Appendix C

Marys River Reclamation Plan

U.S. Department of the Interior
Bureau of Land Management

RECLAMATION PLAN

Marys River Oil and Gas Exploration Project

March 2014

Location: Elko County, Nevada

PREPARING OFFICE

U.S. Department of the Interior
Bureau of Land Management
Elko District Office
3900 East Idaho Street
Elko, NV 89801
(775) 753-0200
(775) 753-034

Table of Contents

1. Project Area Description 1
   1.1. Vegetation 1
   1.2. Soils 1
   1.3. Ecological Sites 2
   1.4. Geomorphologic Landforms 3
   1.5. Climate 3
   1.6. Grazing Units 4
2. Proposed Activities 4
3. Reclamation Objectives 4
4. Reclamation Schedule 5
   4.1. Interim Reclamation 5
   4.2. Final Reclamation 5
5. Reclamation Requirements 6
   5.1. Waste Materials 6
   5.2. Sub-surface Integrity 6
   5.3. Soil Integrity 7
   5.4. Water Courses and Drainages 7
   5.5. Visual Composition 8
   5.6. Slope Stability and Topographic Diversity 8
   5.7. Site Preparation 8
   5.8. Plant Establishment 9
      5.8.1. Seed Mix Development 9
      5.8.2. Seeding Methods 9
   5.9. Invasive Species 10
   5.10. Monitoring 10
6. Literature Cited 11

Noble Energy Inc. (Noble) will be implementing an oil and gas exploration project in the Marys River Project Area near Wells, Elko County, Nevada. This reclamation plan is designed to meet the standards set by the Bureau of Land Management (BLM) and will be in accordance with State of Nevada Division of Environmental Protection laws and regulations. Site specific reclamation plans will be completed at the time the site specific use plan is submitted. The Project Area Description as seen below will provide much of the setting for these site specific use plans. These plans will be submitted as part of and approved through the APD or ROW processes.

1. Project Area Description

The Marys River Exploration Project Area includes Sections 1, 2, 11–14, and 23–26 T38N:R60E; Sections 2–11, 14–23, and 26–35 T38N:R61E; Sections 23–26, 35, and 36 T39N:R60E; and Sections 19–23 and 26–35 T39N:R61E. The southeastern corner of the Project Area is approximately four miles northwest of Wells, Nevada. The Project Area includes approximately 39,366 acres that includes 52% federal (BLM) and 48% private lands. The Humboldt River and Bishop Creek bisect the Project Area. Elevation within the Project Area ranges from 5,300 to 5,700 feet above sea level. Topography is relatively flat with rolling hills, many drainages, hilltops, draws, and eroded hillsides.

1.1. Vegetation

Vegetation is primarily comprised of Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) shrublands. Areas of basin big sage (*A. tridentata tridentata*), mixed desert shrub, riparian woodland (mainly willows; *Salix* spp.), and irrigated cropland are scattered throughout the Project Area. Cheatgrass (*Bromus tectorum*) is prevalent in and crested wheat grass (*Agropyron cristatum*) has been recorded in several areas.

1.2. Soils

Soils of the Project Area have been classified by the USDA-NRCS (2009), and are included in the Soil Survey Geographic (SSURGO) database. The NRCS has identified 15 soil series in the Project Area (Table 1), with the following soil series being most common: Enko coarse loam, Hunnton fine loam, Dacker fine loam, Bioya fine loam, Chiara loam, and Sonoma fine silt.

