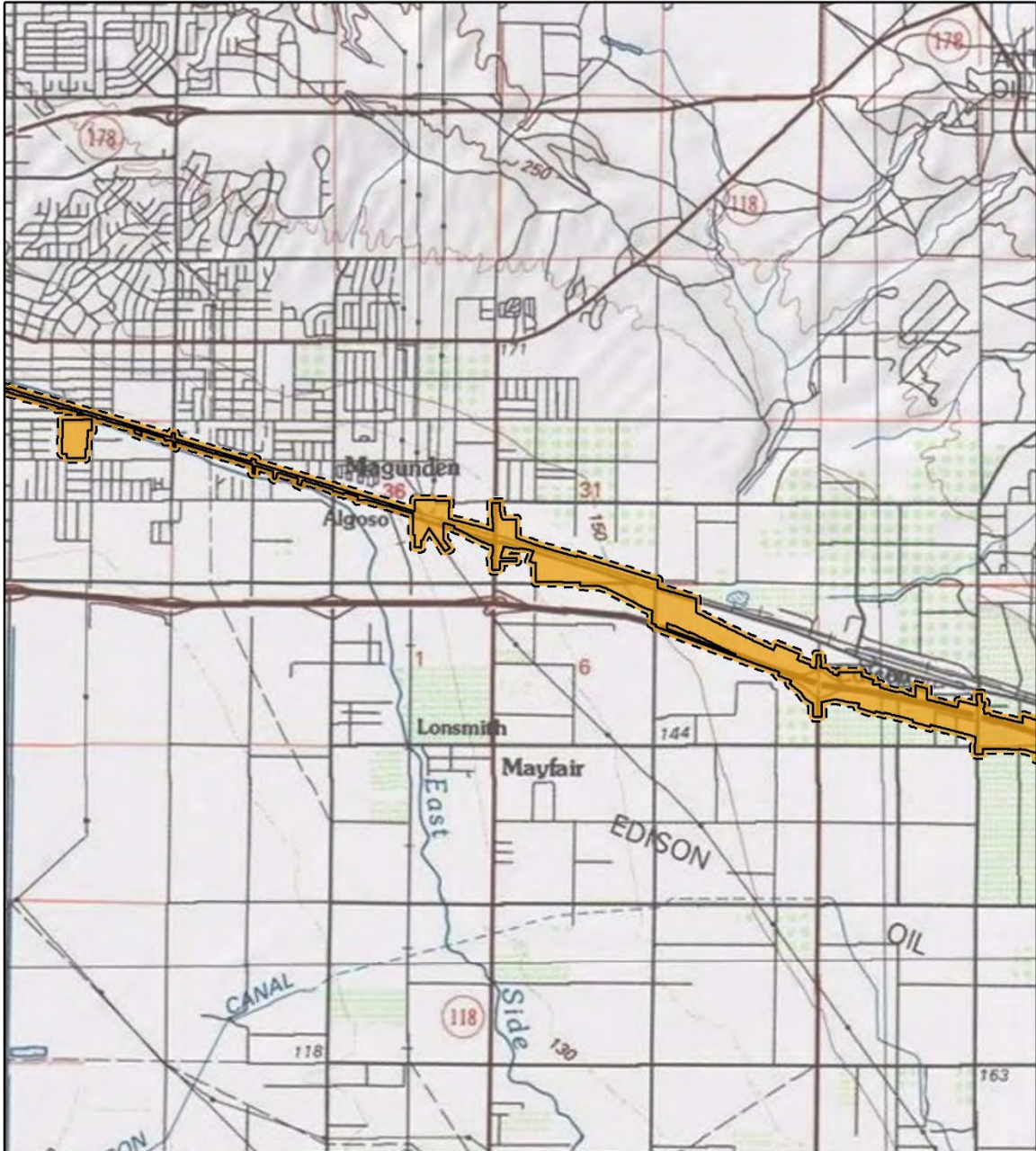Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 3 of 13

Paleontological Sensitivity

High Sensitivity Below
5-Foot Depth

Project Footprint

Study Area
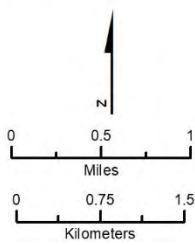(150ft Buffer of
Project Footprint)

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 3)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020); Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 4 of 13

Paleontological Sensitivity

- High Sensitivity
- High Sensitivity Below 5-Foot Depth
- Low or No Sensitivity

Project Footprint

Study Area
(150ft Buffer of Project Footprint)

Sheet 4

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 4)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 5 of 13

Paleontological Sensitivity

High Sensitivity Below 5-Foot Depth

Low or No Sensitivity

Project Footprint
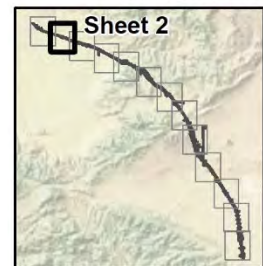
Study Area (150ft Buffer of Project Footprint)
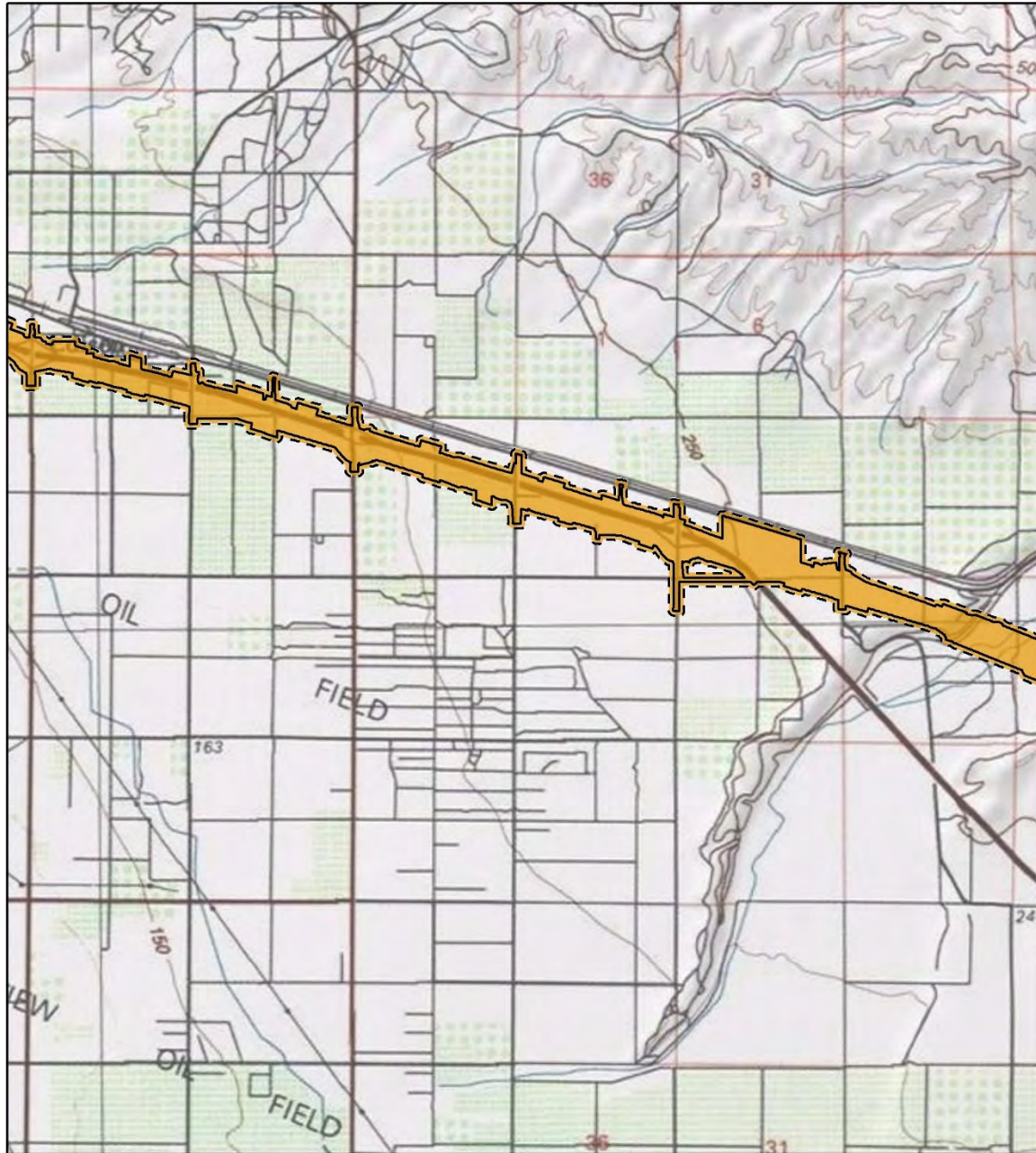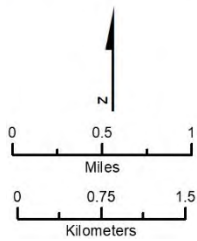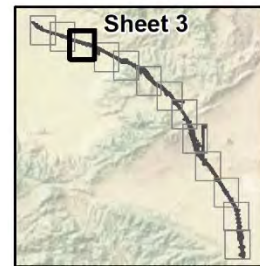
Sheet 5

