GEOLOGIC AND SOIL HAZARDS REPORT

Introduction

Encana Oil and Gas (USA) Inc. have proposed a Hunter Mesa Water Impoundment Facility that will be located southeast of Rifle and south of I-70, west of West Mamm Creek Road and lies between Dry Creek and Mamm Creek in Garfield County, Colorado. This proposed Water Impoundment Facility will be located in Section 1, Township 7 South, Range 93 West, of the Sixth Principal Meridian. The vicinity of this proposed Water Impoundment Facility is shown on a map provided in Figure 2.

The Encana Oil and Gas (USA) Inc., Water Impoundment Facility project is located basically on the eastern edge of the Piceance Basin near the Grand Hogback consisting of approximately 2,200 acres. It lies adjacent to areas undergoing natural gas development by Snyder Oil Corp. and Encana Oil and Gas (USA) Inc. The natural gas resources that are being developed lie within the Quaternary: Pinedale and Bull Lake age gravels and alluvium deposits. The proposed location is:

- Section 1, Township 7S, Range 93W, 6th P.M.

Geology

The proposed project is located near the eastern margin of the Piceance Basin; an irregularly-shaped elongated basin formed by tectonic forces that downwarped the earth's crust as a result of the uplift of the Colorado Rocky Mountains. Areas on all sides of the Piceance Basin have been uplifted by these same tectonic forces.

Structural Geology

The Piceance Basin is the major structural geologic feature in the region. It is bound to the east by the Grand Hogback monocline, the White River Uplift to the northeast, the Gunnison Uplift to the south, the Uncompahgre Uplift to the southwest, the Douglas Creek Arch to the west-northwest, and the axial basin uplift to the north (Grout and Verbeek, 1992).

The Grand Hogback monocline is a sinuous feature comprised of Upper Cretaceous age bedrock of the Mesaverde Group, which includes the Williams Fork Formation and the underlying Mancos Shale. The Grand Hogback forms part of the boundary between two major physiographic provinces, the Colorado Plateau and the Rocky Mountain foreland. The Grand Hogback bends abruptly to the north of the Gibson Gulch Quadrangle and strata along the west- to southwest-facing, steep limb of the monocline typically dip basinward at an angle of 45° or are even overturned in some areas (Grout and Verbeek, 1992). A series of west-northwest trending, broad, gentle anticlines and synclines, are present within the Piceance Basin to the west of the Grand Hogback. The Wolf Creek Anticline and the Divide Creek Anticline are the two closest of these structures. The axis of the Divide Creek anticline crosses the southwestern part of the Gibson Gulch Quadrangle. There are a total of eight joint sets, or fracture-pattern trends, that have been mapped in the Wasatch and Mesaverde Group bedrock units in the area (Grout and Verbeek, 1992). These joint sets are the result of structural deformation of these sedimentary rock units through geologic time.

Surficial Geology

The location for the proposed facility is located in the Pinedale and Bull Lake age gravels and alluvium deposits (Fig 3). Within the Quaternary, it is identify as glacial deposits of the Pinedale and Bull Lake age gravels and alluvium. The Pinedale is equivalent to the Latest Glacial advancements and Bull Lake is the second-oldest glacial advance commonly interpreted in the Rocky Mountains.

Geologic Hazards

The location for the proposed facility is not within any identified slope hazard areas. No significant faults or fissures have been identified proximate to the proposed location. No geologic hazards have been mapped by Garfield County in this area and no faults or other hazards are evident on the Geologic Map of Colorado.

Soils

A copy of a NCRS Custom Soil Resource Report for the project site has been provided. According to information prepared by the Natural Resources Conservation Commission Soil Survey soils in these sections have been mapped as Potts loam, (55), and the Potts-Ildefonso complex, (58) (Fig.3).

The Potts loam, (55) is developed on 3 percent to 6 percent slopes, at elevations of 5,000 to 7,000 feet. Well drained soils with no flooding or ponding. Found in landform setting of valley sides, benches, and mesas. The parent material of this soil is alluvium derived from basalt and/or alluvium derived from sandstone and shale.

