BEST MANAGEMENT PRACTICES MANUAL

NPDES POST-CONSTRUCTION STORMWATER CONTROLS

For

NEW DEVELOPMENT AND SIGNIFICANT RE-DEVELOPMENT PROJECTS

CITY OF ELKO, NEVADA

February 2013
(Revised July 2014)

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1 INTRODUCTION

This Manual was developed by the City of Elko to provide guidance to development project proponents relative to permanent stormwater management controls for their site(s) and to maintain compliance with the General Permit for Discharges from Small Municipal Separate Storm Sewers (MS4 Permit). Under Section VI.E of the MS4 Permit, issued July 6, 2010, the City is required to develop a Post-Construction Stormwater Management Best Management Practices (BMP) program for new development and significant redevelopment (NDSR) projects.

1.1 HISTORICAL BACKGROUND

The Clean Water Act (CWA) was enacted in 1972 to protect the waters of the United States from the discharge of pollutants. The CWA's primary objective was to restore and maintain the integrity of the nation's hydrology by eliminating pollutant discharge and achieving water quality levels that allow waters to be fishable and swimmable.

The National Pollutant Discharge Elimination System (NPDES) is a permitting program developed by the United States Environmental Protection Agency (EPA) that regulates point-source discharges, and defines urban stormwater as a point-source once it enters a municipal separate storm sewer system (MS4). In 1990, Phase I was issued requiring NPDES permit coverage for (1) medium and large MS4s serving a population of 100,000 or more, (2) construction activities disturbing 5 acres of land or more, and (3) ten categories of industrial activity. Phase II (the final rule) was completed in December 1999 and extends the regulation of construction activities from five acres to one acre of land disturbance. Phase II MS4s are covered by a general permit regulating small MS4s in an urbanized area that are not already covered under the Phase I stormwater program.

In July 2010, the Nevada Department of Environmental Protection (NDEP), under authority delegated by the U.S. EPA, re-issued a General Permit for Discharges from Small Municipal Separate Storm Sewers (MS4 Permit, Permit No. NVS040000) to the City of Elko and other

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co-permitees. This permit, included as Appendix A, specifies the coverage area, authorized discharges, minimum control measures (MCMs), as well as requirements for construction site stormwater runoff control and post-construction stormwater management programs. The permit also requires the development and implementation of a stormwater Ordinance to govern the local enforcement of the permit requirements.

In December 2005, in compliance with Permit No. NVS040000, Section VI.D, Construction Site Runoff Control, the City of Elko published the Construction Site Best Management Practices Handbook. This Handbook regulates the storm water discharge during construction activity.

In September 2012, the City of Elko undertook this Post-Construction Best Management Practices Manual (BMP Manual) to maintain compliance with Permit No. NVS040000, Section VI.E, Post-Construction Stormwater Management BMP program for NDSR projects. The sections contained herein are intended to directly address regulatory requirements outlined in the MS4 Permit.

1.2 MS4 PERMIT PROGRAM AREA

The MS4 Permit (Permit No. NVS040000) was issued to Carson City, portions of Douglas County, Lyon County and the Indian Hills General Improvement District located within the Carson City Urbanized Area, the City of Elko, Nellis Air Force Base and the Coyote Springs Development.

As a co-permittee, the City of Elko, is working to comply with the permit for new and significant redevelopment with the issuance of this BMP Manual.

1.3 PURPOSE AND ORGANIZATION OF THE MANUAL

The intent of this Manual is to identify Best Management Practices to be incorporated during planning, design and construction of new development and redevelopment suited for the unique hydrologic, hydrogeologic and regional environment of Elko, Nevada. This Manual shall be used as a guidance document for potential developers intending to design new developments or significant redevelopments in the City of Elko, Nevada. It is intended to

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provide comprehensive documentation of regulatory background, stormwater quality background information, references, procedures, forms and checklists necessary to prepare an application for a new or significant re-development. The Manual provides guidance on recommended planning and design principles, as well as selection and design of appropriate non-structural and structural Best Management Practices.