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 5)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 6 of 13

Paleontological Sensitivity

- High Sensitivity
- High Sensitivity Below 5-Foot Depth
- Low or No Sensitivity

Project Footprint

Study Area
(150ft Buffer of Project Footprint)

Sheet 6

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 6)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
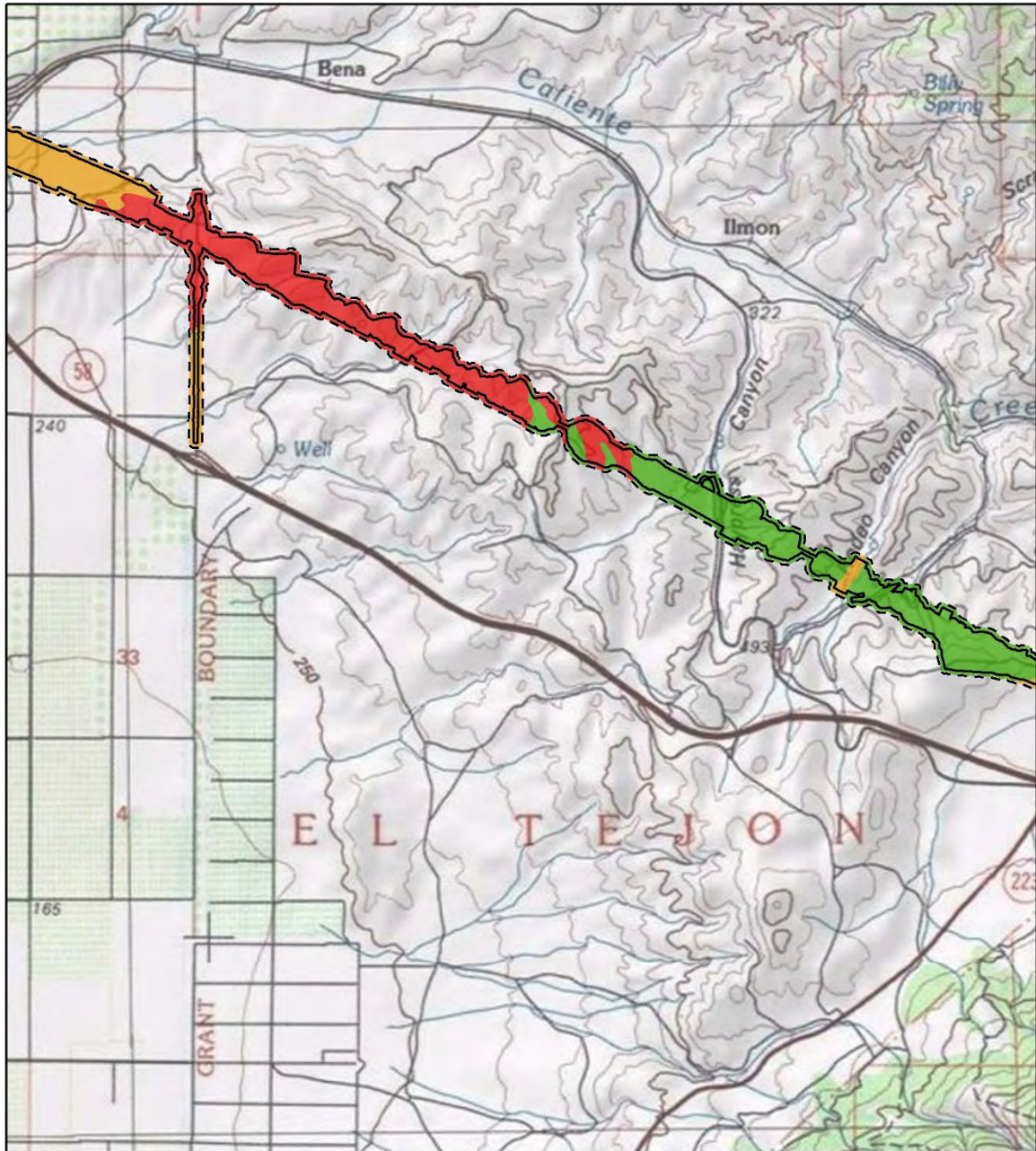Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 7 of 13

Paleontological Sensitivity

- High Sensitivity
- High Sensitivity Below 5-Foot Depth
- Low or No Sensitivity

Project Footprint

Study Area
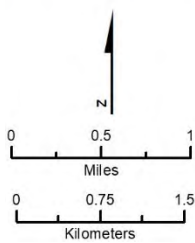(150ft Buffer of Project Footprint)

Sheet 7

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 7)

SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 8 of 13
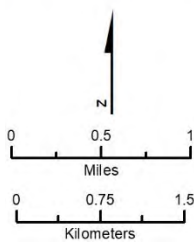
Paleontological Sensitivity

