

**WILDLIFE AND BIOLOGICAL RESOURCES EVALUATION
QUICKSILVER OIL PAD SITE
Pirtlaw Partners LTD. #24-33
ROUTT COUNTY, COLORADO**



Prepared for:
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October 16, 2011

1.0 INTRODUCTION

1.1 Project Information

Olsson Associates (OA) has prepared a Wildlife and Biological Resources Evaluation for the proposed installation of an oil pad site east of Hayden, Colorado in mountain pastureland. The site is located in SW ¼ Section 33, Township 7 North, Range 87 West, 6th Principal Meridian. The proposed oil pad site is approximately six miles west of Hayden, Colorado at an elevation of approximately 6,945 feet. Access to the site is approximately 2.1 miles northwest along County Road 70 from Highway 70. The pad is accessed approximately 1.3 miles east on private access from County Road 70.

Information used in the preparation of this report was gathered by OA through existing data sources along with an onsite visit with the Colorado Division of Wildlife (CDOW) on September 9, 2011. Additionally, GIS GAP analysis information along with GIS data was used as part of this review.

The purpose of the report was to review the wildlife and sensitive plant species that occupy, or may potentially occupy the project area at varying periods throughout the year, and to evaluate species that may potentially be impacted by project development. Factors considered include: 1) existing land management; 2) plants and wildlife with special designations by Federal and State agencies; 3) Colorado Oil and Gas Conservation Commission (COGCC) Sensitive Wildlife Habitat (SWH) and Restricted Surface Occupancy (RSO) and 4) existing vegetation communities. This report provides written documentation describing findings as well as recommended mitigation measures for potential development.

2.0 LANDSCAPE SETTING

2.1 Vegetation and Climate

Vegetation communities around the project area do not appear to have been altered by agriculture. GAP analysis identifies the vegetative community within the site as sagebrush with rabbitbrush and bitterbrush. Vegetation is all on a west-facing slope consisting of short vegetation dominated mostly by rabbitbrush (*Chrysothamnus* spp.), intermediate wheatgrass (*Thinopyrum intermedium*), and snowberry (*Gaultheria* spp.).

The climate near Hayden is considered semi-arid with a range of temperatures and precipitation. According to data collected by the Steamboat Springs weather station (057936), the average annual precipitation in the region averages 23.97 inches, and average daily temperatures range from a high of about 80 degrees F in the summer months to a low of about 4 degrees F during the winter months (Western Regional Climate Center 2011).

2.2 Soils

Mapped soil types published by the Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA), were reviewed to determine the soil types and natural vegetation characteristics of the project site and surrounding area (NRCS 2011).

The NCRS indicates that the soil type found at the project site is (10E) Bulkley Silty Clay 12 to 25 percent slopes. The NRCS provides the map unit description as:

The Bulkley Silty Clay makes up 100 percent of the map unit. Slopes are 12 to 25 percent. This component is on side slopes, base slopes, head slopes and nose slopes. The parent material consists of colluvium derived from sandstone and shale and/or slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is more than 80 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low to high. Depth to water table is more than 80 inches. This soil is not flooded. It is not ponded. Nonirrigated land capability classification is 6e. The ecological site is claypan (R034XY296CO). This soil does not meet hydric criteria.

2.3 Terrain

The project area lies along a west down-sloping mountain side dominated by rabbitbrush. The elevation at the proposed drill pad is approximately 6,945 mean feet above sea level.

3.0 WILDLIFE AND PLANT EVALUATION

3.1 Evaluation Methods

A preliminary review of the project area was conducted as an aid to help determine the likelihood of the presence of wildlife and/or plant species that are threatened, endangered, or sensitive. Vegetation types were determined through GIS Gap analysis of vegetation communities and an onsite visit. Identification of sensitive wildlife species was aided by using Colorado Oil and Gas Conservation Commission (COGCC) shapefiles and data from the Natural Diversity Information Source (NDIS) by Colorado Division of Wildlife (Attachment A).

OA and representatives from CDOW conducted an onsite review of the area to identify and locate wildlife species, wildlife sign (tracks, fecal droppings, and vegetation disturbance), vegetation communities, and wildlife habitats. Photographs were taken during the onsite visit and data files were reviewed to describe the general project location, vegetation, terrain, and biological findings.