The Post-Construction Best Management Practices Manual is organized in the following way:

- Chapter 1, **Introduction**, describes the history of the EPA's National Pollution Discharge Elimination System (NPDES) permit process and the specific permit requirements outlined in NDEP's MS4 Permit and its applicability to the City of Elko, Nevada. This section also describes the purpose of the handbook and its organization, and offers a list of references to other manuals and handbooks.

- Chapter 2, **Storm Water Quality Management**, summarizes the common point and non-point source pollutants which are relevant to new construction and redeveloped sites. This section also includes a discussion of environmental impacts from point and non-point sources, including specific applications within the City of Elko. A discussion of the City of Elko's hydrologic environment is also included in this section.

- Chapter 3, **Elko Post-Construction BMP Controls Program**, is a compilation of information concerning the City of Elko's Post-Construction Stormwater Management BMP program for NDSR projects, policies and procedures as enforced by the City's Engineering Department. This section also includes a discussion of the new and re-development application and review process.

- Chapter 4, **Planning and Site Design Principles**, outlines the design and planning considerations required to achieve compliance with the City of Elko's Post-Construction Stormwater Management BMP program for NDSR projects.

- Chapter 5, **BMP Selection** includes a discussion of tools to assist with BMP selection and design. BMP design and maintenance is also discussed in this section.

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- Chapter 6, **Non-Structural BMP Source Controls**, includes a listing of non-structural best management practices for consideration to achieve source controls with the goal of minimizing stormwater quality impacts.

- Chapter 7, **Structural BMP Treatment Controls**, lists acceptable structural BMPs intended to provide treatment of stormwater runoff with the goal of minimizing stormwater quality impacts.

- Chapter 8, **Manufactured (Proprietary) Treatment Controls**, identifies typical manufactured BMP controls available in the industry as an alternative to structural and non-structural BMP controls.

- Appendix A, **MS4 Permit**, is included for reference. The permit was issued by the NDEP to the City of Elko regulating discharge from small MS4s. Section VI.E of this permit specifically requires the development of the Post-Construction Stormwater Management BMP program for NDSR projects.

- Appendix B, **Site Plan Review Application**, identifies the preferred format for development plan submission in the City of Elko. The forms are intended to be used in conjunction with this Manual.

- Appendix C, **Area Soils Report**, shows classification of soils in and around the Elko area.

1.4 RELATIONSHIP TO OTHER MANUALS AND HANDBOOKS

The manuals and documents listed below are referenced and applicable to the City of Elko Post-Construction BMP manual.

- Truckee Meadows Structural Controls Manual (2007 or the most current edition).
- City of Elko, Construction Site Best Management Practices Handbook (2005 or the most current edition).
- City of Elko Stormwater Management Plan (SWMP).
- City of Elko Code

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1.5 COMMENTS AND DISTRIBUTION

Comments and questions on the City of Elko Post-Construction Site BMP Manual for New Development and Significant Re-Development may be directed to:

Development Manager
City of Elko Development Department
1755 College Avenue
Elko, NV 89801

Phone: (775) 777-7217
Email: sawilkinson@ci.elko.nv.us

or

Environmental Coordinator
City of Elko Development Department
1755 College Avenue
Elko, NV 89801

Phone: (775) 777-7213
Email: jpaxson@ci.elko.nv.us

Copies of the City of Elko Post-Construction Site BMP Manual for New Development and Significant Re-development may be obtained from City of Elko City Hall. A digital version of the Manual is also available at www.ci.elko.nv.us.

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2 STORMWATER QUALITY MANAGEMENT

Stormwater runoff is a major contributor of pollution in surface water bodies and drinking water supply. Urban development and redevelopment areas have increased impervious cover and disturbed area causing a variety of non-point source pollutants. This Manual identifies BMP controls to address pollutants and improve the stormwater quality in the City of Elko.

