Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

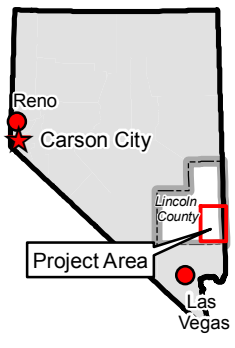
- Mountain Peak
- Clover Valley Booster Station
- Standpipe
- Rate of Flow Controller
- Storage Tank
- Tule Desert Booster Station
- Natural Gas Metering Station
- Existing Well
- Proposed Well
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toquop Energy Plant ROW
- Lincoln County Land Act Area
- LCCRDA Corridor
- Well Field Boundary Extent

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/ Vidler Water Company.

N

0 1 2 3 4 5
Miles

UTM, NAD 1983, Zone 11, Meters



Proposed Action and Alternative 1

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toquop Energy Plant ROW
- Hydrographic Basin Within the Project Area
- Lincoln County Land Act Area

Sources: ESRI Datasets; BLM Ely District Datasets.

N

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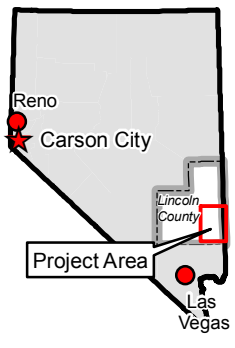
Miles

UTM, NAD 1983, Zone 11, Meters



Utah
Nevada
Cedar Range
Miller Spring Wash
Buckboard Wash
Empy Wash
Clover Creek
Caliente
93
Kershaw-Ryan State Park
Clover Valley Hydrographic Basin
Beaver Dam State Park
East Pine Wash
Pine Wash
Rainbow Canyon
Ash Creek
Pine Creek
Willow Creek
Clover Mountains
Coldwater Creek
Mud Springs Wash
Dobin Creek
Jacks Mountain
Sawmill Mountain
Cottonwood Creek
Cedar Wash
East Pass Wash
Diamond Peak
Delamar Mountains
Meadow Valley Wash
Meadow Valley Mountains
Kane Springs Wash
Garden Wash
Garden Mountain
Blue Nose Peak
Lime Mountain
Virgin River Valley Hydrographic Basin
Tule Desert Hydrographic Basin
Tule Desert
Rainbow Pass
Sams Camp Wash
Jones Spring Point
Tule Springs Hills
Snow Spring Wash
Jumbled Mountain
Toquop Wash
Toquop Gap
Mormon Mountains
Mormon Peak
South Fork Toquop Wash
East Mormon Mountains
Sand Hollow Wash
Lone Mesa
Davidson Peak
Whitmore Wash
Halfway Wash
Flat Top Mesa
Town Wash
Moapa Peak
Lincoln County
Clark County
Pulsipher Wash
Abbott Wash
Mesquite
Farrier Wash
Power/Gas Utility Corridor
Virgin River
Bunkerville
Weiser Wash
Virgin Hill
15

Project Area

Map 1-1
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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

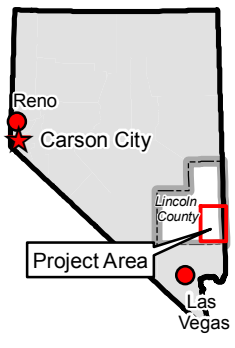
- Mountain Peak
- Clover Valley Booster Station
- Standpipe
- Rate of Flow Controller
- Storage Tank
- Tule Desert Booster Station
- Natural Gas Metering Station
- Existing Well
- Proposed Well
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toquop Energy Plant ROW
- Lincoln County Land Act Area
- LCCRDA Corridor
- Well Field Boundary Extent

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/ Vidler Water Company.

N

0 1 2 3 4 5
Miles

UTM, NAD 1983, Zone 11, Meters



Proposed Action and Alternative 1

Map 2-1
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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream, or Wash
- Fault
- Hydrographic Basin
- Lincoln County Land Act Area

Sources: ESRI Datasets 2006; USGS Caliente and Las Vegas 250K Quadrangles; BLM Ely District Datasets; Vidler Water Company. 2007a. Clover Valley Well Siting; Vidler Water Company. 2007b. Tule Desert Spring Impacts.