3.2 Background Information

Lists of Federally threatened, endangered, candidate, and proposed species (USFWS 2010), and State of Colorado threatened, endangered, and special concern species (NDIS-CDOW 2011) were reviewed to determine which special status wildlife species could be present in the project area. Table 1 provides the United States Fish and Wildlife Service (FWS) list for threatened, endangered, candidate, and proposed species for Routt County.

**Table 1
Federal Threatened, Endangered, Candidate, and Proposed Species Listed for Routt
County, Colorado**

Common Name	Scientific Name	Status	Impact Evaluation
Greater Sage-grouse	<i>Centrocercus urophasianu</i>	Candidate	A
Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	Candidate	A
Bonytail Chub	<i>Gila elegans</i>	Endangered	A
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Endangered	A
Greenback Cutthroat Trout	<i>Oncorhynchus clarki ssp. stomias</i>	Threatened	A
Humpback Chub	<i>Gila cypha</i>	Endangered	A
Razorback Sucker	<i>Xyrauchen texanus</i>	Endangered	A
North American Wolverine	<i>Gulo gulo luscus</i>	Candidate	A

Impact Evaluation

A – Potential habitat is absent from the project area and/or it is out of the known range for the taxon and/or extirpated.
 B – No wild population is known in Colorado.
 C – The project is located within the range of the species, however due to conditions at the project site, the species would not occur in this location.

The NDIS was reviewed in reference to state-listed threatened, endangered, and species of special concern for incorporation into this report. Table 2 provides the listed state threatened and endangered species that are found in Routt County as identified from the NDIS. Table 3 provides a list of state special status wildlife species that are found in Routt County by NDIS.

Table 2 - State List Threatened or Endangered Species (DOW NDIS)

Common Name	Scientific Name	Status	Impact Evaluation
Boreal Toad	<i>Bufo boreas</i>	State Endangered	A
Canada Lynx	<i>Lynx canadensis</i>	State Endangered	A
Plains Sharp-tailed Grouse	<i>Tympanuchus phasianellus jamesii</i>	State Endangered	A
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	State Endangered	A
Whooping Crane	<i>Grus americana</i>	State Endangered	A
Wolverine	<i>Gulo gulo</i>	State Endangered	A
Bald Eagle	<i>Haliaeetus leucocephalus</i>	State Threatened	A
Northern River Otter	<i>Lutra canadensis</i>	State Threatened	A
Western Burrowing Owl	<i>Athene cunicularia</i>	State Threatened	A

Impact Evaluation

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Table 3 – State Special Status Species potentially affected by the project (DOW NDIS)

Common Name	Scientific Name	Status	Impact Evaluation
Ferruginous Hawk	<i>Buteo regalis</i>	State Special Concern	C
Greater Sandhill Crane	<i>Grus canadensis tabida</i>	State Special Concern	A
Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>	State Special Concern	A
Northern Leopard Frog	<i>Rana pipiens</i>	State Special Concern	A
Northern Pocket Gopher	<i>Thomomys talpoides</i>	State Special Concern	C
Peregrine Falcon	<i>Falco peregrinus</i>	State Special Concern	A
Sage Grouse	<i>Centrocercus urophasianus</i>	State Special Concern	A

Impact Evaluation

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4.0 RESULTS OF EVALUATION

4.1 TESS Plant Species

Existing sources reviewed did not identify threatened, endangered, or sensitive species (TESS) near the area. The occurrence and distribution of TESS plants are strongly influenced by geologic formations and the resulting soil types present in an area. Individual plant populations are often scattered and are usually only comprised of a small number of individual plants. This is primarily a result of specific soil and moisture requirements of each species and the high variability in the distribution and surface exposure of the layers within the formation. The site is located on sagebrush pasture managed for livestock production, therefore it is unlikely that TESS plants are present at the site.

4.2 Federally Threatened, Endangered, and Candidate Species

No Federally listed threatened, endangered, or candidate species were observed during the evaluation.

4.3 State Listed Threatened, Endangered and Special Concern Wildlife Species

During the evaluation, no state listed threatened, endangered, or special concern wildlife species were observed in the project area.

4.4 Raptors

There are no active raptor nests documented in the vicinity of the Project or near the access road leading to the Site. Riparian habitat area along the Yampa River east of the pad site has habitat to support raptors.

4.6 Terrestrial Species

4.6.1 American Elk and Mule Deer

Elk (*Cervus canadensis*) were observed near the pad site during the onsite visit.