- High Sensitivity
- High Sensitivity Below 5-Foot Depth
- Low or No Sensitivity
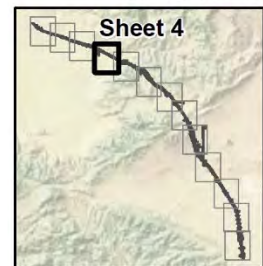
- Project Footprint
- Study Area (150ft Buffer of Project Footprint)
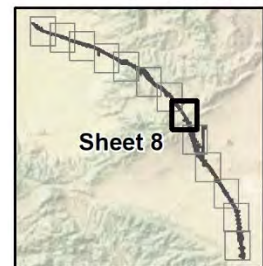
Figure 3.9-A-2 Paleontological Sensitivity (Sheet 8)
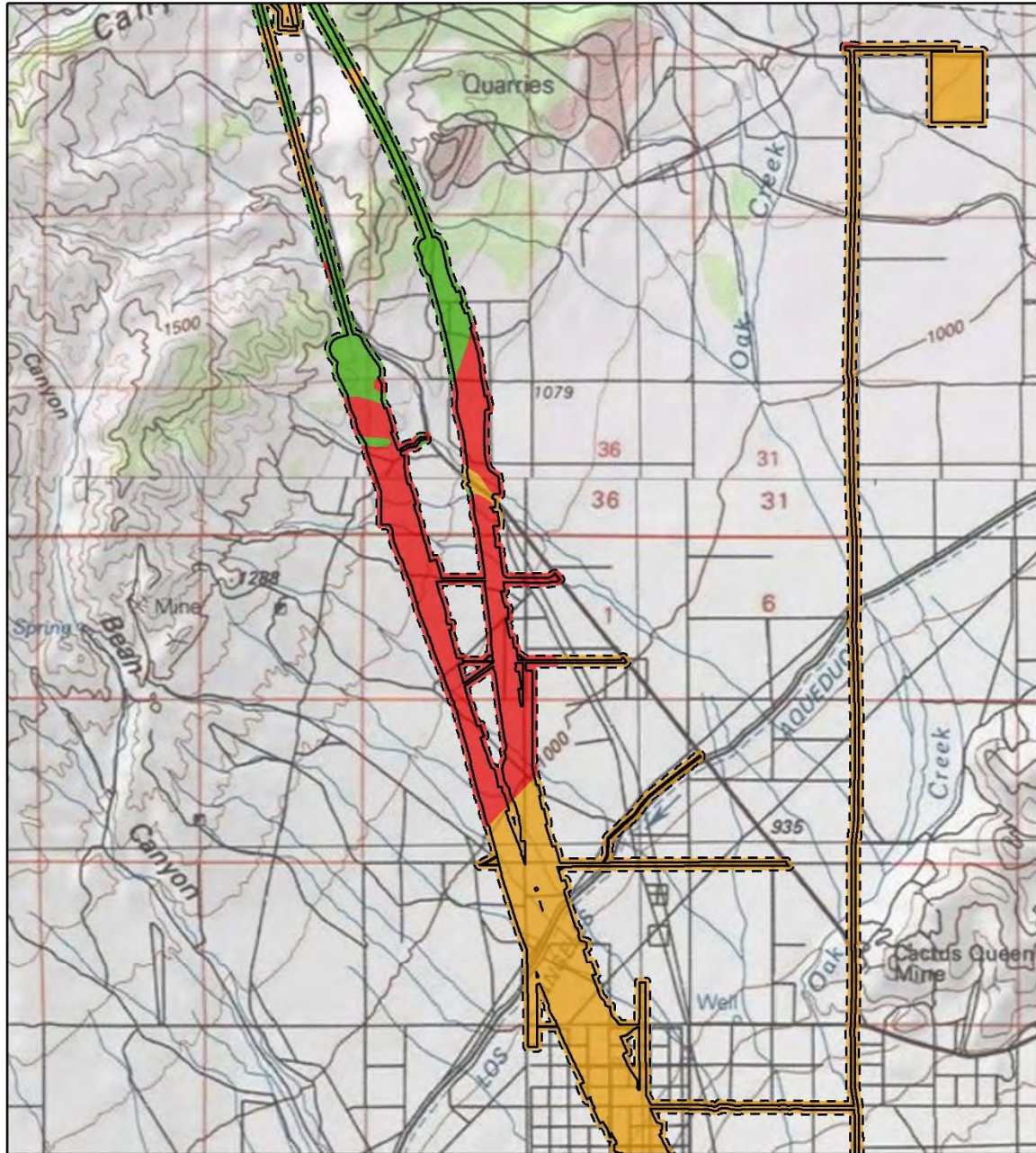
SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 9 of 13
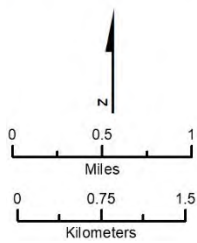
Paleontological Sensitivity

- High Sensitivity (red)
- High Sensitivity Below 5-Foot Depth (orange)
- Low or No Sensitivity (green)

Project Footprint

Study Area
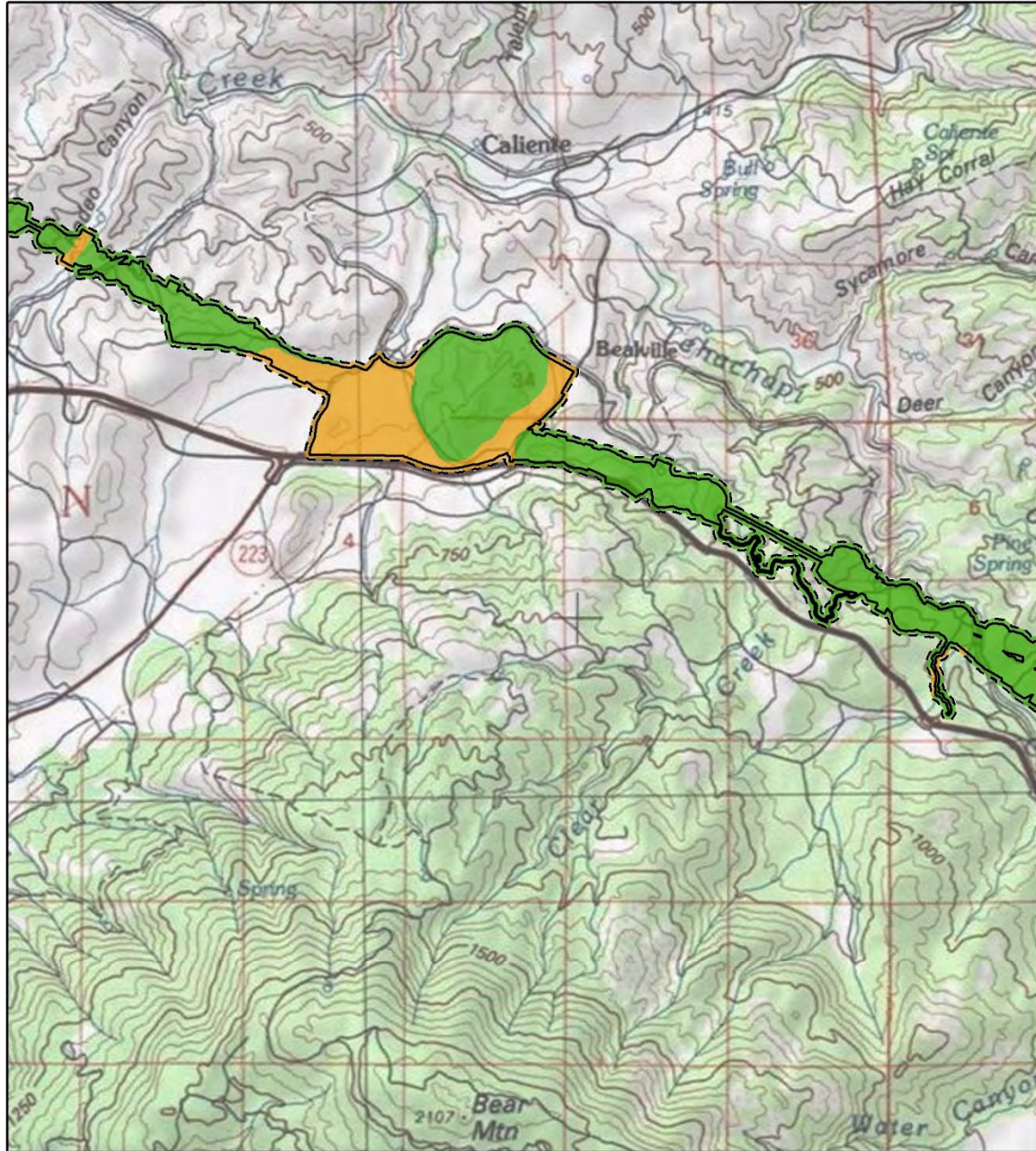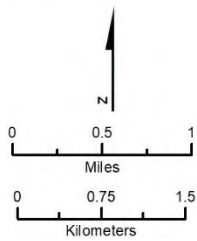(150ft Buffer of Project Footprint)
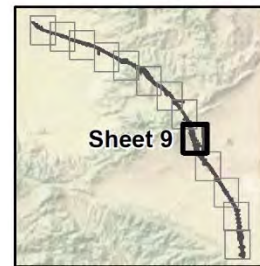
Sheet 9