N

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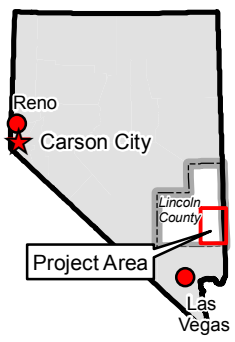
Miles

UTM, NAD 1983, Zone 11, Meters



General Physiography and Faults in the Region of Influence

Map 3-1
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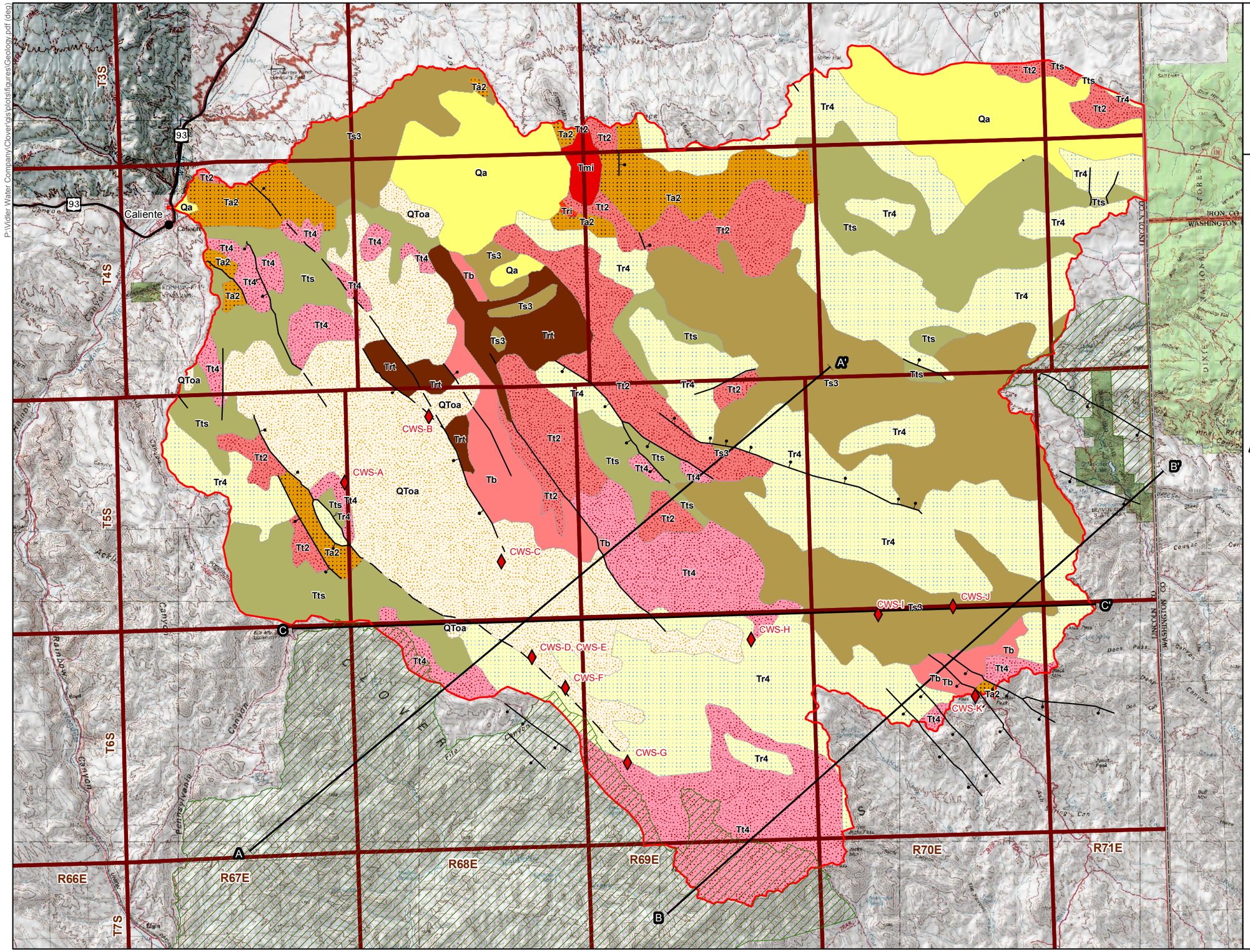
Clover Valley Geology and Description of Map Units



LEGEND

- CWS-A Proposed New Well Locations
- Wilderness Area

Geology

- Qa
- QToa
- Tb
- Tr4
- Tt4
- Ts3
- Ta2
- Ts2
- Tt2
- Tts
- Trt
- Tri
- Tmi
- Tgr
- Ꞓc
- CZq

- Faults With Ball on Downthrown Side
- Faults Without Downthrown
- Inferred Fault
- A A' Cross Section