Elk utilize the site for winter range and severe winter range in the project area. During the spring, elk follow the snow line to higher elevations. Elk rely primarily on available grasses for food. Areas of pinyon-juniper woodlands and scattered oak brush provide necessary forage and production areas, as well as escape, thermal, and loafing cover for elk.

The project area is seasonally occupied by elk. The project area is within CDOW Game Management Unit (GMU) 131 and is mapped by the NDIS as an elk winter concentration area and severe elk winter range. Elk winter concentration areas are considered sensitive wildlife areas under Section 1200 of the COGCC Rules (COGCC 2009) and are defined as follows:

- "Winter Range" is defined as "that part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up."
- "Winter Concentration Area" is defined as "that part of the winter range where densities are at least 200% of the surrounding winter range density during the same period used to define winter range in 5 out of 10 winters."
- "Severe Winter Range" is defined as "that part of the winter range where 90% of the individuals are located during the average 5 winters out of 10 from the first heavy snowfall to spring green-up."
- "Critical Winter Range" for mule deer includes both "Winter Concentration Areas and mule deer Severe Winter Range."

The elements necessary to provide year-round habitat for these species (forage, water, and cover) are present in or near the project area.

4.6.2 Black Bear and Mountain Lion

No black bears (*Ursus americanus*) or mountain lions (*Puma concolor*) were observed during the survey.

Mountain lions have large territories and are highly mobile as they search for food or new territories. Mountain lions typically follow migrating deer herds (their primary food source), preferring to hunt in rocky terrain near woodland habitats. Appropriate habitat conditions occur within or near the project area and mountain lions likely utilize the project area year-round.

Black bears are transient species in the project area due to the distribution of adequate food sources. Black bears are omnivorous and their diet depends largely on what foods are seasonally available, although their mainstay is vegetation. In spring, emerging grasses and

succulent forbs are favored, whereas during summer and early fall, bears take advantage of a variety of berries and other fruits. In late fall, preferences are for berries and acorns, where available. When the opportunity is present, black bears eat a diversity of insects, including beetle larvae and social insects (ants, wasps, bees, termites, etc.), and they will prey upon a variety of mammals, including rodents, rabbits, and young or unwary ungulates. Black bear generally hibernate from mid-November through April or May depending on food availability and weather conditions.

4.6.3 Small Mammals

No small mammal species were observed during the onsite evaluation of the Project. Common small mammal species (small game, furbearers, non-game) that may be present include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), ground squirrel (*Spermophilus sp.*), cottontail (*Sylvilagus sp.*), and least chipmunk (*Tamias minimus*).

4.6.4 Other Bird Species

The understory grasses within rabbitbrush and sagebrush next to the pad site could provide nesting and foraging habitat for various other migratory and non-migratory bird species, depending on the season.

4.6.5 Reptiles

No reptiles were documented during the evaluation. The elevation of the project is not optimal for reptile habitat occurring within the project area.

4.7 Aquatic Species

4.7.2 Fish

No fish were observed during the Project evaluation. No waterbodies are located within the vicinity of the Project.

4.7.2 Amphibians

No amphibians were observed during the onsite evaluation.

4.8 Waters of the United States

No jurisdictional Waters of the United States (WOUS) are located within the vicinity of the Project.

4.9. Noxious Weeds

Knapweed (*Centraurea sp.*) was observed along the access road leading the proposed well pad site. No other noxious weeds were observed in the vicinity of the Project.

5.0 AFFECTS TO TESS PLANT SPECIES

No TESS plants were observed during surveys, and there are no known populations of these plants nearby.

6.0 AFFECTS TO WILDLIFE

6.1 Wildlife Impact Assessment

The proposed project may affect winter wildlife habitat at the pad site itself. The primary potential impact to wildlife in the area will be due to increased human presence in the area during construction, maintenance, and operation of the oil drilling site.

6.1.1 Terrestrial Species

6.1.1.1 Elk and Mule Deer

Additional human presence and activities during project development may create a disturbance for elk populations within and immediately adjacent to the project area. This disturbance may add stress to these species if operation occurs during the winter, and may cause avoidance of the area during construction.

6.1.1.2 Birds

Passerine Species: There is no expected impact to foraging and nesting habitat for passerine bird species based on COGCC mapping files, however, information from CDOW suggests the potential exists to affect a Columbian sharptail grouse lek that is unmapped.