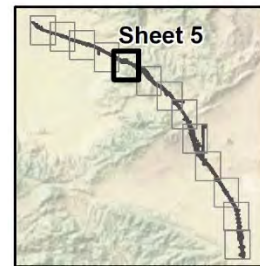**Figure 3.9-A-2 Paleontological Sensitivity (Sheet 9)**
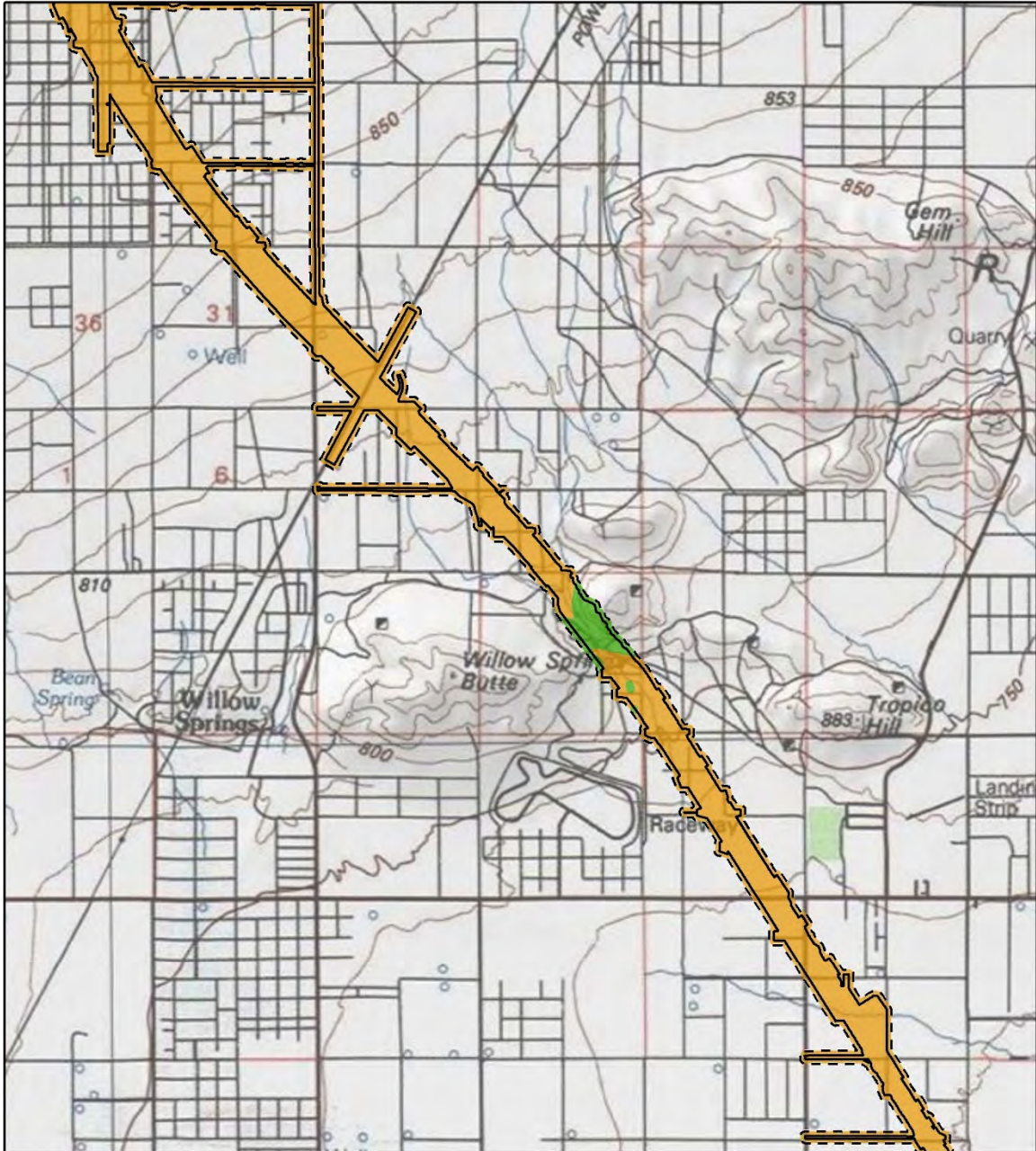
SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 10 of 13
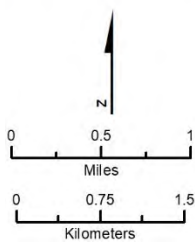
Paleontological Sensitivity

High Sensitivity Below 5-Foot Depth

Low or No Sensitivity

Project Footprint

Study Area
(150ft Buffer of
Project Footprint)
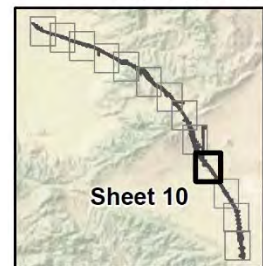
Sheet 10

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 10)
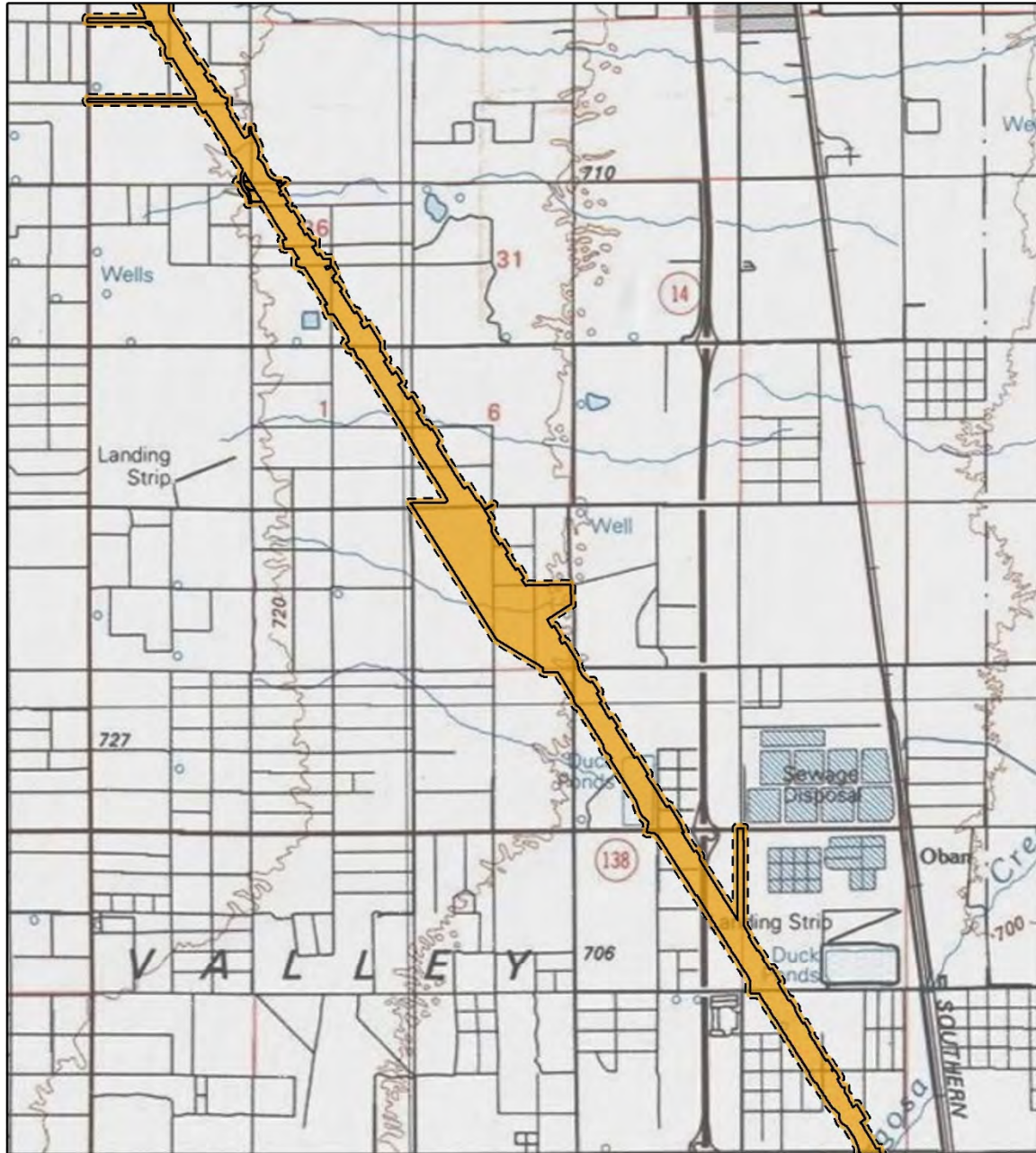
SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).
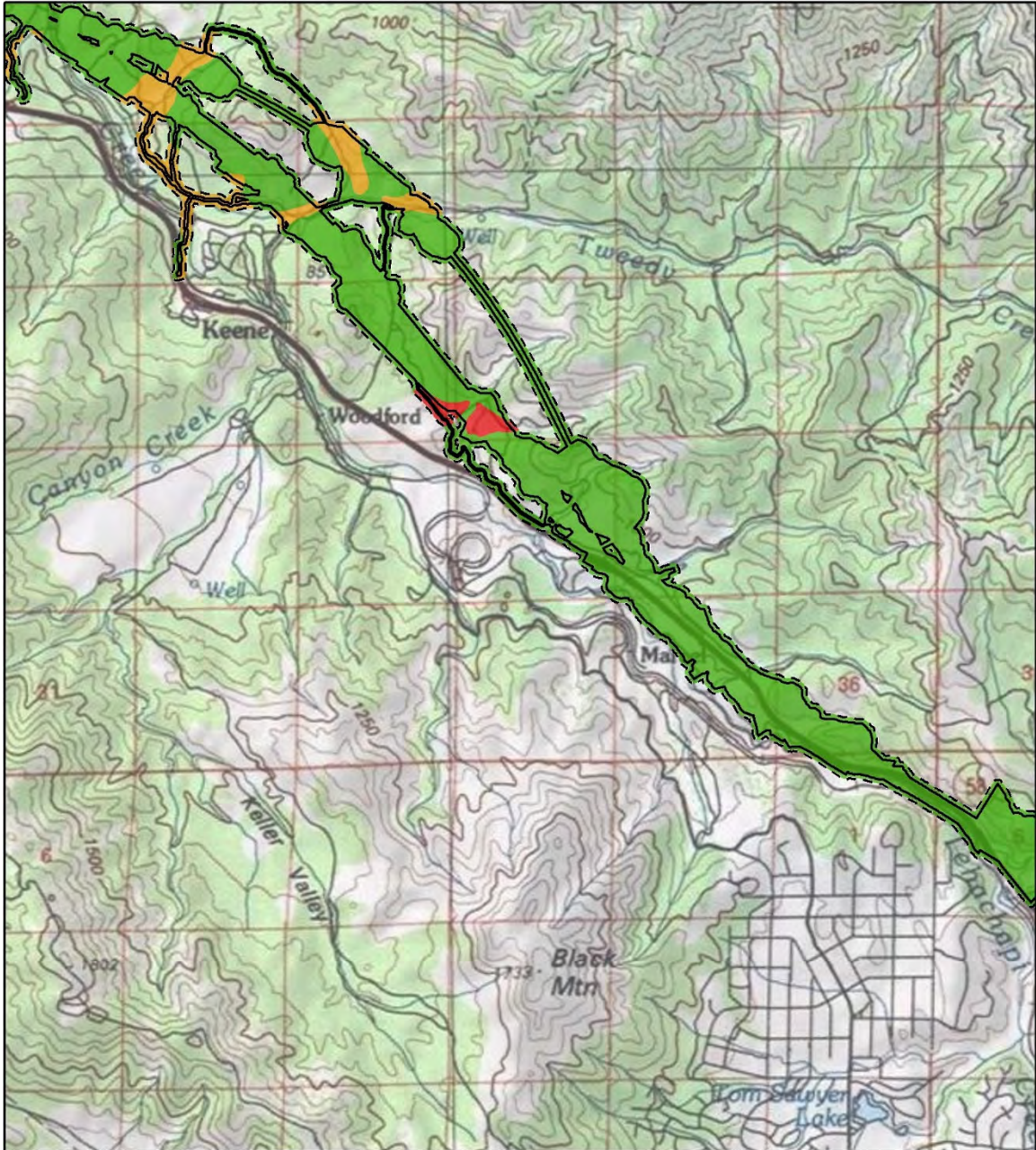
Sheet 11 of 13
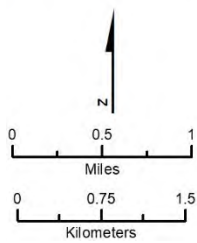
Paleontological Sensitivity