General Features

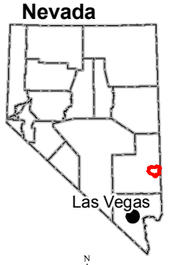
- Study Area
- Township and Range Line
- County Boundary

Sources:
Base topographic data:
(c) 2002 National Geographic Holdings (www.topo.com)
Geology data: U.S. Geological Survey, Stewart, J.H. and Carlson, J.E. 1978; Ekren et al 1977
Fault data:Turner, R.M. and Bawiec, W.J., 1996, nvfault3: DDS 41, U.S. Geological Survey, Denver.
Well and Spring data: NV Dept. Water Resources; USGS Geographic Names Information Systems

Map prepared by URS for the Clover Valley Well Siting Memo (Vidler 2007a)

UTM, Clarke 1866, Zone 11, Meters

Nevada



0 2 4
Miles

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Map 3-2a

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DESCRIPTION OF MAP UNITS

Qa	ALLUVIAL DEPOSITS - Locally includes beach and sand dune deposits
QToa	OLDER ALLUVIAL DEPOSITS
Tb	BASALT FLOWS
Tr4	RHYOLITIC FLOWS AND SHALLOW INTRUSIVE ROCKS
Tt4	WELDED AND NONWELDED SILICIC ASH-FLOW TUFFS - Locally includes thin units of air-fall tuff and sedimentary rock
Ts3	TUFFACEOUS SEDIMENTARY ROCKS - Locally includes minor amounts of tuff
Ta2	ANDESITE AND RELATED ROCKS OF INTERMEDIATE COMPOSITION - Flows and breccias
Ts2	TUFFACEOUS SEDIMENTARY ROCKS - Locally includes minor amounts of tuff
Tt2	WELDED AND NONWELDED SILICIC ASH-FLOW TUFFS - Locally includes thin units of air-fall tuff and sedimentary rock
Tts	ASH-FLOW TUFFS AND TUFFACEOUS SEDIMENTARY ROCKS
Trt	ASH-FLOW TUFFS, RHYOLITIC FLOWS, AND SHALLOW INTRUSIVE ROCKS
Tmi	INTRUSIVE ROCKS OF MAFIC AND INTERMEDIATE COMPOSITION
Tri	RHYOLITIC INTRUSIVE ROCKS
Tgr	GRANITIC ROCKS - Mostly quartz monzonite and granodiorite
Ꞓc	LIMESTONE AND DOLOMITE, LOCALLY THICK SEQUENCES OF SHALE AND SILTSTONE - Includes units such as Pioche Shale, Eldorado Dolomite, Geddes Limestone, Secret Canyon Shale, Hamburg Dolomite, Dunderberg Shale, and Windfall Formation of northern Nevada and Carrara, Bonanza King, and Nopah Formations of southern Nevada
CZq	QUARTZITE AND MINOR AMOUNTS OF CONGLOMERATE, PHYLLITIC SILTSTONE, LIMESTONE, AND DOLOMITE - Includes Prospect Mountain Quartzite, Osgood Mountain Quartzite, and Gold Hill Formation in northern Nevada and Stirling Quartzite, Wood Canyon Formation, and Zabriskie Quartzite in southern Nevada.

Source: Ekrem et al, 1977
Map produced by URS for the Clover Valley Well Siting Memo (Vidler 2007a)