Table 1. Soil series present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Soil Series	Acreage	Project Area %
Enko - coarse loam, 0 to 30 percent slopes	8,183.61	20.79
Hunnton - fine loam,1 to 30 percent slopes	6,530.01	16.59
Dacker - fine loam, 0-15 percent slopes	5,527.04	14.04
Bioya – fine loam, 0-15 percent slopes	5,126.83	13.02
Chiara - loam, 0 to 30 percent slopes	3,945.93	10.02
Sonoma - fine silt 0 to 2 percent slopes	3,754.67	9.54
Oupico - coarse loam, 0 to 30 percent slopes	3,463.31	8.8
Ocala - fine silt, 0 to 2 percent slopes	1,671.26	4.25
Halleck - fine silt, 0 to 4 percent slopes	499.5	1.27
Welch - fine loam, 0 to 15 percent slopes	287.1	0.73
Sonoma variant - silt loam, 0 to 2 percent slopes	205.14	0.52
Moranch - coarse silt, 0 to 2 percent slopes	137.53	0.35
Crooked Creek - clay loam, 0 to 4 percent slopes	14.14	0.04
Hunewill - sandy loam, 0 to 30 percent slopes	9.44	0.02
Hussa - clay loam, 0 to 9 percent slopes	6.28	0.02
Total	**39,362**	**100**

1.3. Ecological Sites

The Marys River Project Area is comprised of six ecological sites defined by the USDA-NRCS (2009) (Table 2). A loamy 8-10 inch precipitation zone ecological site dominates 83% of the Project Area. Soils in this ecological site are comprised of mostly well drained, clayey or loamy, Mollisols (USDA-NRCS 2006). Saline bottoms, saline meadows, and sodic flats, although a small component of the Project Area (8.25%), typically respond poorly to conventional reclamation.

Table 2. Ecological Soil sites present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Ecological site	Ecological Site Number	Acreage	Project Area %
Loamy 8-10 inch precipitation zone.	R025XY019NV	32,786.16	83.29
Loamy Bottom 8-14 inch precipitation zone.	R025XY003NV	2,535.69	6.44
Saline Bottom	R024XY007NV	1,876.40	4.77
Saline Meadow	R024XY009NV	1,233.12	3.13
Wet Meadow	R025XY005NV	792.88	2.01
Sodic Flat 8-10 inch precipitation zone.	R024XY008NV	137.53	0.35
Total		**39,362**	**100**

1.4. Geomorphologic Landforms

The most common landforms of the area are fan remnants, fan skirts, and floodplains, together comprising 95% of the Project Area (Table 3). Areas classified by the NRCS as fan remnants are remaining parts of older fan-landforms. Fan skirts are lower lying areas, formed by water runoff throughout upland areas. Floodplains are classified as nearly level ground adjacent to streams prone to inundation under flooding conditions. Although only a small percentage of land is classified as floodplains, these riparian landforms are an important part of the landscape. Floodplains occur along the Humboldt River and Bishop Creek.

Table 3. Geomorphologic landforms present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Landform	Acreage	Project Area %
Fan Remnants	24,881.19	63.21
Fan Skirts	7,896.66	20.06
Flood Plains	4,766.82	12.11
Alluvial Flats	1,110.02	2.82
Inset Fans	707.07	1.8
Total	**39,362**	**100**

1.5. Climate

The majority of the Marys River Project Area is nearest to the NOAA Wells, Nevada weather station (Station No. 268988). The highest precipitation months are January, March, and May. Total average annual precipitation, according to the 30 year average, is 25 centimeters (Western Regional Climate Center: http://www.wrcc.dri.edu/). Restoration success is often erratic on sites that receive 25 cm or less precipitation annually; climatic conditions during the reclamation

process will likely exert an overriding effect on the success of the reclamation efforts (Call and Roundy 1991, Holechek 2010, Roundy 1999).

1.6. Grazing Units

There are 12 grazing allotments present within the Marys River Project Area, summarized in Table 4 (USDI-BLM 2006). Acreages listed in Table 4 are the total number of acres in each allotment, not the amount of acres found within the Project Area.

Table 4. Grazing allotments present within the Marys River Project Area. Unit number, name, and size are summarized.