High Sensitivity Below 5-Foot Depth

Project Footprint

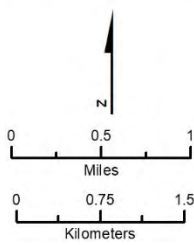Study Area (150ft Buffer of Project Footprint)
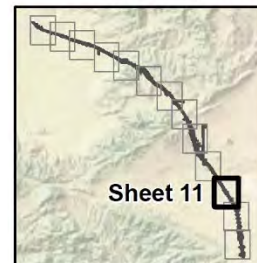
Sheet 11

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 11)
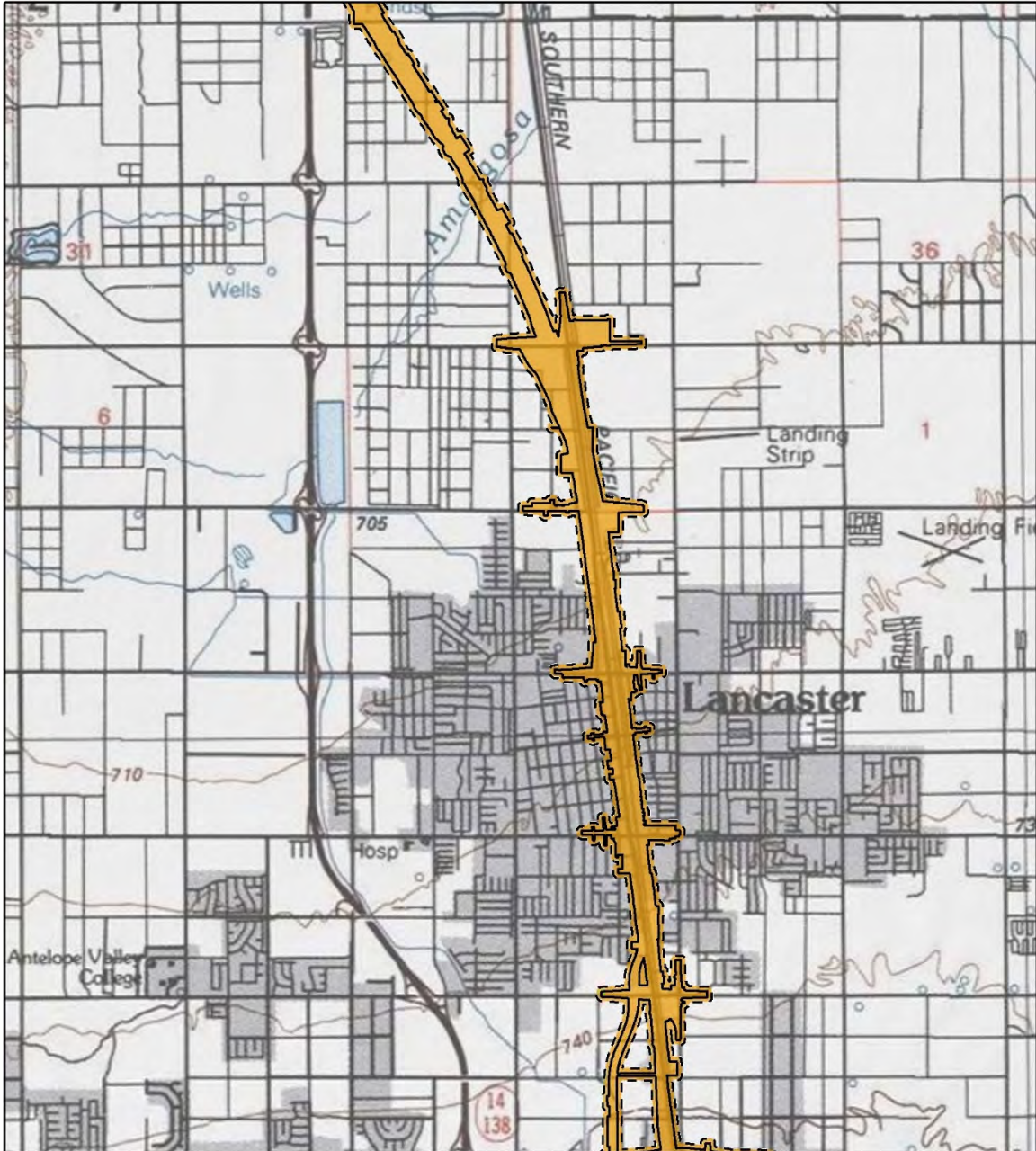
SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

Sheet 12 of 13
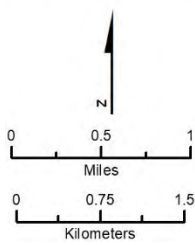
Paleontological Sensitivity