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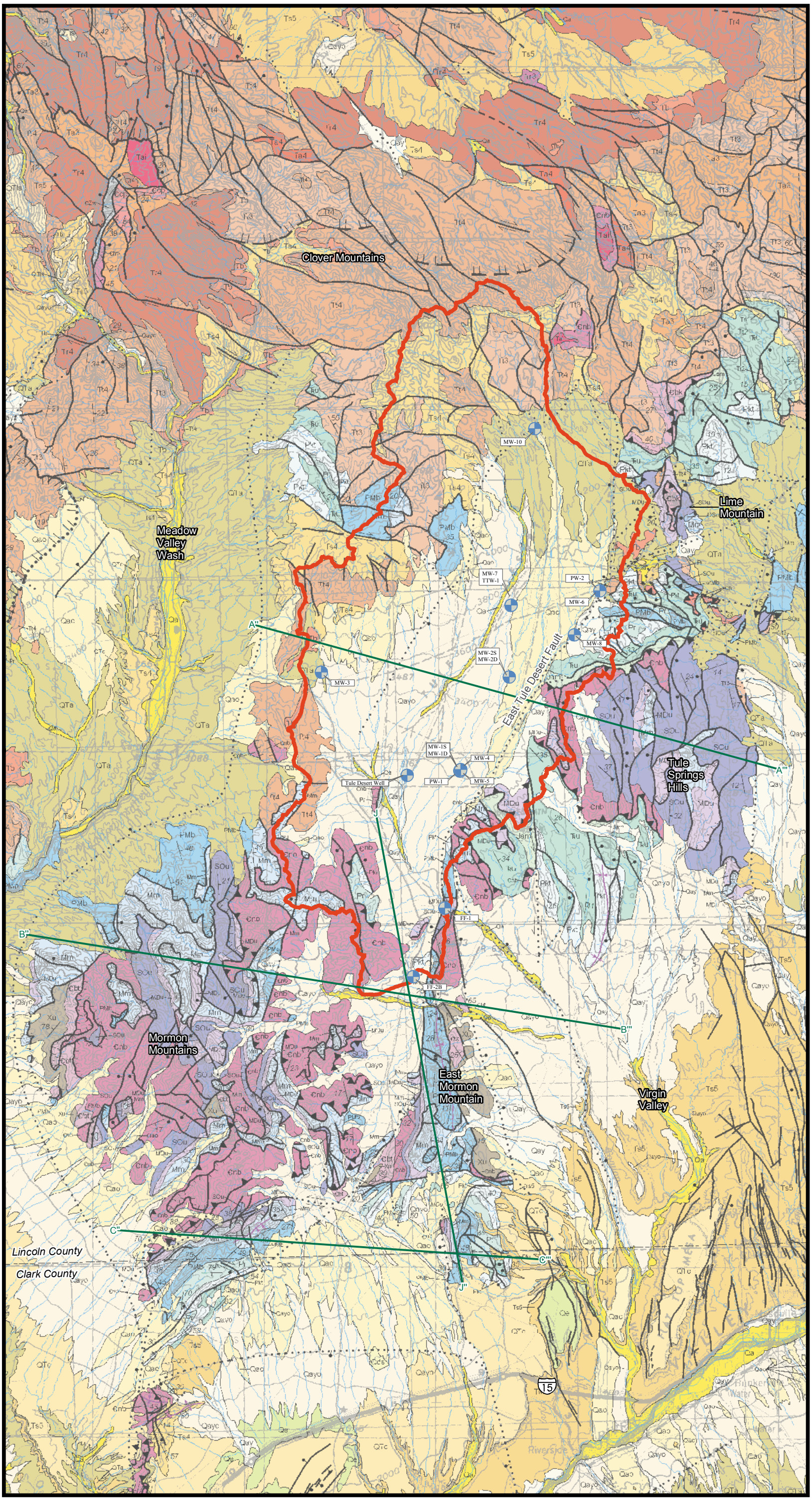
Map 3-2b
DRAFT



LEGEND

Project Features

- Tule Desert Hydrologic Basin Boundary
- Cross Section Location
- Project Related Wells in Tule Desert

Sources:
Geologic Base Map: Map 150 Geologic Map of Parts of the Colorado, White River, and Death Valley Groundwater Flow Systems, Nevada, Utah, and Arizona; Page et al & Nevada Bureau of Mines and Geology 2005
Cross Sections: Geologic Cross Sections of Parts of the Colorado, White River, and Death Valley Regional Ground-Water Flow Systems, Nevada, Utah, and Arizona; Page, Scheirer, and Langenheim 2006

Hydrologic Basins: Nevada Division of Water Resources
Well Data: Vidler Water Company, Inc 2006

Map prepared by URS for the Tule Desert Spring Impacts Memo (Vidler 2007b)

0 2.5 5
Miles
0 2.5 5
Kilometers

Geologic Map of Tule Desert, Lincoln County, Nevada

Map 3-3
DRAFT

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Spring
- Well
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative Action
- Hydrogeologic Cross Section Location
- Hydrographic Basin
- Toquop Energy Plant ROW
- Lincoln County Land Act Area
- LCCRDA Corridor

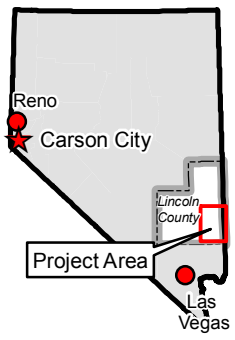
Note: Only springs and wells discussed in text are labeled

Sources: ESRI Datasets; BLM Datasets; Vidler Water Company. 2007a. Clover Valley Well Siting; Vidler Water Company. 2007b. Tule Desert Spring Impacts; LCWD/Vidler Water Company.