2.1 COMMON POLLUTANTS

Stormwater runoff has the potential to carry harmful pollutants to rivers, lakes, reservoirs, and ground water aquifers. These pollutants can contaminate drinking water and harm wildlife. Pollutants commonly found in urban stormwater runoff consist of dissolved, suspended, and gross solids. Dissolved solids include the nitrogen and phosphorus families and can be removed from water with settling or filtration. Nutrients, such as nitrogen or phosphorus, can potentially affect stormwater by lowering oxygen levels, destroying habitat, and promoting algal blooms. Dissolved solids are classified as solids that will pass through a 2 micron (0.002 cm) filter. Suspended solids are particles that will settle or float to the top and will not pass through a 2 micron (0.002 cm) filter. Gross solids are sediments greater than 75 microns in size. Some examples of gross solids are grass, leaves, and litter.

2.2 POLLUTANT SOURCES

Pollutants enter the stormwater system through point and non-point sources.

2.2.1 Point Sources

Common point source pollutants in Elko and throughout the state of Nevada come from industrial sources such as chemical discharges, mining activities, and railway transportation. Point source pollutants are generally regulated through federal and state

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permits to industrial and wastewater treatment plants. Point sources are outside the scope of the Post-Construction Stormwater Management BMP program for NDSR projects.

2.2.2 Non-Point Sources

Non-point source (NPS) pollutants are the leading cause of water quality problems in Nevada. NPS's are very difficult to track as the pollution found in the water bodies combines from many different smaller sources. Information on NDEP's non-point source pollution management program can be found on the NDEP website at http://ndep.nv.gov/bwqp/NPSGWP.htm.

Non-point sources (NPS) are categorized into three groups: atmospheric deposition, groundwater, and stormwater runoff.

Atmospheric Deposition

Atmospheric deposition occurs when pollutants are transferred from the air to water bodies through rain or snow. Nevada exhibits a high naturally occurring windblown atmospheric deposition NPS contribution. Dust or sediment created through disturbed area during construction activities may also contribute as NPS. Gas pollutants are produced by incinerators, power plants, and smoke stacks. The NDEP Bureau of Air Quality Planning (BAQP) monitored the City of Elko's air quality from 2006 to 2009. The data collected during this period indicates that particulate matter less than or equal to 10 micrometers in diameter (PM_{10}) has shown a decline in ambient concentrations. PM_{10} emissions are manmade and come from salt and sand on roads, construction dust, and rock processing. Air quality compliance is met with the 24-hour PM_{10} when the number of days per calendar year above 150 $\mu g/m^3$ is less than or equal to one, over a 3-year period. The NDEP has an active monitoring site at Grammar School #2 in the City of Elko. A majority of atmospheric deposition results from existing sources, and is therefore outside of the scope of the Post-Construction Stormwater Management BMP program for NDSR projects.

Groundwater

Non-point sources of contaminants can be found in groundwater from failed septic systems, landfill leaching, and animal feces. Fecal contamination can reach ground water sources by passing through the soil and large cracks in the ground. The EPA issued the Ground Water

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Rule in October 2006 to protect drinking water quality from pollutants. Current mining facilities require a water pollution control permit (WPCP) per Nevada Administrative Code (NAC) 445A.350-445A.447. Existing groundwater pollutant source controls are outside of the scope of Post-Construction Stormwater Management BMP program for NDSR projects.

Stormwater Runoff

Stormwater runoff from rainstorms and snow melts cause a variety of pollutants to be conveyed to the Humboldt River. These are washed into the drain system by stormwater runoff. Gasoline and oil from automobiles, and salt and sand from snow and ice treatment are washed into storm sewers, and ultimately to streams and rivers, harming fish and wildlife. Other pollutants carried into the stormwater system include litter and trash that can damage the stormwater pipes and kill wildlife. Bacteria from livestock or pet feces also wash into the stormwater runoff potentially containing disease causing pathogens which impair water bodies and make them un-swimmable. Fertilizers, herbicides and insecticides from agricultural lands and residential areas are washed into the stormwater system, causing chemical contaminants to be transported downstream. Under the NPDES program, urban Stormwater is considered a point-source pollutant once it enters a MS4. The City of Elko's Post-Construction Stormwater Management BMP program for NDSR projects focuses primarily on limiting the impacts from stormwater runoff.