The Potts-Ildefonso complex, (58) soils are developed on 12 to 25 percent slopes, and consist of well drained soils on mountainsides and ridges at elevations of 5,000 to 6,500 feet. These

soils are found in landform setting of valley sides, alluvial fans, and mesas. The parent material of this soil is alluvium derived from basalt and/or alluvium derived from sandstone and shale.

Conclusions and Summary

Construction and operation of the proposed facility at this location will not be exposed to any significant risks from geologic hazards. The implementation of storm water controls and best management practices should take into consideration the geology and soil types present at this location. These engineering controls and practices should be applied to divert stormwater away from the construction areas and to prevent additional weight which could trigger a debris flow or landslide. Pits are required to be lined by COGCC rules, but pit liners may also prevent water infiltration into unconsolidated sediments which could trigger slope failure. Pits and catchment basins should be sited and designed so as not to add weight to potentially unstable areas.

Olsson appreciates the opportunity to provide this information to Encana Oil and Gas (USA) Inc. pertaining to the assessment of geologic and soil hazards associated with the proposed Hunter Mesa Water Impoundment Facility in Garfield County, Colorado. Olsson can conduct field work to assist with the site specific assessments of the proposed project, to determine the degree to which these hazards may affect the specific locations.

Sincerely,

Olsson Associates

Tammie Lee Crossen
Associate Geologist

Attachments: Figure 1 – Vicinity Map
Figure 2 – Geology Map
Figure 3 – Soils Map
Figure 4 – Slope Hazards Map