N

0 2 4 6 8 10
Miles

UTM, NAD 1983, Zone 11, Meters



Springs and Wells within the Region of Influence

Map 3-4

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- City/Town
- State Line
- County Line
- LCCRDA Corridor
- Hydrographic Basin
- Death Valley Flow System
- Meadow Valley Wash Flow System
- Salt Lake Flow System
- Virgin River Valley Flow System
- White River Flow System

Elko County
Tooele County
Juab County
Lander County
Eureka County
White Pine County
Millard County
Beaver County
Nye County
Iron County
Washington County
Lincoln County
Clark County
Inyo County
San Bernardino County
Nevada
Utah
Arizona
California
Mohave County

Austin
Eureka
Ely
Pioche
Panaca
Caliente
Alamo
Beatty
Indian Springs
Mesquite
Saint George
Overton
Las Vegas
Searchlight

Antelope Valley South
Deep Creek Valley
Southern Great Salt Lake Desert
Tippett Valley
Long Valley
Jakes Valley
Spring Valley
Tule Valley
Hamlin - Snake Valleys
White River Valley
Cave Valley
Lake Valley
Hamlin Valley
Pine Valley
Spring Valley
Patterson Valley
Dry Lake Valley
Garden Valley
Coal Valley
Pahroc Valley
Railroad Valley
Upper Virgin River Valley
Panaca Valley
Clover Valley
Cactus Flat
Stonewall Flat
Kawich Valley
Gold Flat
Pahranagat Valley
Delamar Valley
Tikapoo Valley
Emigrant Valley
Kane Springs Valley
Fort Pierce Wash
Virgin River Valley
Tule Desert
Sarcobatus Flat
Oasis Valley
Fortymile Canyon
Yucca Flat
Lower Meadow Valley Wash
Coyote Spring Valley
Crater Flat
Frenchman Flat
Three Lakes Valley
Mercury Valley
Indian Springs Valley
Lower Moapa Valley
Hidden Valley
California Wash
Amargosa Desert
Garnet Valley
Black Moutains Area
Death Valley
Lower Amargosa Desert
Pahrump Valley
Chicago Valley
Vialjean Valley
Shadow Valley

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Vidler Water Company.

N

0 10 20 30 40
Miles

UTM, NAD 1983, Zone 11, Meters

Hydrographic Basins and Flow Systems

Map 3-5
DRAFT

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Well
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Inferred Groundwater Elevation Contour
- Groundwater Elevation Contour
- Hydrographic Basin
- Lincoln County Land Act Area

Sources: ESRI Datasets; BLM Ely District Datasets; Vidler Water Company, 2007; LCWD/Vidler Water Company.

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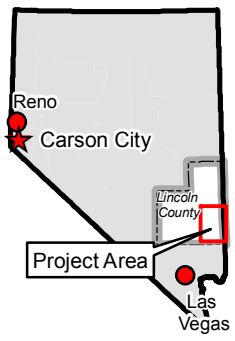
Miles

UTM, NAD 1983, Zone 11, Meters



Groundwater Elevation Map for Selected Portions of the Carbonate Rock Aquifer

Map 3-6

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Special Status Plant Species Location
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Biome Transition
- Lincoln County Land Act Area
- LCCRDA Corridor
- Hydrographic Basin
- Blackbrush
- Mojave Creosote Bush Scrub
- Mountain Shrub
- Piñon - Juniper
- Ponderosa Pine - Mountain Shrub
- Sagebrush/ Perennial Grass
- Other
- Potential Las Vegas Buckwheat Habitat
- Occupied Las Vegas Buckwheat Habitat
- 2005 Fire Boundary

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Vidler Water Company.