2.3 CITY OF ELKO HYDROLOGY

2.3.1 Precipitation

Precipitation patterns show that relatively small, but frequent storm events contribute more pollution than large, less frequent storm events. The pollution from roads, parking lots, or construction sites will be transported downstream with the first "flush" of a rainfall event.

Table 2-4 provides a general summary of precipitation and snowfall for the Elko Airport from 1888 to 2012.

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TABLE 2-4

PERIOD OF RECORD GENERAL CLIMATE SUMMARY – PRECIPITATION
STATION: (262573) ELKO WB AIRPORT, NV
PERIOD OF RECORD = 1888 TO 2012

	Precipitation						Snowfall		
	Mean (in)	High (in)	Year	Low (in)	Year	1 Day Max (in)	Mean (in)	High (in)	Year
January	1.17	5.71	1916	0.00	1911	2.00	7.8	45.7	1996
February	0.92	5.50	1901	0.00	1889	1.20	4.6	26.1	1932
March	0.92	4.25	1904	0.04	1988	1.50	3.9	23.2	1967
April	0.85	3.94	1900	0.00	1916	3.30	1.8	15.6	1975
May	0.97	4.09	1971	0.00	1892	1.73	0.5	11.3	1971
June	0.77	4.08	1913	0.00	1893	1.25	0.0	0.0	1888
July	0.37	2.35	1950	0.00	1889	1.28	0.0	0.0	1888
August	0.40	4.61	1970	0.00	1888	4.13	0.0	0.0	1888
September	0.45	3.22	1978	0.00	1889	2.25	0.0	2.0	1982
October	0.72	2.90	1889	0.00	1891	1.63	0.5	5.6	1984
November	0.92	3.53	1900	0.00	1891	1.50	3.2	20.0	1930
December	1.09	5.46	1891	0.00	1896	1.60	6.4	33.2	1983
Annual	9.57	18.34	1983	4.35	1919	4.13	28.7	100.8	1996
Winter	3.19	11.55	1890	0.25	1931	2.00	18.9	68.8	1932
Spring	2.75	6.90	1904	0.62	1924	3.30	6.1	35.5	1967
Summer	1.54	6.38	1970	0.00	1893	4.13	1.1	0.0	1888
Fall	2.09	5.73	1900	0.00	1891	2.25	3.7	20.0	1930

Source: Western Regional Climate Center http://www.wrcc.dri.edu

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The City of Elko experiences an average annual rainfall of 9.57 inches, and an average annual snowfall of 28.7 inches.

2.3.2 Water Bodies

Water quality standards are adopted by the State Environmental Commission (SEC) and are approved by the U.S. Environmental Protection Agency (EPA). NAC 445A.144 is Nevada's water quality standard for metals and other toxic compounds. Water quality standards defining the beneficial uses of water bodies are given in the Nevada Administrative Code (NAC) 445A.122. Water bodies are classified by the following categories:

- Watering of livestock
- Irrigation
- Aquatic life
- Recreation involving contact with water
- Recreation not involving contact with water
- Municipal or domestic supply
- Industrial supply
- Propagation of wildlife
- Waters of extraordinary ecological or aesthetic value, and
- Enhancement of water quality

The City of Elko's primary receiving water body is the Humboldt River. Water quality monitoring along the Humboldt River has been measured upgradient and at various outfall discharge locations. Refer to the City of Elko's Water Quality monitoring report, included in the City's SWMP for surface water quality data. The report shows evidence of contribution of pollutants from the urbanized watershed, although the in-stream water quality impacts do not appear significant. TSS and turbidity continue to represent one of the more significant pollutants of concern, although given the nature of the City's conveyance system (i.e. washes, culverts and natural conveyances), this is an expected result. The City intends to address this pollutant type for consideration of further BMP development. Results for phosphorus, chlorides, and fecal coliform are within standard limits.