Grazing Unit	Unit Name	Acres
3206	Bishop Creek	7,766
3228	Metropolis	41,853
3229	Metropolis Seeding	2,456
3233	Rabbit Creek	6,715
3241	Westside	7,874
e	Mud Springs	3,998
3243	Railroad Field	3,165
3246	Antelope Springs FFR	1,489
3247	Burnt Creek	3,422
4310	Clover Creek FFR	1,488
4319	Hylton	4,166
3208	Black Butte	61,799

2. Proposed Activities

The primary activities proposed in the Project Area will be exploratory oil and gas drilling (Noble, 2014). Depending on well pad selection (20 of 33 potential wells sites will be developed) the proposal could include up to 276.5 acres of surface disturbance at the well pad sites, 20.5 miles of disturbance along existing roads that will be upgraded, and the potential construction of up to 12.6 miles of new roads. Existing roads would be utilized as much as possible, minimizing the need for road construction.

3. Reclamation Objectives

The long-term objective of reclamation is to return the land, following use for energy development, to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, habitat, and forage. Reclamation will be considered successful when the site is recontoured and stabilized, protected from erosion, and revegetated with a self-sustaining, vigorous, diverse, native (or otherwise approved) plant community that maintains ecological resilience and the integrity of natural processes.

At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species which occur in the surrounding natural vegetation. Permanent vegetative cover will be determined successful when the basal cover of desirable perennial species is at least 80 percent of the basal cover of the adjacent undisturbed area or of potential basal cover as defined in the National Resource Conservation Service Ecological Site(s) for the area.

Operators and right-of-way holders are required to meet reclamation performance standards. Successful compliance with standards and meeting of objectives will be determined by the BLM. If revegetation is unsuccessful, subsequent treatments and reseedings will be required until objectives are met.

4. Reclamation Schedule

4.1. Interim Reclamation

Interim reclamation will be conducted concurrently with exploration. Disturbed areas will undergo interim seeding as soon as possible during the period optimal for seeding (generally October 1-March 1) these disturbed areas could include: completed pad construction, topsoil storage berms, storm water control features, temporarily disturbed areas along roads and pipelines, and cut and fill slopes. The goal of interim seeding would be to stabilize materials, maintain biotic soil activities, and minimize weed infestations. If interim revegetation is unsuccessful, additional prep and reseeding shall be completed annually until standards are met.

Within 6 months following completion of the last well planned on a pad, or after a year has passed with no new wells drilled, interim reclamation will be completed to reduce the well pad to the smallest size needed for production. The interim reclamation timeline can be extended at the discretion of the BLM Authorized Officer to prevent unnecessary reclamation. Trash and equipment unnecessary to production operations shall be removed immediately.

4.2. Final Reclamation

Final reclamation will be initiated within no more than 1 year following plugging and abandonment of the final well on pads no longer having a producing well. All equipment, facilities, and trash will be removed from the location immediately following plugging and abandonment. Roads that are no longer essential to the proposed activities will also undergo final reclamation within a year. Prior to final reclamation, an inspection of the disturbed area shall be held to review the existing reclamation plan or agree to an updated plan. Seed tags will be submitted for BLM approval at least 14 days before proposed seeding date. The BLM will be notified at least 48 hours prior to commencing final reclamation work and within 48 hours of completion of reclamation work.

For both Interim and Final Reclamation, earthwork and revegetation activities are limited by the time of year during which they can be effectively implemented. Site conditions and yearly climatic variations may require that the proposed schedule be modified to achieve revegetation success. Interim and Final Reclamation will be ongoing until reclamation objectives are met or the BLM's Authorized Officer determines reclamation efforts have been sufficient. It is possible that these sites will need to be monitored for five years or more before they achieve reclamation objectives. Monitoring will end once reclamation standards have been met.

Table 5. General Final Reclamation Schedule

TECHNIQUES	Quarter				
	1 Jan-Mar	2 Apr-Jun	3 Jul-Sep	4 Oct-Dec	Year(s)
Soil Surface Restoration					Within 1 year of project completion
Seeding					Within 1 year of project completion
Monitoring					5 years following reseeding

5. Reclamation Requirements

The requirements listed in Chapter 519A – *Reclamation of Land Subject to Mining or Exploration Projects* (NAC 519A) are designed to facilitate successful reclamation.