Raptors: There are no active raptor nests documented within the vicinity of the Project, therefore there are no expected impacts to nesting raptors or raptor populations during project construction. The nearest mapped nest is a bald eagle (*Haliaeetus leucocephalus*) nest located along the Yampa River approximately one mile east of the site.

Other Birds: Based on the location of the pad site next to the road, any expected impacts will likely be minimal, and compliance with the Migratory Bird Treaty Act (MBTA) will help to offset any potential impacts.

6.1.1.3 Black Bear and Mountain Lion

Due to the large home range of both black bear and mountain lion, and because of the extensive amount of available habitat for these species, no significant affects from this project are expected.

6.1.1.4 Small Mammals

The amount of available habitat for small mammals, including bats, should not be affected by the proposed project. Project development is not expected to affect small mammal populations.

6.1.1.5 Reptiles

Project development is not expected to affect reptile populations due to the available habitat surrounding the area of the pad site.

6.1.2 Aquatic Species

6.1.2.1 Fish

No impacts from the proposed project are expected due to the lack of existing waterbodies with supporting habitat within the vicinity of the Project. However; appropriate application of stormwater Best Management Practices (BMPs) and Spill Prevention Counter Control (SPCC) measures would virtually eliminate any potential impacts to fish and other aquatic species.

6.1.2.2 Amphibians

The amount of available habitat for amphibians will not be affected by the proposed project. Project development is not expected to affect amphibian populations. No impacts from the proposed project are expected and appropriate application of stormwater Best Management Practices (BMPs) and Spill Prevention Counter Control (SPCC) measures would virtually eliminate any potential impacts to fish and other aquatic species.

7.0 MITIGATION RECOMMENDATIONS

The following recommendations for mitigation are presented for maintenance and improvement of wildlife habitat, quality, and prevention of human-caused impacts to resources.

7.1 Maintenance and Restoration of Habitat

Reclamation plans should include efforts to restore natural vegetation communities. OA recommendations include the preparation of a reclamation plan prior to construction, to salvage topsoil and prevent the spread of noxious weeds.

7.2 Planning for Sensitive Time Periods and Areas

7.2.1 Mule Deer and Elk

Disturbance associated with construction equipment and personnel may cause elk and mule deer to select habitats in more secluded areas away from the project area. Any construction and/or operational activities during the winter months may impact elk populations based on COGCC mapping and associated SWH regulatory guidance. According to the Colorado Oil and Gas Conservation Commission's amended rules, effective April 1, 2009, elk winter concentration areas and mule deer critical winter range are included in the rules as sensitive wildlife habitat (COGCC 2009).

Information obtained from the CDOW during the site visit indicates that the site is more heavily used in the spring beginning about March. Although mapping does not indicate this area as Elk production or an Elk resident population inhabitant, CDOW site knowledge indicates otherwise. Based on the CDOW information, OA recommends activities be completed by March 1st and that constant coordination with the CDOW is maintained to determine current use of the area by Elk.

7.2.2 Migratory Birds

Flagging or some other marker should be applied to support wires on the tower in order to prevent foraging birds from colliding with the wires.

In order to comply with the Migratory Bird Treaty Act (MBTA) by showing a good faith effort to reduce potential impacts on nesting birds, if any brush/tree clearing should become necessary,

it should take place outside of the nesting seasons. Nesting season is generally considered between May 15 and July 31 in this area for most species. June 1 to July 15 is the peak period when most incubation and brood rearing takes place. If brush/tree clearing can occur prior to May 1, most affected birds will relocate to alternate nesting sites. After mid- to late- July, most fledging has occurred and brush/tree clearing impacts would be minimized.

7.2.3 Raptors and other birds

No raptor nests were documented within the vicinity of the Project, therefore no raptor nesting areas are expected to be disturbed. The Bald and Golden Eagle Protection Act (BGEPA) provides federal protection for both eagle species and project efforts will need to comply with the BGEPA.

Information obtained from the COGCC species mapping indicates that the nearest sharptail grouse lek SWH is approximately 0.5 miles from the well pad site and not within an RSO. However, onsite information provided by the CDOW indicates the potential for an unmapped lek along the access road. Based on information from the CDOW, this pad site would likely be considered an RSO as well as a SWH area. OA recommends that activities be completed prior to March 1st and not start before July 31st to avoid impacts to leking and nesting sharptail grouse. The site is outside the mapped SWA and RSO, but coordination with the CDOW is recommended for any unmapped areas prior to construction.