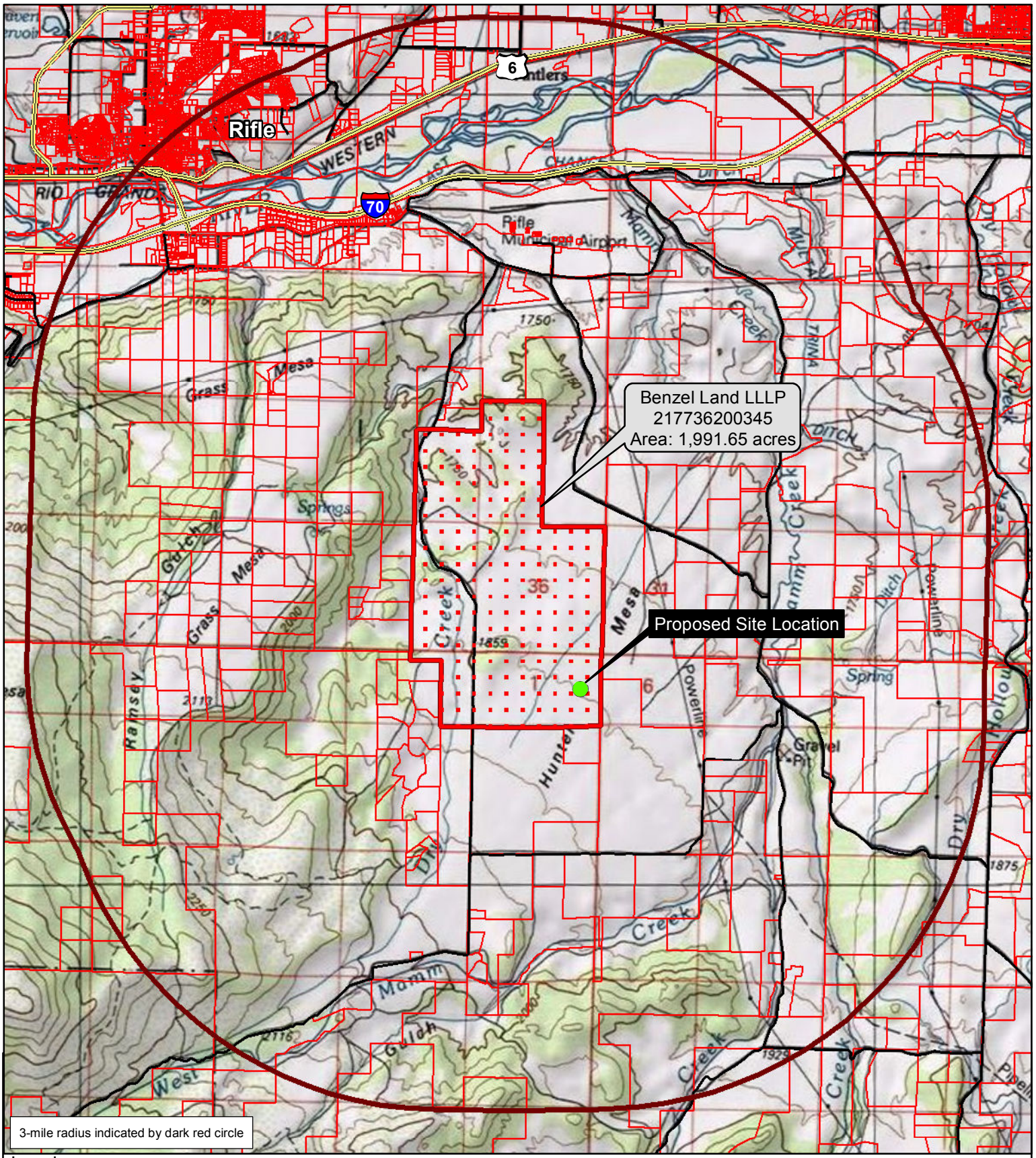
References

Grout, Marilyn A. and Verbeek, Earl R., 1992, U.S.G.S. Bulletin 1787-Z, Fracture History of the Divide Creek and Wolf Creek Anticlines and Its Relation to Laramide Basin-Margin Tectonism, Southern Piceance Basin, Northwestern Colorado, 32 p.

Online References

Colorado Oil and Gas Conservation Commission http://cogcc.state.co.us/

Natural Resources Conservation Service - Soil Survey http://www.nrcs.usda.gov/



Legend

- Parcels
- 2177-362-00-345 (Area: 1,991.65 acres)
- 3 Mile Radius
- Proposed Site
- Highway/Interstate
- County Roads