High Sensitivity Below
5-Foot Depth

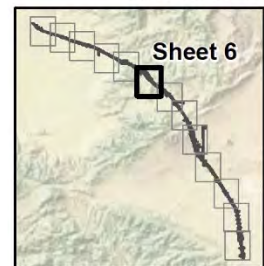Project Footprint

Study Area
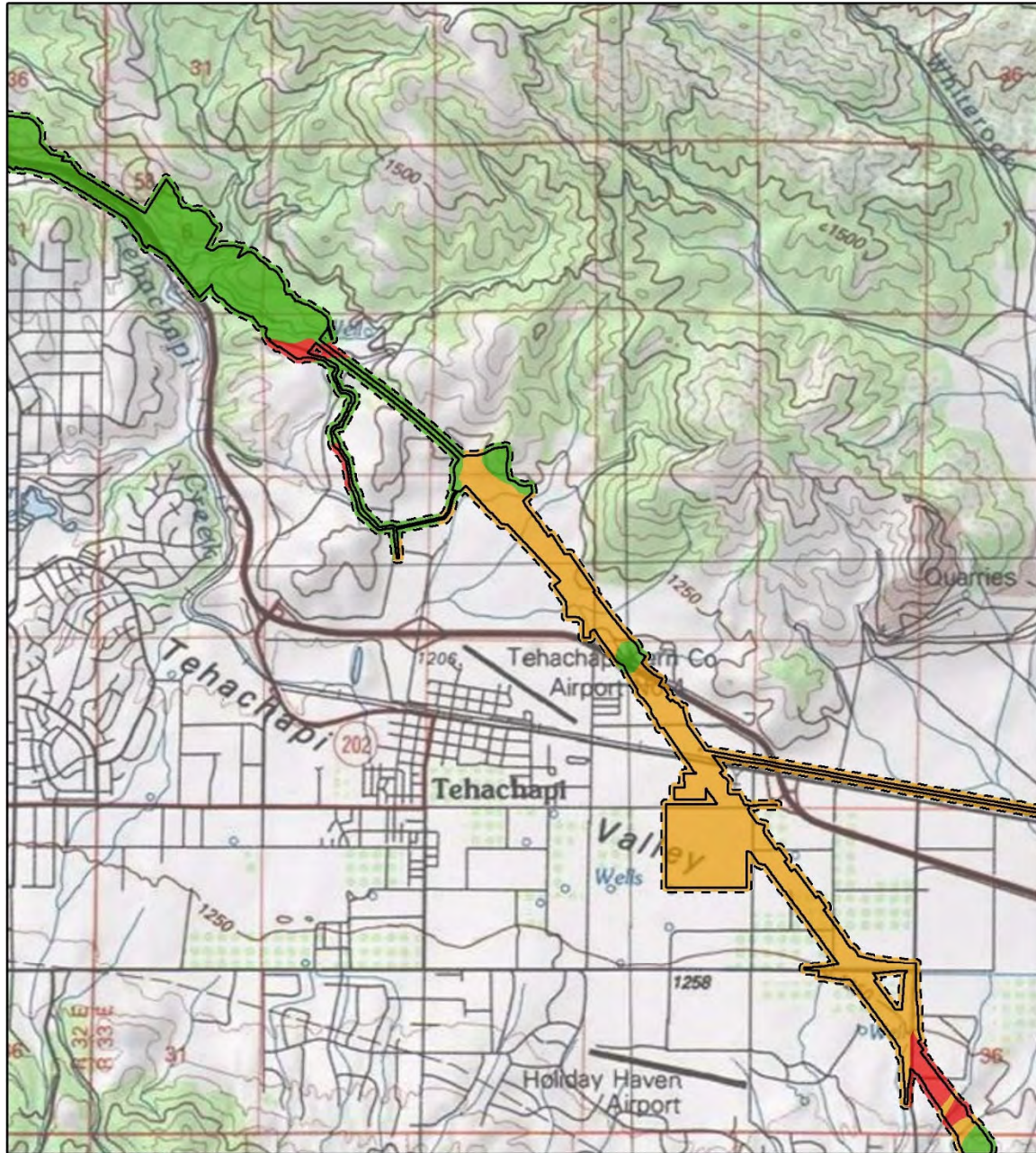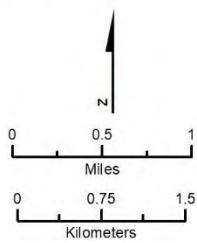(150ft Buffer of
Project Footprint)
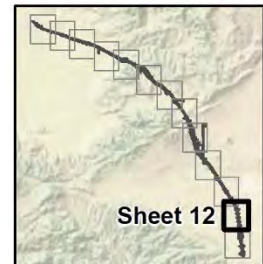
Sheet 12

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 12)
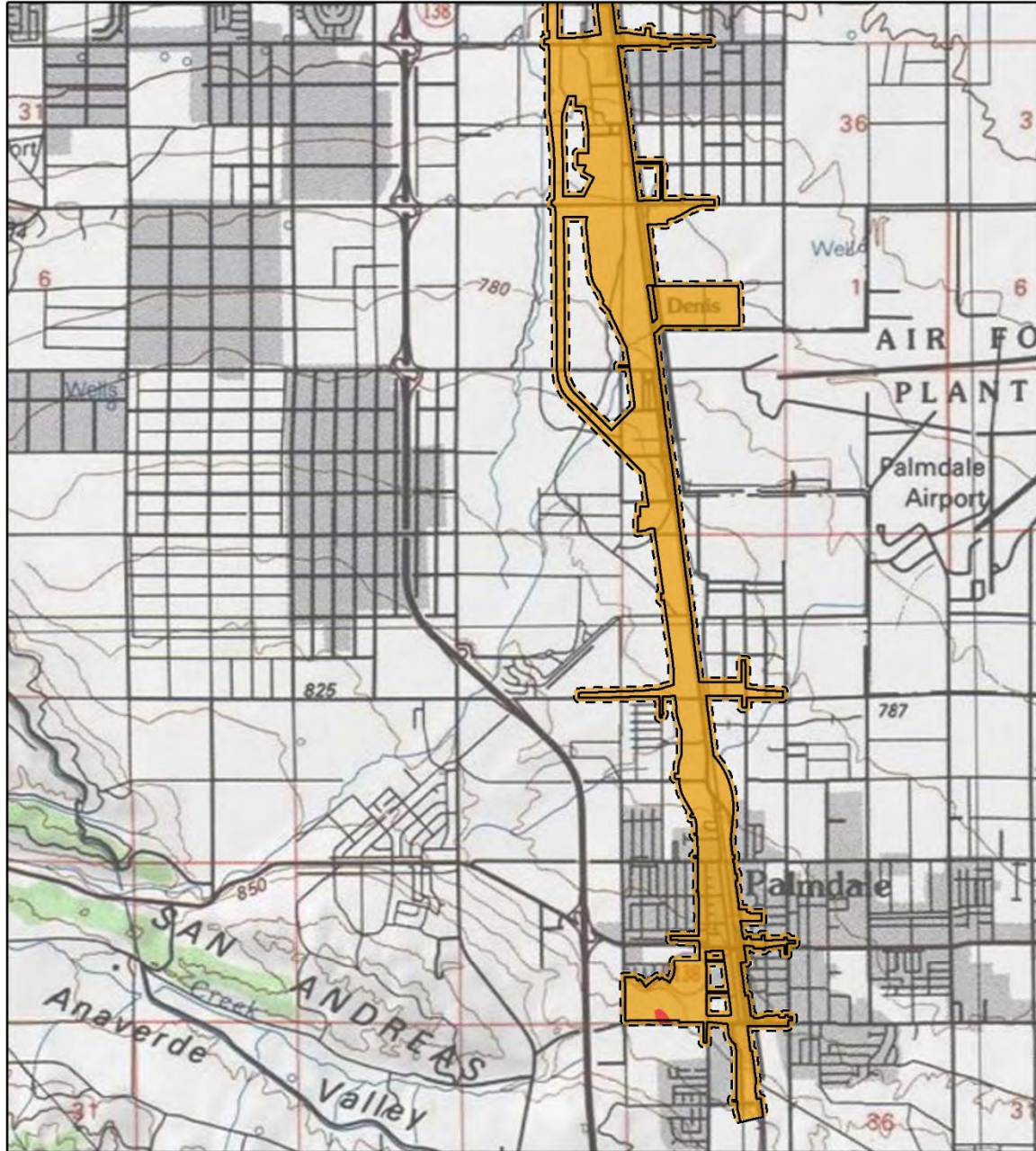
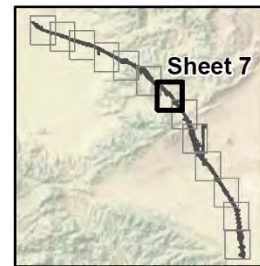SOURCE: USGS Topgraphic Quandrangles from Esri/National Geographic Society (2020);
Phase 4B CCNM Engineering Data from CHSR (07/2020).