7.2.4 Black Bears

Black bears will likely move through the general project area and could be attracted to human related food sources. In order to prevent human injury and/or the unwanted removal, injury, or destruction of bears, it is recommended that food/garbage storage and removal be done in a timely and secure manner so as to not habituate bears to human activities.

7.3 Other Mitigation Practices

7.3.1 Erosion

Efforts to control soil erosion within the project area should be implemented. Disturbed soils within the project area are susceptible to erosion and downstream water quality could be negatively affected by increased soil erosion. In addition to stormwater management around the project site, other current factors (noxious weeds, livestock grazing, other oil & gas development) affecting soil erosion should be managed and remedial measures implemented.

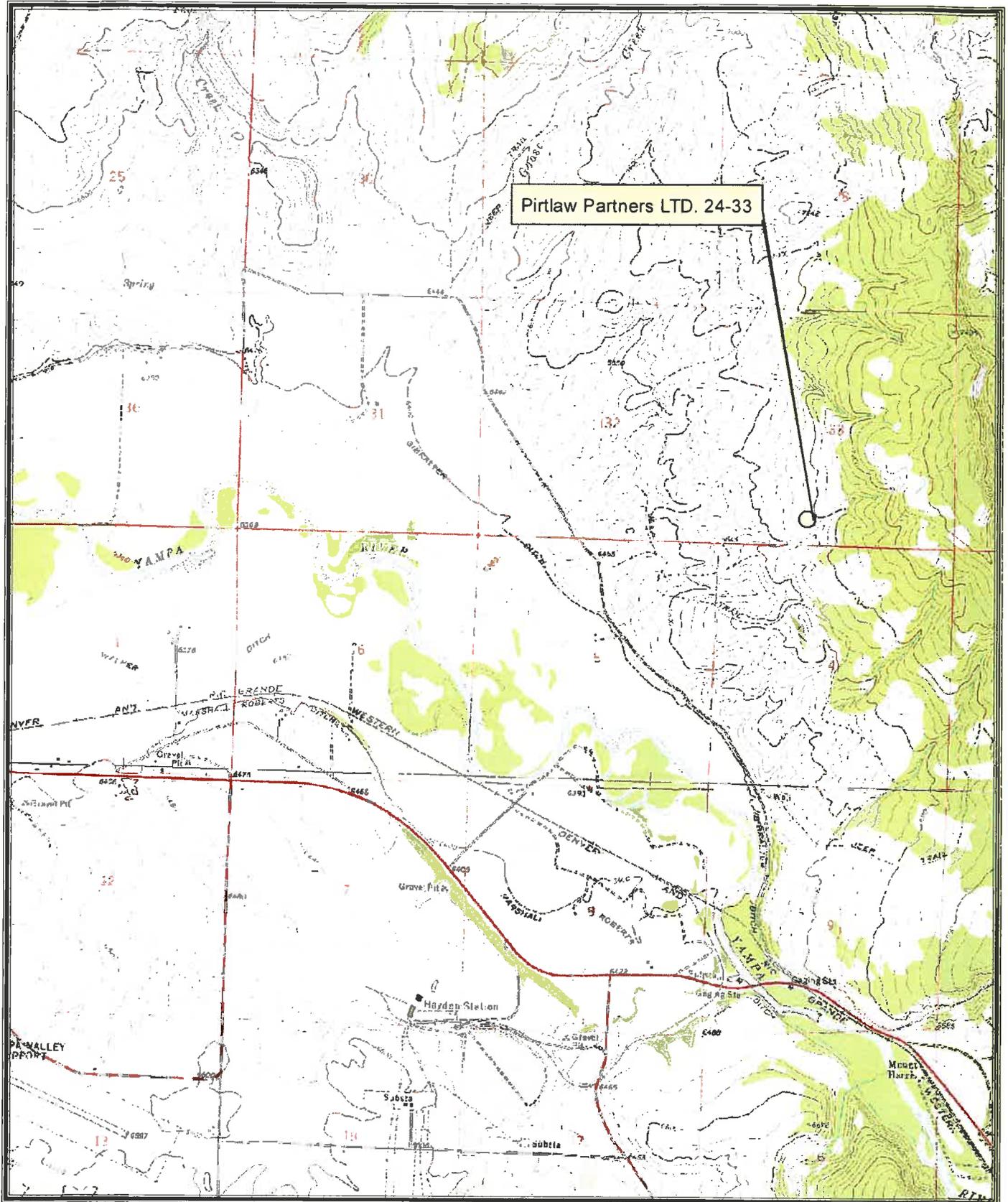
7.3.2 Weeds

Vegetation removal and soil disturbance during construction can create optimal conditions for the establishment of invasive, non-native species. Construction equipment traveling from weed-infested areas into weed-free areas could disperse noxious or invasive weed seeds and propagates, resulting in the establishment of these weeds in previously weed-free areas.