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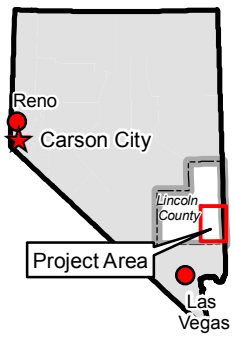
Miles

UTM, NAD 1983, Zone 11, Meters



Vegetation

Map 3-7
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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Lincoln County Land Act Area
- LCCRDA Corridor
- Hydrographic Basin
- Area of Critical Environmental Concern (ACEC)
- 2005 Fire Boundary
- Desert Tortoise Habitat
- Desert Tortoise Critical Habitat
- Potential Southwestern Willow Flycatcher Habitat
- Suitable Southwestern Willow Flycatcher Habitat

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Vidler Water Company

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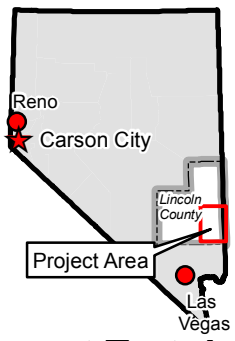
Miles

UTM, NAD 1983, Zone 11, Meters



Desert Tortoise Critical Habitat & Southwestern Willow Flycatcher Habitat

Map 3-8

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Lincoln County Land Act Area
- LCCRDA Corridor
- Hydrographic Basin
- Area of Critical Environmental Concern (ACEC)
- Southwestern Willow Flycatcher Designated Critical Habitat
- Woundfin and Virgin River Chub Designated Critical Habitat

Lower Meadow Valley Wash Hydrographic Basin
Tule Desert Hydrographic Basin
Toquop Gap
Mormon Mountains
South Fork Toquop Wash
East Mormon Mountains
Beaver Dam Slope ACEC
Sand Hollow Wash
Lone Mesa
Davidson Peak
Virgin River Valley Hydrographic Basin
Toquop Wash
Flat Top Mesa
Moapa Peak
Lincoln County
Clark County
Mormon Mesa ACEC
Power/Gas Utility Corridor
Mesquite
Bunkerville
Virgin Hill
15
Virgin River ACEC
Halfway Wash
Nickel Creek
Gold Butte ACEC
Lower Moapa Valley Hydrographic Basin
Muddy River
Gold Butte Area Hydrographic Basin
Overton Wash
Kingman Wash
Kaolin Wash
Black Mountains Area Hydrographic Basin
Mud Wash
Black Wash

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Vidler Water Company; US Fish and Wildlife Services Datasets

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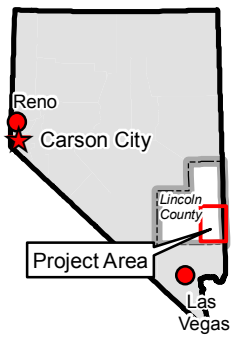
Miles

UTM, NAD 1983, Zone 11, Meters



Virgin River Fish & Southwestern Willow Flycatcher Critical Habitat

Map 3-9

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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

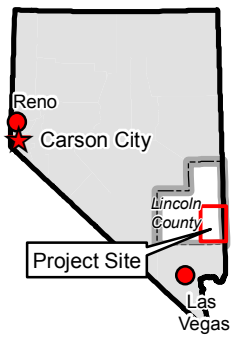
- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toquop Energy Plant ROW
- Lincoln County Land Act Area
- LCCRDA Corridor
- Bureau of Land Management (BLM)
- State
- Private
- Wilderness
- Area of Critical Environmental Concern (ACEC)

Sources: ESRI Datasets 2006; BLM Ely District Datasets; ICWD/Vidler Water Company.

N

0 1 2 3 4 5
Miles

UTM, NAD 1983, Zone 11, Meters



Land Ownership and Use in the Vicinity of the Project Area

Map 3-10
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Lincoln County Land Act
Groundwater Development
and Utility Right-of-Way Project

Legend

- Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toquop Energy Plant ROW
- Lincoln County Land Act Area
- LCCRDA Corridor
- Hydrographic Basin
- Wilderness Area
- Area of Critical Environmental Concern (ACEC)

1 - Toquop Energy Project
2 - Holley Energy Partners
3 - Kern River Expansion Pipeline
4 - Mesquite Replacement Airport
5 - Interstate 15 - Exit 109 Interchange
6 - Clark, Lincoln, and White Pine Counties Groundwater Development
7 - Kane Springs Groundwater Development
8 - Build-Out of the Lincoln County Land Act Area
9 - Build-Out of the Mesquite Lands Act Property
10 - Proposed Lower Meadow Valley Wash Area of Critical Environmental Concern

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Vidler Water Company.

N

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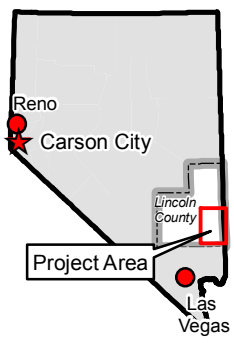
Miles

UTM, NAD 1983, Zone 11, Meters



Cumulative Impacts Analysis

Map 4-1
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