0 0.5 1 2 Miles

N W E S

PROJECT NO:	012-0400
DRAWN BY:	Jenna Muhlbach
DATE:	3/12/12

VICINITY MAP
ENCANA OIL & GAS (USA) INC.
HUNTER MESA POND SITE
GARFIELD COUNTY, COLORADO

OLSSON ASSOCIATES
826 21-1/2 ROAD
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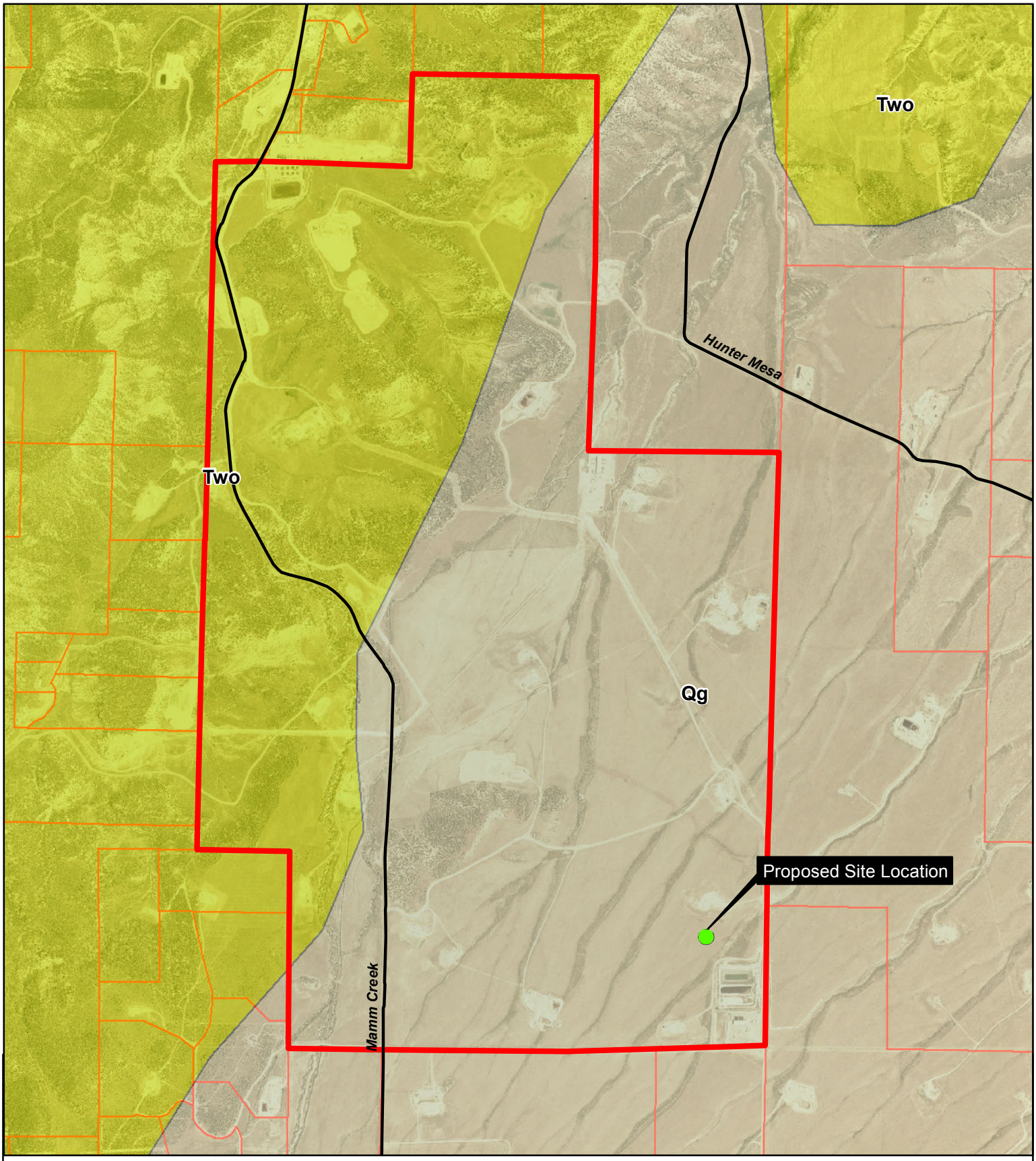
FIGURE
1



Legend

- Proposed Site
- 2177-362-00-345 (Area: 1,991.65 acres)
- Parcels
- Highway/Interstate
- County Roads