Requirements include:

1. Manage waste materials.
2. Ensure subsurface integrity (geology & hydro-geology).
3. Ensure biological, chemical, physical integrity of soil.
4. Re-establish stable water courses and drainage features.
5. Blend visual composition with surroundings.
6. Re-establish slope stability and topographic diversity.
7. Prepare site to meet the needs for plant establishment.
8. Re-establish desired, self-perpetuating plant community.
9. Prevent introduction/establishment of invasive plants.
10. Implement a monitoring and management protocol.

Operators are obligated to follow requirements 1-5 from the initiation of proposed activities. Requirements 6-10 will be completed concurrent with Interim and Final Reclamation.

5.1. Waste Materials

All waste materials will be managed according to Best Management Practices. Product and wastes would be containerized or otherwise stored such that precipitation or run-off would not come in contact with any industrial, petroleum or chemical material. Equipment would be properly maintained to reduce the possibility of leaks and hose ruptures. In the event of a discharge or spill, cleanup procedures would be implemented immediately to ensure that no materials would be available for transport by stormwater run-off. All drilling fluids would be directed to tanks (part of the closed loop system) this would eliminate the possibility to enter drainages. Drill cuttings and fluids would be contained on site within the closed loop drilling system.

Contaminated soil will be segregated, treated, and/or bio-remediated, following guidance from the BLM who will be notified if contamination occurs. The BLM must authorize any waste materials to be buried on site. Similarly, the disposal of waste (including trash) off site must be to an authorized disposal facility. All hazardous waste material identified by the Comprehensive Environmental Response Compensation Liability Act (CERCLA) removed from the site will be disposed of at a hazardous waste facility that is approved by the U.S. Environmental Protection Agency (Noble, 2014).

5.2. Sub-surface Integrity

The operator will ensure the integrity of sub-surface resources by plugging drill holes and surface openings, and filling/capping any other openings to ensure that contamination of ground and surface water does not occur. Dry hole markers will be subsurface, to prevent their use as perching sites by raptors. Noble will prepare a Spill Prevention Plan and a Storm Water Pollution Prevention Plan with the approval of the state regulator agency and BLM (Noble, 2014).

5.3. Soil Integrity

Topsoil shall be stripped following removal of vegetation during construction of well pads, roads, or other surface facilities. This shall include all growth medium - at a minimum, the upper 2-6 inches of soil - but shall also include stripping of any additional topsoil present at a site, such as indicated by color or texture. Stripping depth may be specified during the onsite inspection. Stripped topsoil shall be stored separately from subsoil or other excavated material. Contractors will reference the site-specific document to determine salvage strategies.

Topsoil will not be piled more than 10 feet high, as the resulting compaction and anaerobic conditions can result in soil degradation (Ghose 2001). Precautions will be taken to protect soil from erosion, degradation and contamination, including covering piles with mulch, and diverting water runoff around piles. If mulching is necessary, a certified weed free straw or hay mulch will be applied (Noble, 2014). Topsoil piles will be labeled to avoid confusion. Soil that will be stored for more than one growing season will be seeded with short-lived species to compete against weeds in accordance to NAC 519A.325. Early successional natives such as bee plant or slender wheatgrass are recommended (Norton et al. 2009). Seedbed prep is not generally required for topsoil storage piles or other areas of temporary seeding.

5.4. Water Courses and Drainages

Depending on site specific needs, culverts, wing ditches, and channels will be utilized to manage water. Waterbars, slope breakers, erosion control blankets, fencing, mulch, straw bales, and rolls may also be used to manage soil erosion. Soil erosion control will be implemented on sites in highly erosive soils and steep areas. Mulching, netting, tackifiers, hydromulch, matting, and excelsior are common methods used to limit erosion on slopes that may be employed. The type of control measure will depend on slope gradients and the susceptibility of soil to wind and water erosion. All runoff and erosion control structures will be inspected periodically, cleaned out, and maintained in functional condition throughout the duration of construction and drilling.