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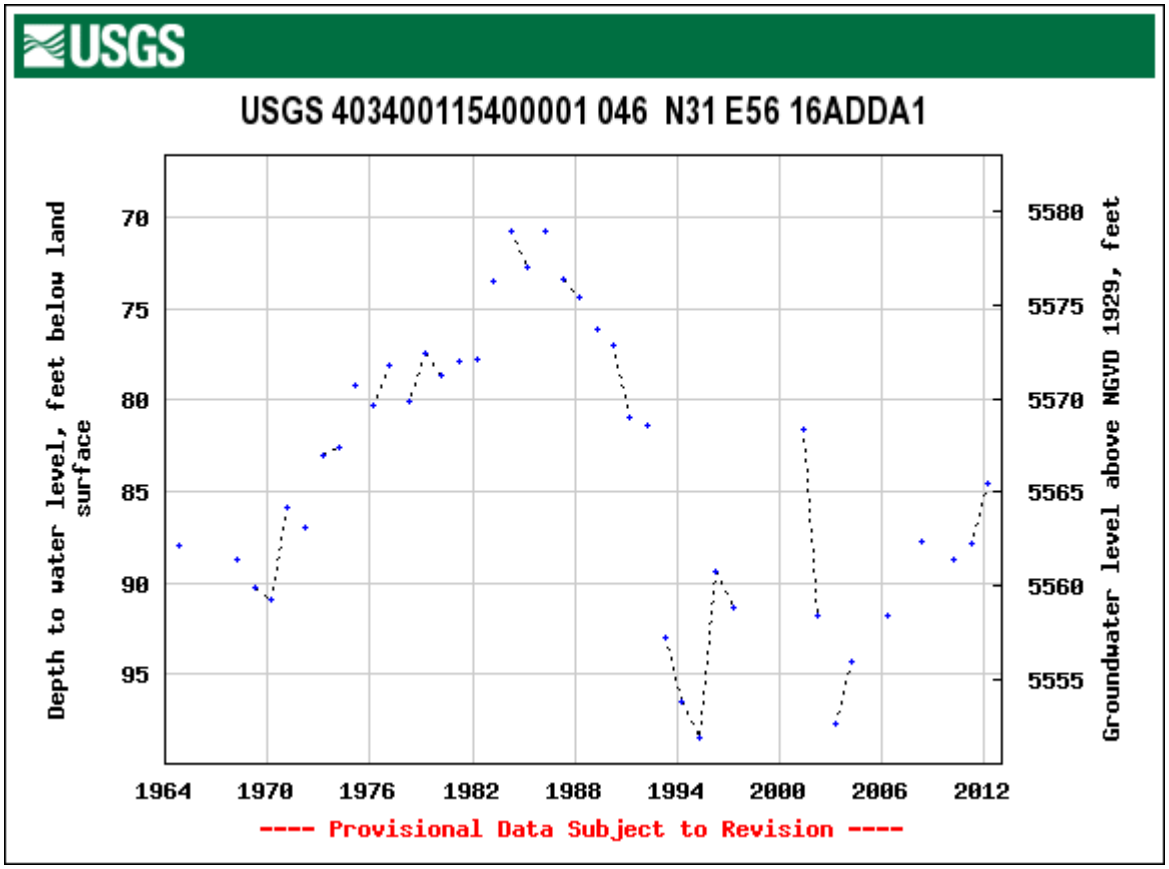
2.3.3 Infiltration

Infiltration is stormwater that is absorbed into the soil and stored as ground water. As impervious cover increases, infiltration decreases and more runoff is created. Urban areas with large developments of impervious cover have accelerated runoff, increased runoff volumes, and shortened runoff time into streams and rivers. The increased runoff can also increase the magnitude and frequency of floods in nearby streams.

The USGS has wells located in Elko County monitoring daily groundwater levels. This site is maintained by the USGS Nevada Water Science Center. Figure 2-3 shows the groundwater levels over the last 48 years and the groundwater level was at its highest around 1984.