Geology Type

- Qg - Gravels and Alluvium
- Two - Wasatch Formation & Ohio Creek Formation

0 0.125 0.25 0.5 Miles

N W E S

PROJECT NO:	012-0400
DRAWN BY:	Jenna Muhlbach
DATE:	4/10/12

GEOLOGIC MAP
ENCANA OIL & GAS (USA) INC.
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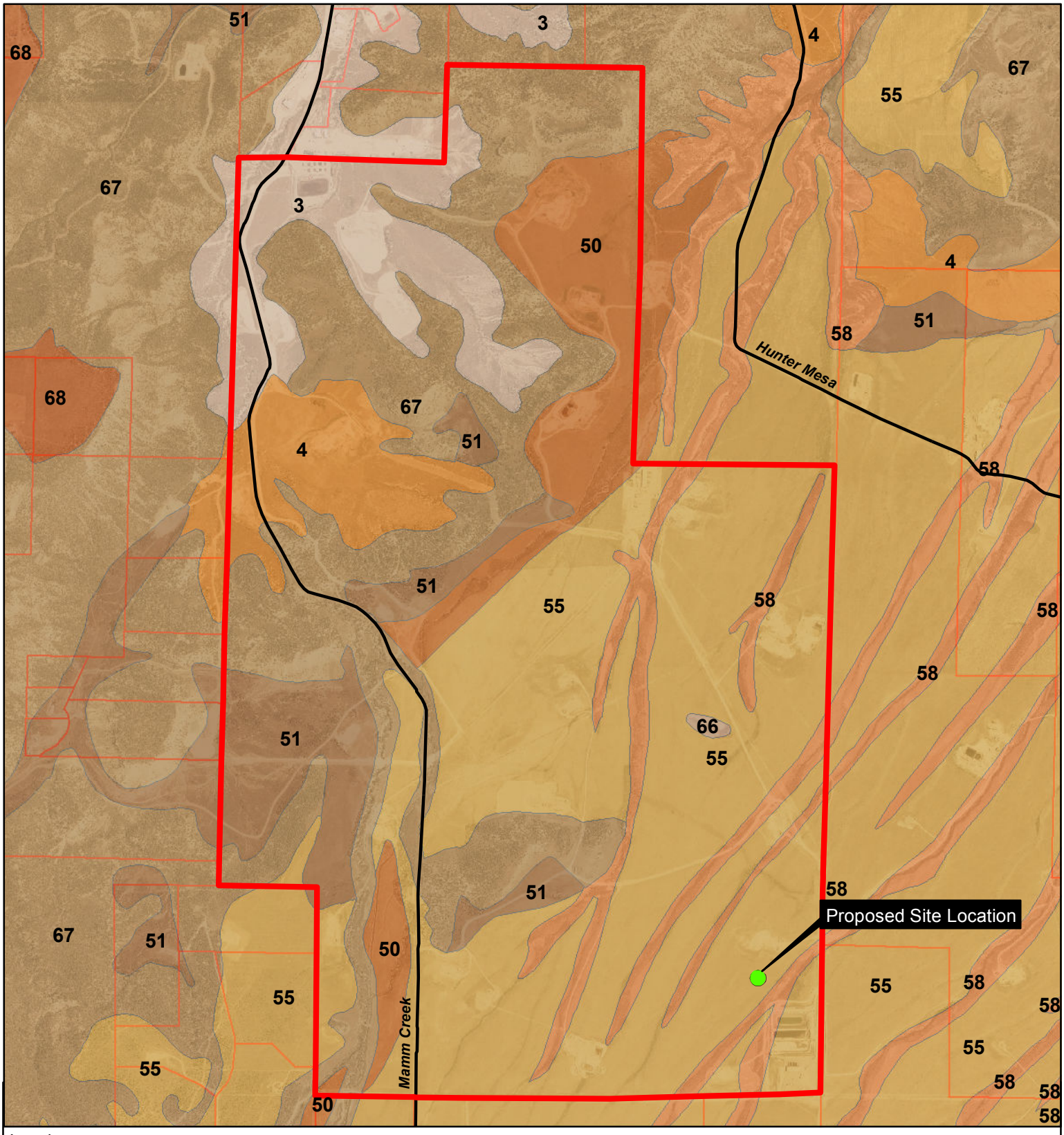
FIGURE
2



Legend

- Proposed Site
- 2177-362-00-345 (Area: 1,991.65 acres)
- Parcels
- Highway/Interstate
- County Roads

Soil Type

- 3 - Arvada loam, 1-6% slopes
- 4 - Arvada loam, 6-20% slopes
- 50 - Olney loam, 3-6% slopes
- 51 - Olney loam, 6-12% slopes
- 55 - Potts loam, 3-6% slopes
- 58 - Potts-Ildefonso complex, 12-25% slopes
- 66 - Torriorthents-Camborthids-Rock outcrop complex, steep
- 67 - Torriothents-Rock outcrop complex, steep
- 68 - Vale silt loam, 3-6% slopes