Several simple practices should be employed to prevent most weed infestations. The following practices should be adopted for any activity to reduce the costs of noxious weed control through prevention. The practices include:

- Prior to delivery to the site, equipment should be thoroughly cleaned of soils remaining from previous construction sites which may be contaminated with noxious weeds.
- If working in sites with weed-seed contaminated soil, equipment should be cleaned of potentially seed-bearing soils and vegetative debris at the infested area prior to moving to uncontaminated terrain.
- All maintenance vehicles should be regularly cleaned of soil.
- Avoid driving vehicles through areas where weed infestations exist.

ATTACHMENT A



Pirtlaw Partners LTD. 24-33

PROJECT: Quicksilver Resources

DRAWN BY: sd

DATE: 1/1/2011

TOPOGRAPHY MAP
 Township 7 North - Range 87 West
 Quicksilver Resources
 Rout County

OLSSON
 ASSOCIATES

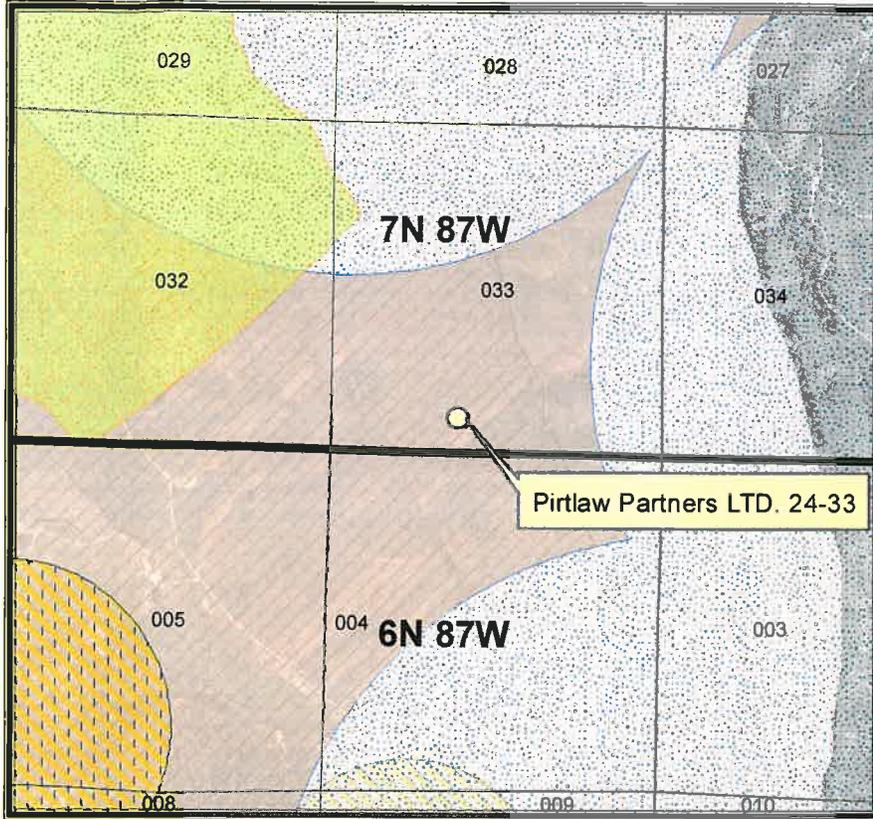
1111 Lincoln Mall Suite 111
 P.O. Box 84608
 Lincoln, NE 68501-4608

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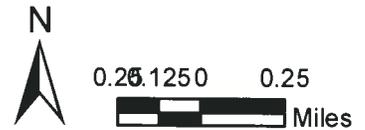
FIGURE