All drainages affected by the well pad or access road will be maintained by culverts and other methods as described in The Gold Book. All roads will be constructed in a manner that does not result in grading within and parallel to drainages. To avoid depositing fill material in drainages,

roads will be constructed at a height above drainage channels (USDI-BLM 2012). During the reclamation phase, drainages will be reconstructed and stabilized to function similar to pre-disturbance levels. Drainages and riparian areas will be addressed in greater detail in the site-specific reclamation plans.

5.5. Visual Composition

Pads, roads, pipeline and production facilities shall be located and placed to avoid or minimize visibility from travel corridors, and other potentially sensitive observation points, unless directed otherwise by the BLM due to other resource concerns, and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad.

To the extent practical, existing vegetation shall be preserved when clearing and grading for pads, roads, and pipelines. The authorized officer may direct that cleared rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Above-ground facilities shall be painted a natural color in a non-reflective finish selected to minimize contrast with adjacent vegetation or rock outcrops. The color shall be specified by the BLM.

5.6. Slope Stability and Topographic Diversity

In all areas where the soil has been compacted, the soil will be ripped to a minimum of 18-24 inches, with a furrow spacing of 18-24 inches. Where possible, soil will be ripped in two passes at perpendicular directions. After mitigating compaction, contours will be reshaped to blend with natural topography, to the extent possible. Fill material will be pushed into cuts and up over the backslope of the cuts, leaving no depressions where water could pond. Erosion control structures will be installed where necessary to maintain hydrologic function.

5.7. Site Preparation

In all disturbed areas where soil has been stripped, stored subsoil and topsoil will be restored according to their original orientation in the soil profile, i.e. subsoil below the topsoil. Topsoil will be spread to a depth of 6 inches across the disturbed areas or to a depth similar to what existed pre-disturbance in consultation with the BLM. BLM may require soil amendments.

Final seedbed preparation shall consist of scarifying (pitting, raking or harrowing) the spread topsoil prior to seeding. Scarification shall be repeated no more than 24 hours before prior to seeding to break up any crust that has formed if the area is to be broadcast-seeded or hydro-seeded, or if more than one season has elapsed since final seedbed preparation.

To enhance vegetative establishment and control erosion on slopes steeper than 3:1 (i.e. 15°), seedbed preparation shall consist of pocking or pitting. Surface soil material shall be completely and uniformly pocked or pitted with small depressions, to form micro-basins scaled to site and materials. Depressions shall be constructed in rows, in a "fish scale" pattern. This pattern shall be constructed perpendicular to the natural flow of water down a slope and/or to prevailing winds.

5.8. Plant Establishment

5.8.1. Seed Mix Development

All disturbed areas on public lands will be seeded with a seed mixture approved by the BLM, consistent with BLM standards in terms of species and seeding rate for the specific habitat type within the project area.

- Seed will contain no noxious, prohibited or restricted weed seeds and contain no more than 0.5 percent by weight of other weed seeds.
- Only viability-tested, certified seed for the current year, with a minimum germination rate of 80% and a minimum purity of 90% will be used, i.e. pure live seed (PLS) must be ≥ 72%.
- Seed that does not meet the above criteria will not be applied to public lands.

Where possible seed will be selected that is locally adapted and genetically appropriate (i.e. choose a local seed supplier if possible, and ensure genetic compatibility with local plants. Seed from lower elevations/warmer climates may not be adapted for Nevada growing conditions).

5.8.2. Seeding Methods

Seeding will be conducted no more than 24 hours following final seedbed preparation. In general, seeding will take place immediately preceding the season with the highest chance of precipitation, typically October through December. Specialized rangeland equipment, such as rangeland drills, Truax drills, surface seeders, hydro-seeders, scarifiers, dozers, or other appropriate equipment will be used in reseeding disturbed areas.