FIGURE 2-3

PERIODIC GROUNDWATER DATA



Source: USGS Nevada Water Science Center http://groundwaterwatch.usgs.gov

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The variability in groundwater levels is not necessarily directly related to an increase in percent of impervious cover in Elko's urbanized area, and the overall decline in groundwater depth may be attributed to groundwater pumping for the domestic water supply. The data does indicate, however, that depth to groundwater should not influence infiltration rates.

2.3.3.1 Soils

The City of Elko is composed of soils classified in groups C and D having a slow or very slow infiltration rate when thoroughly wet. Group C consists of soils having a layer of moderately fine texture. The soil in group D consists of clays that have high shrink-swell potential. See Appendix C for the local soil map showing the soil classifications. Local soil survey information can be found by contacting the Natural Resource Conservation Service (NRCS) at http://www.nrcs.usda.gov/.

2.4 ENVIRONMENTAL IMPACTS OF STORMWATER RUNOFF IN ELKO

2.4.1 Water Supply

Many non-point pollutants are carried through streams, tributaries, or stormwater systems discharging into rivers and lakes, or entering groundwater aquifers that provide the public with drinking water. As these pollutants enter the water body, they undergo several processes as they flow downstream. Stormwater runoff mixes with the water body and the pollutant is diluted.

The City of Elko water supply comes from 20 wells which pump water from the underground aquifer referred to as the Elko Segment of the Humboldt River Basin. Water from the Humboldt River Basin is treated for drinking water. The City of Elko is in compliance with EPA water quality standards and a water quality data table is listed on the City of Elko's website at http://www.ci.elko.nv.us/commdev/ccr%202008.pdf. It does not appear that stormwater runoff has negative impacts on the City of Elko's water supply.

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2.4.2 Ecological

The impacts affecting the ecosystem are visible where high concentrations of nutrients cause algae to grow. Metals can have many different health impacts on fish, and in turn, we risk eating potentially contaminated fish. Sediments from roadway runoff caused by peak high flows can impact fish by smothering fish eggs and clogging fish gills. Trash may harm and even kill fish and wildlife. The Humboldt River is listed on the state's 303(d) impaired water list, in part due to a phosphorus pollutant load that adversely impacts aquatic life and bacteria/pathogen pollutant loads (E. Coli) that may be harmful to human health. These impacts indicate that stormwater runoff may be negatively affecting the ecology of this stretch of the river in the City.

2.4.2.1 Temperature

Temperature impacts chemical and biological characteristics of surface water. Commonly, water flowing across hot parking lots, roadways, and sidewalks then entering a stream or river is a source of thermal pollution. Urban runoff can kill fish directly. High temperatures can affect chemical concentrations in water bodies and means lower dissolved oxygen levels. The Humboldt has historically experienced seasonal variations in flow resulting in extremely low flow or completely dry conditions for portions of the year. Low flow conditions can also contribute to temperature fluctuation. When developing TMDL's for a specific reach of a water body, regulators must incorporate such seasonal variations into their calculation of appropriate maximum pollutant loads.

2.4.2.2 Dissolved Oxygen

Streams gain oxygen from the atmosphere and from plants through photosynthesis. Dissolved oxygen is needed for aquatic life and to support an ecosystem. Bacteria and algae consume oxygen as organic matter decays. High temperatures are directly related to low dissolved oxygen levels. Oxygen is consumed by fish, decomposition, and various chemical reactions and without dissolved oxygen, fish cannot survive.

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2.4.2.3 Nutrients

Nutrients are commonly found in stormwater runoff from fertilizers, animal waste, or detergents. When these pollutants enter the water body, they have the potential to lower the oxygen level and destroy wildlife and plant life. Nitrogen and Phosphorus are nutrients that can inhibit a stream or river from being fishable or swimmable.

2.4.3 Increased Runoff

Development can alter the hydrology of the landscape and adversely affect water quality and quantity. Development changes land use and generally increases the amount of stormwater runoff from a site. Impervious surfaces transform hydrology and impact aquatic habitats by changing the rate and volume of runoff and altering natural drainage features, including groundwater levels. Changes in water quantity begin with the initial site clearing and grading. Vegetation which intercepted rainfall and reduced runoff is removed. Natural depressions which provided temporary storage of rainfall are filled and graded. Soils are exposed and compacted resulting in increased sedimentation and decreased infiltration. Having lost much of its natural storage capacity, the cleared, graded site allows rainfall to rapidly become runoff.