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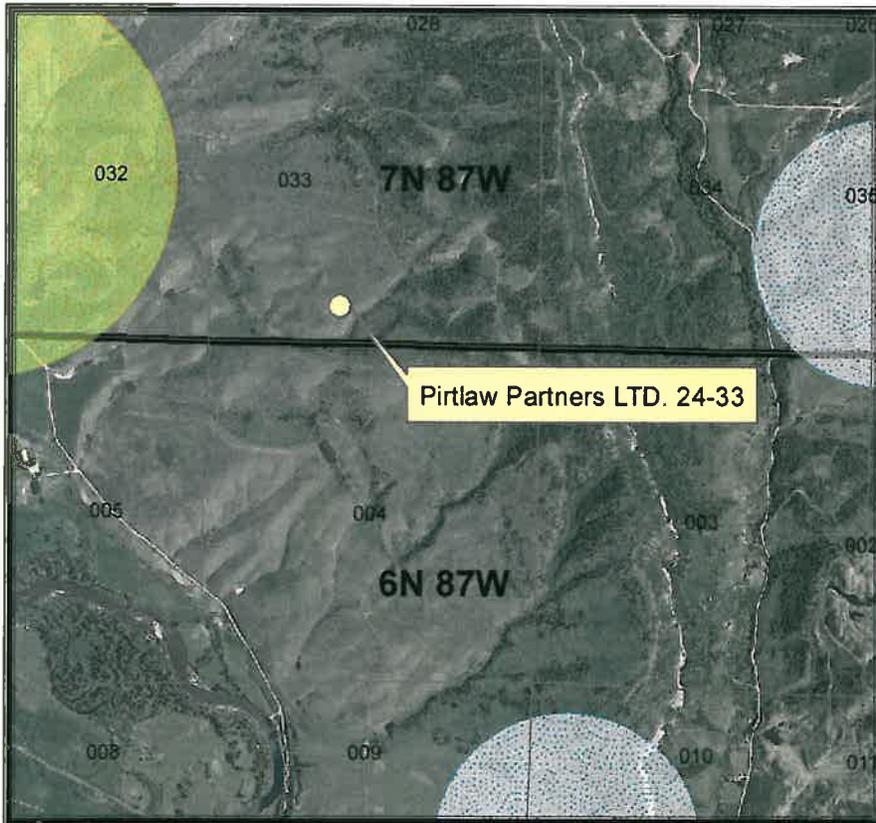
(SWH)
Sensitive Wildlife Habitat



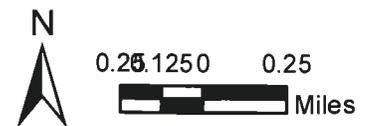
- Gr. Sage Grouse Production
- Columbian Sharp Tailed Grouse Production Areas
- Gunn. Sage Grouse Production Areas
- Lesser Prairie Chicken Production Areas
- Plains Sharp Tailed Grouse Production Areas
- Bald Eagle Active Nest Sites
- Bald Eagle Winter Night Roost Sites
- Golden Eagle Active Nest Sites
- Elk Severe Winter Range
- Elk Winter Concentration Area



(RSO)
Restricted Surface Occupancy



- Gr. Sage Grouse Lek Sites
- Columbian Sharp Tailed Grouse Lek Sites
- Gunn Sage Grouse Lek Sites
- Lesser P. Chicken_Lek Sites
- Plains Sharp Tailed Grouse Lek Sites
- Bald Eagle Active Nest Sites
- Golden Eagle Active Nest Sites
- Ferruginous Hawk Active Nest Sites
- Peregrine Falcon Active Nest Sites
- N. Goshawk Active Nest Sites
- Prairie Falcon Active Nests
- Osprey Active Nest Sites
- Aquatic Designated Cutthroat Trout Habitat
- Aquatic Gold Medal Waters
- Bighorn Sheep Production Area



*Note: This figure is associated with a spreadsheet to assist with the identification of parcel stipulations and it is not a standalone figure. Elk, mule deer, and pronghorn sensitive wildlife habitat is excluded. Data was acquired through the COGCC (Dec. 2010) using shapefiles with designation having 101708.

PROJECT: Quicksilver Resources

DRAWN BY: sd

DATE: 1/1/2011

Pirtlaw Partners 24-33
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FIGURE

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