The main purpose of seeding methods is to place the seed in direct contact with the soil, cover the seed with soil, and firm the soil around the seed to eliminate air pockets. Most species can be successfully drill seeded into the soil. Seeding depth in the soil depends on seed size and species specific requirements; where possible, drill seed following the contours of the site. Follow drill seeding with culti-paction or crimped weed-free straw mulch, to enhance seed-to-soil contact and prevent loss of seeds and soil. The U.S.D.A. - Natural Resources Conservation Service recommendation for drill-seeding rate on arid and semi-arid rangelands with large seeded species is 20-40 PLS per square foot, and for small seeded species (most seed mixes), the rate is 30 to 50 PLS per square foot.

In areas that cannot be drilled, broadcast seed within 24 hours of soil work at the applicable rate. If seeding takes place later than within 24 hours of dirt work, cover seed ½ to 1 inch deep with a harrow or drag bar, unless pocking. When pocking is used as seedbed preparation, seed must be broadcast within 24 hours of soil prep. Broadcast or aerial seedings are at the rate of 60 to 95 PLSs per square foot (approximately double the drill-seeding rate).

Hydro-seeding and hydro-mulching may be used in areas of temporary seeding or in areas where drill-seeding or broadcast-seeding/raking are impractical. Hydro-seeding and hydro-mulching must be conducted in two separate applications to ensure adequate seed-to-soil contact. Note that

temporary seeding allows use of a seed mix containing sterile hybrid non-native species or approved cover crop, in addition to native perennial species.

5.9. Invasive Species

Operators will be held accountable for the spread of noxious weeds caused by disturbances on federal lands associated with the proposed activities (USDI-BLM 2012). Noxious weeds will be documented during the pre-disturbance survey, and site-specific management will be addressed. Noble will follow the Marys River Integrated Weed Management Plan. This plan outlines management goals, methods, and monitoring of weeds of site specific applications. Weed surveys will be completed annually for the life of the project following these protocols. Herbicide use must be approved by the BLM.

5.10. Monitoring

Monitoring: The operator shall annually survey and report vegetative cover on all disturbed sites, to monitor reclamation success and weed management. An annual report shall be submitted to the BLM Field no later than December 1 of each year.

1. Reclaimed areas shall be monitored annually. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the authorized officer.

2. Adaptive management techniques to support reclamation success and standards may be required. Reclamation will be considered successful when the site is protected from erosion and revegetated with a self-sustaining, vigorous, diverse, native (or otherwise approved) plant community that minimizes loss of habitat, visual resources, and forage.

6. Literature Cited

Ghose, M. K. 2001. Management of topsoil for geo-environmental reclamation of coal mining areas. Environmental Geology 40: 1405–1410.

Nevada Administrative Code (NAC) 519A. Law and regulations. State of Nevada, Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation. <http://ndep.nv.gov/bmrr/regs.htm> Accessed 12 December 2012.

Nevada Administrative Code (NAC) 519A.325 . Removal and stockpiling of topsoil; avoidance of depression in land. <http://ndep.nv.gov/bmrr/regs.htm> Accessed 12 December 2012.

Noble Energy Inc. 2014. Marys River oil and gas exploration proposal, master surface use plan of operations (MSUPO). Unpublished Data, Denver, Colorado.

Norton, J., Krzyszowska-Waitkus, A., and T. Loubsky. 2009. Successful restoration of severely disturbed lands: overview of critical components. Wyoming Reclamation and Restoration Center, University of Wyoming. Bulletin B-1202.

United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 2009. Soil survey geographic (SSURGO) database for Elko County, available online at http://soildatamart.nrcs.usda.gov.

United States Department of the Interior - Bureau of Land Management (USDI-BLM). 2006. Nevada grazing allotments geodatabase. Nevada State Office. <http://www.blm.gov/nv/st/en/prog/more_programs/geographic_sciences/gis/geospatial_data.html> Accessed 12 December 2012.

United States Department of the Interior - Bureau of Land Management (USDI-BLM). 2012. Recommended operating procedures for notice level operations in the Elko District. Unpublished report, Elko District BLM Field Office, Elko, Nevada.