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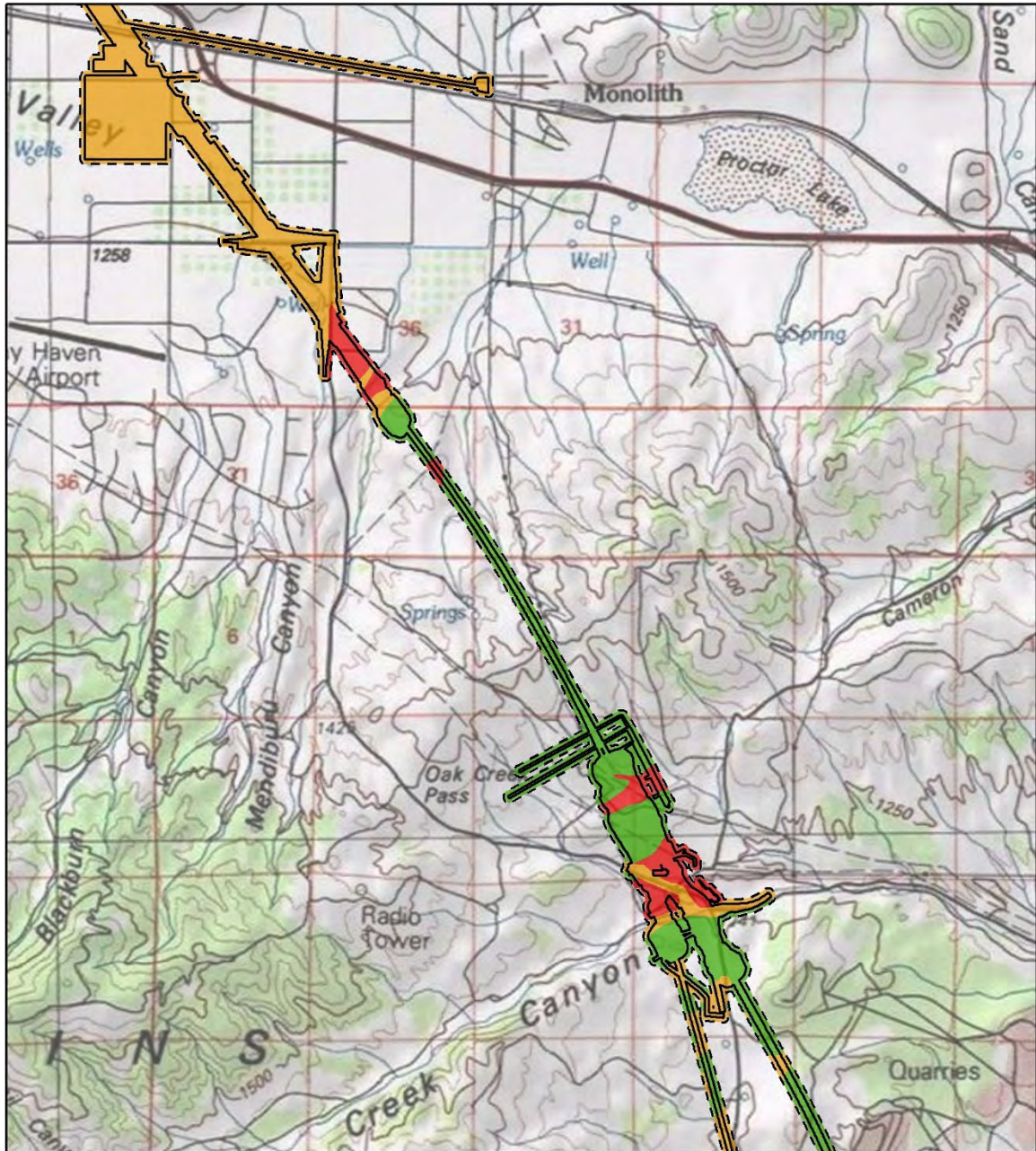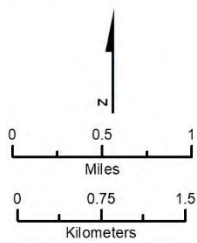**Paleontological Sensitivity**

- High Sensitivity
- High Sensitivity Below 5-Foot Depth
- Low or No Sensitivity

Project Footprint

Study Area
(150ft Buffer of Project Footprint)
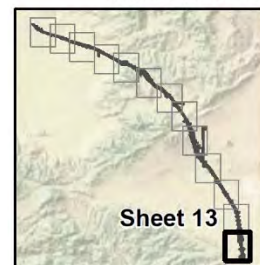
Sheet 13

Figure 3.9-A-2 Paleontological Sensitivity (Sheet 13)

**Table 3.9-A-1 Segments of Alternative 1 with "High" and "High at Depth"
Paleontological Sensitivity**

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	17285	17875	Qa/(high at depth)	11.8
3.9-11	17875	17937	QTkr/(high)	1.24
3.9-11	17937	17942	Tbe/(high)	0.10
3.9-11	17942	17956	QTkr/(high)	0.30
3.9-11	17956	18033	Tbe/(high)	1.54
3.9-11	18040	18045	Tbe/(high)	0.10
3.9-11	18052	18057	Tbe/(high)	0.10
3.9-11	18064	18069	Tbe/(high)	0.10
3.9-11	18069	18090	Qa/(high at depth)	0.40
3.9-11	18148	18153	Qa/(high at depth)	0.10
3.9-11	18220	18273	Qa/(high at depth)	1.10
3.9-11	18299	18306	Qa/(high at depth)	0.14
3.9-11	18468	18472	Qa/(high at depth)	0.08
3.9-11	18505	18518	Qa/(high at depth)	0.26
3.9-11	18552	18555	Qa/(high at depth)	0.06
3.9-11	18569	18572	Qa/(high at depth)	0.06
3.9-11	18653	18657	Qoa/(high)	0.07
3.9-11	18659	18668	Qoa/(high)	0.18
3.9-11	18891	18898	Qoa/(high)	0.14
3.9-11	18945	18950	Qoa/(high)	0.10
3.9-11	19003	19082	Qa/(high at depth)	1.58
3.9-11	19092	19250	Qa/(high at depth)	3.16
3.9-11	19250	19270	Qoa/(high)	0.40
3.9-11	19270	19272	Qa/(high at depth)	0.05
3.9-11	19272	19275	Qoa/(high)	0.07
3.9-11	19275	19277	Qa/(high at depth)	0.05
3.9-11	19302	19319	Qoa/(high)	0.35
3.9-11	19425	19434	Qoa/(high)	0.20
3.9-11	19447	19470	Qoa/(high)	0.50
3.9-11	19470	19473	Qa/(high at depth)	0.05
3.9-11	19495	19504	Qa/(high at depth)	0.18
3.9-11	19508	19514	Qa/(high at depth)	0.12
3.9-11	19521	19535	Qa/(high at depth)	0.28
3.9-11	19630	19663	Qoa/(high)	0.70
3.9-11	19663	19668	Qa/(high at depth)	0.10
3.9-11	19670	19770	Qoa/(high)	2.00

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	19770	20125	Qa/(high at depth)	7.10
3.9-11	20155	21268	Qa/(high at depth)	21.2
Approximate total miles of "high" paleontological sensitivity in Alternative 1				**8.9**
Approximate total miles of "high at depth" paleontological sensitivity in Alternative 1				**48.32**

Table 3.9-A-2 Segments of Alternative 2 with "High" and "High at Depth" Paleontological Sensitivity