0 0.125 0.25 0.5 Miles

N W E S

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SOILS MAP
ENCANA OIL & GAS (USA) INC.
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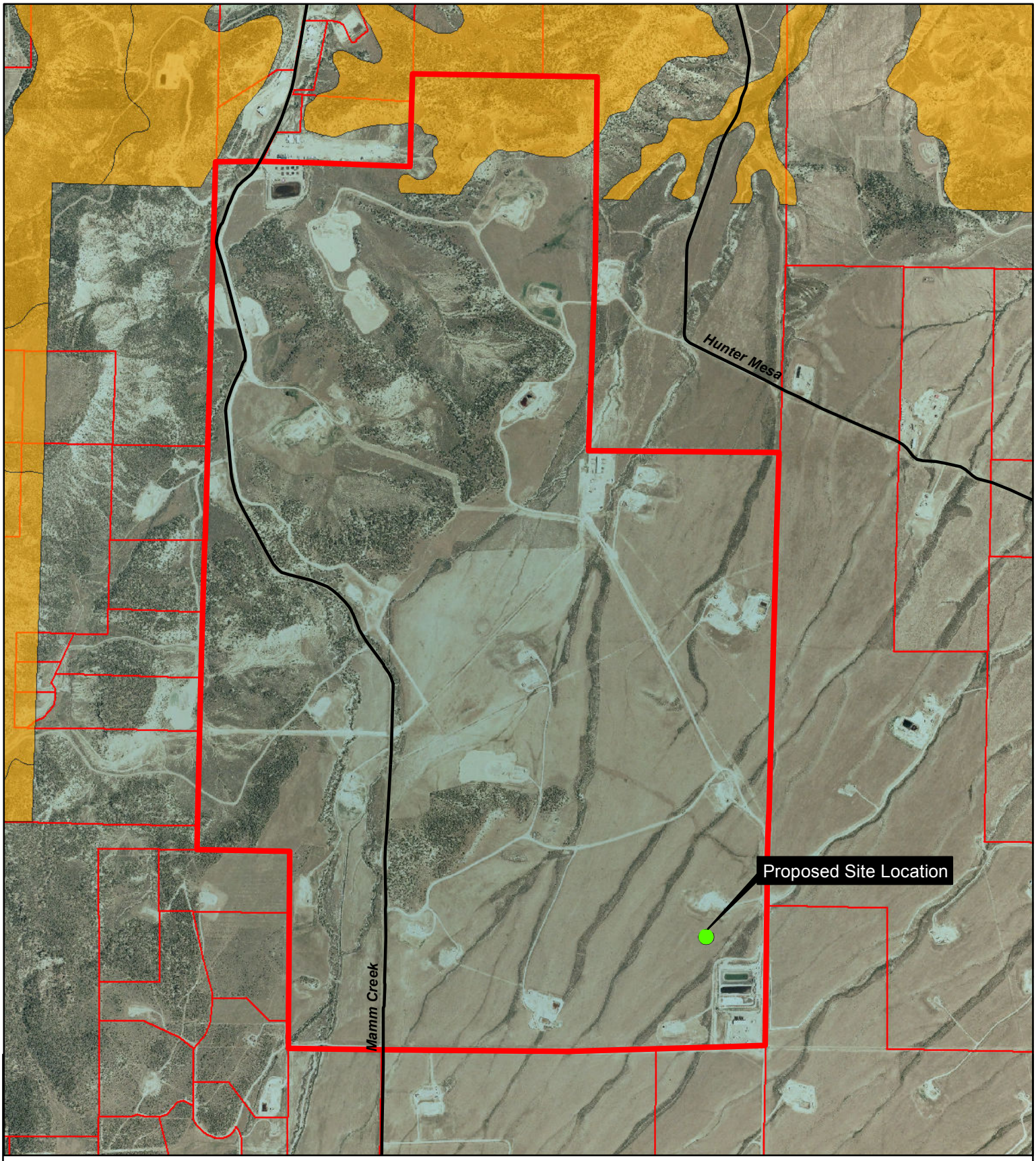
FIGURE
3



Legend

- Proposed Site
- 2177-362-00-345 (Area: 1,991.65 acres)
- Parcels
- SlopeHazard
- Highway/Interstate
- County Roads

0 0.125 0.25 0.5 Miles

N W E S

PROJECT NO:	012-0400
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DATE:	4/10/12

SLOPE HAZARDS MAP
ENCANA OIL & GAS (USA) INC.
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FIGURE

4