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	17285	17875	Qa/(high at depth)	11.8
3.9-11	17875	17937	QTkr/(high)	1.24
3.9-11	17937	17942	Tbe/(high)	0.10
3.9-11	17942	17956	QTkr/(high)	0.30
3.9-11	17956	18033	Tbe/(high)	1.54
3.9-11	18040	18045	Tbe/(high)	0.10
3.9-11	18052	18057	Tbe/(high)	0.10
3.9-11	18064	18069	Tbe/(high)	0.10
3.9-11	18069	18090	Qa/(high at depth)	0.40
3.9-11	18148	18153	Qa/(high at depth)	0.10
3.9-11	18220	18273	Qa/(high at depth)	1.10
3.9-11	18299	18306	Qa/(high at depth)	0.14
3.9-11	18468	18472	Qa/(high at depth)	0.08
3.9-11	18505	18518	Qa/(high at depth)	0.26
3.9-11	18552	18555	Qa/(high at depth)	0.06
3.9-11	18569	18572	Qa/(high at depth)	0.06
3.9-11	18653	18657	Qoa/(high)	0.07
3.9-11	18659	18668	Qoa/(high)	0.18
3.9-11	18891	18898	Qoa/(high)	0.14
3.9-11	18945	18950	Qoa/(high)	0.10
3.9-11	19003	19082	Qa/(high at depth)	1.58
3.9-11	19092	19250	Qa/(high at depth)	3.16
3.9-11	19250	19270	Qoa/(high)	0.40
3.9-11	19270	19272	Qa/(high at depth)	0.05
3.9-11	19272	19275	Qoa/(high)	0.07
3.9-11	19275	19277	Qa/(high at depth)	0.05
3.9-11	19302	19319	Qoa/(high)	0.35
3.9-11	19425	19434	Qoa/(high)	0.20
3.9-11	19447	19470	Qoa/(high)	0.50

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	19470	19473	Qa/(high at depth)	0.05
3.9-11	19495	19504	Qa/(high at depth)	0.18
3.9-11	19508	19514	Qa/(high at depth)	0.12
3.9-11	19521	19535	Qa/(high at depth)	0.28
3.9-11	19630	19663	Qoa/(high)	0.70
3.9-11	19663	19668	Qa/(high at depth)	0.10
3.9-11	19670	19770	Qoa/(high)	2.00
3.9-11	19770	20125	Qa/(high at depth)	7.10
3.9-11	20155	21268	Qa/(high at depth)	21.2
Approximate total miles of "high" paleontological sensitivity in Alternative 2				8.9
Approximate total miles of "high at depth" paleontological sensitivity in Alternative 2				48.32

Table 3.9-A-3 Segments of Alternative 3 with "High" or "High at Depth" Paleontological Sensitivity

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	17285	17875	Qa/(high at depth)	11.8
3.9-11	17875	17937	QTkr/(high)	1.24
3.9-11	17937	17942	Tbe/(high)	0.10
3.9-11	17942	17956	QTkr/(high)	0.30
3.9-11	17956	18033	Tbe/(high)	1.54
3.9-11	18040	18045	Tbe/(high)	0.10
3.9-11	18052	18057	Tbe/(high)	0.10
3.9-11	18064	18069	Tbe/(high)	0.10
3.9-11	18069	18090	Qa/(high at depth)	0.40
3.9-11	18148	18153	Qa/(high at depth)	0.10
3.9-11	18220	18273	Qa/(high at depth)	1.10
3.9-11	18299	18306	Qa/(high at depth)	0.14
3.9-11	18468	18472	Qa/(high at depth)	0.08
3.9-11	18505	18518	Qa/(high at depth)	0.26
3.9-11	18552	18555	Qa/(high at depth)	0.06
3.9-11	18569	18572	Qa/(high at depth)	0.06
3.9-11	18653	18657	Qoa/(high)	0.07
3.9-11	18659	18668	Qoa/(high)	0.18
3.9-11	18891	18898	Qoa/(high)	0.14
3.9-11	18945	18950	Qoa/(high)	0.10
3.9-11	19003	19082	Qa/(high at depth)	1.58
3.9-11	19092	19250	Qa/(high at depth)	3.16

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	19250	19270	Qoa/(high)	0.40
3.9-11	19270	19272	Qa/(high at depth)	0.05
3.9-11	19272	19275	Qoa/(high)	0.07
3.9-11	19275	19277	Qa/(high at depth)	0.05
3.9-11	19302	19319	Qoa/(high)	0.35
3.9-11	19425	19430	Qoa/(high)	0.10
3.9-11	19450	19452	Qoa/(high)	0.05
3.9-11	19452	19457	Qa/(high at depth)	0.10
3.9-11	19457	19467	Qoa/(high)	0.20
3.9-11	19505	19510	Qa/(high at depth)	0.10
3.9-11	19515	19520	Qa/(high at depth)	0.10
3.9-11	19525	19530	Qa/(high at depth)	0.10
3.9-11	19535	16545	Qa/(high at depth)	0.20
3.9-11	19580	19590	Qoa/(high)	0.20
3.9-11	19630	19640	Qoa/(high)	0.20
3.9-11	19645	19787	Qoa/(high)	2.84
3.9-11	19787	20122	Qa/(high at depth)	6.70
3.9-11	20152	21265	Qa/(high at depth)	21.2
Approximate total miles of "high" paleontological sensitivity in Alternative 3				**8.35**
Approximate total miles of "high at depth" paleontological sensitivity in Alternative 3				**47.40**

Table 3.9-A-4 Segments of Alternative 5 with "High" or "High at Depth" Paleontological Sensitivity

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	17285	17875	Qa/(high at depth)	11.8
3.9-11	17875	17937	QTkr/(high)	1.24
3.9-11	17937	17942	Tbe/(high)	0.10
3.9-11	17942	17956	QTkr/(high)	0.30
3.9-11	17956	18033	Tbe/(high)	1.54
3.9-11	18040	18045	Tbe/(high)	0.10
3.9-11	18052	18057	Tbe/(high)	0.10
3.9-11	18064	18069	Tbe/(high)	0.10
3.9-11	18069	18090	Qa/(high at depth)	0.40
3.9-11	18148	18153	Qa/(high at depth)	0.10
3.9-11	18220	18273	Qa/(high at depth)	1.10
3.9-11	18299	18306	Qa/(high at depth)	0.14
3.9-11	18468	18472	Qa/(high at depth)	0.08

Figure	Station Start	Station End (from North)	Geological Units/ Sensitivity	Miles
3.9-11	18505	18518	Qa/(high at depth)	0.26
3.9-11	18552	18555	Qa/(high at depth)	0.06
3.9-11	18569	18572	Qa/(high at depth)	0.06
3.9-11	18653	18657	Qoa/(high)	0.07
3.9-11	18659	18668	Qoa/(high)	0.18
3.9-11	18891	18898	Qoa/(high)	0.14
3.9-11	18945	18950	Qoa/(high)	0.10
3.9-11	19003	19082	Qa/(high at depth)	1.58
3.9-11	19092	19250	Qa/(high at depth)	3.16
3.9-11	19250	19270	Qoa/(high)	0.40
3.9-11	19270	19272	Qa/(high at depth)	0.05
3.9-11	19272	19275	Qoa/(high)	0.07
3.9-11	19275	19277	Qa/(high at depth)	0.05
3.9-11	19302	19319	Qoa/(high)	0.35
3.9-11	19425	19434	Qoa/(high)	0.20
3.9-11	19447	19470	Qoa/(high)	0.50
3.9-11	19470	19473	Qa/(high at depth)	0.05
3.9-11	19495	19504	Qa/(high at depth)	0.18
3.9-11	19508	19514	Qa/(high at depth)	0.12
3.9-11	19521	19535	Qa/(high at depth)	0.28
3.9-11	19630	19663	Qoa/(high)	0.70
3.9-11	19663	19668	Qa/(high at depth)	0.10
3.9-11	19670	19770	Qoa/(high)	2.00
3.9-11	19770	20125	Qa/(high at depth)	7.10
3.9-11	20155	21268	Qa/(high at depth)	21.2
Approximate total miles of "high" paleontological sensitivity in Alternative 5				**8.9**
Approximate total miles of "high at depth" paleontological sensitivity in Alternative 5				**48.32**

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