Stormwater runoff can cause erosion and flooding. Development can change water flow and the percolation of water into the soil, which affects how much water can infiltrate into the ground to maintain water levels in streams, wetlands, and groundwater aquifers. Stormwater runoff also affects water quality, which can have adverse impacts on aquatic plants and animals. Figure 2-3 shows the relative increase in runoff associated with incremental changes in impervious cover.

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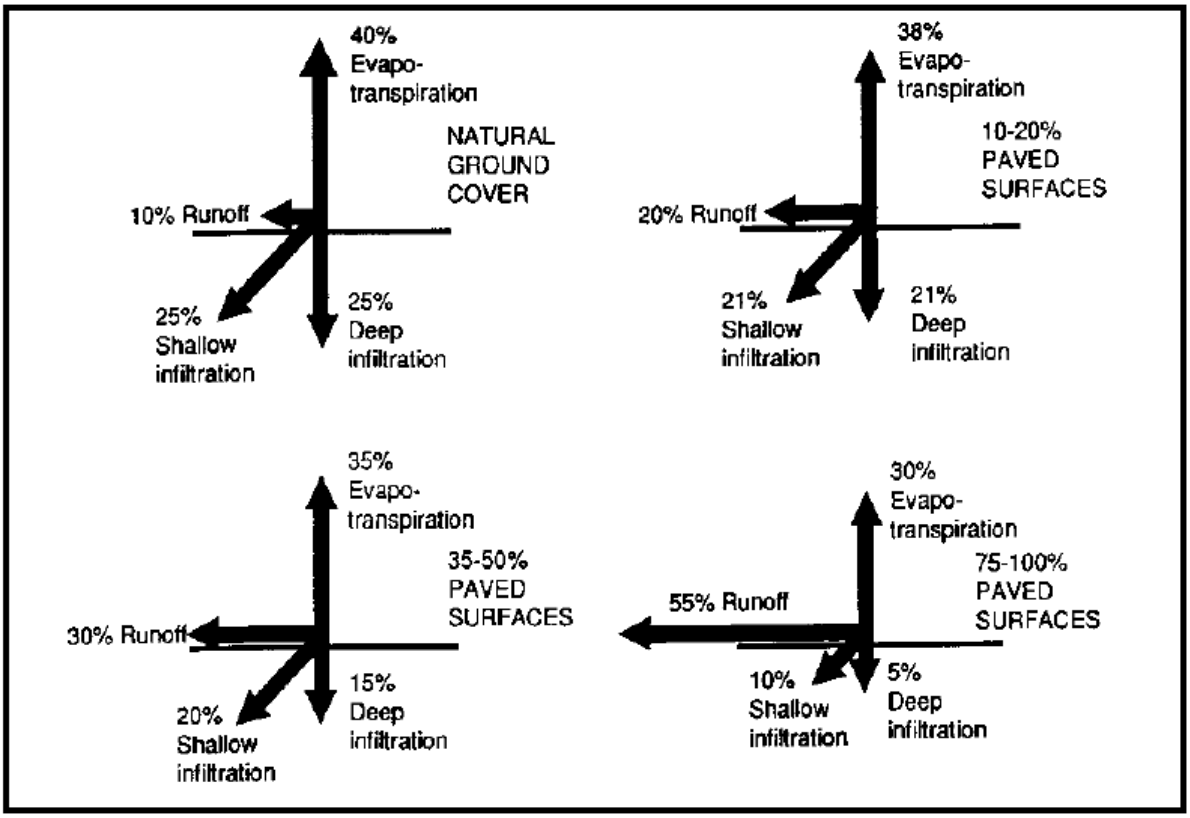
FIGURE 2-3

TYPICAL CHANGES IN RUNOFF FLOW RESULTING FROM PAVED SURFACES



Source: Minnesota Pollution Control Agency (MPCA), 1989

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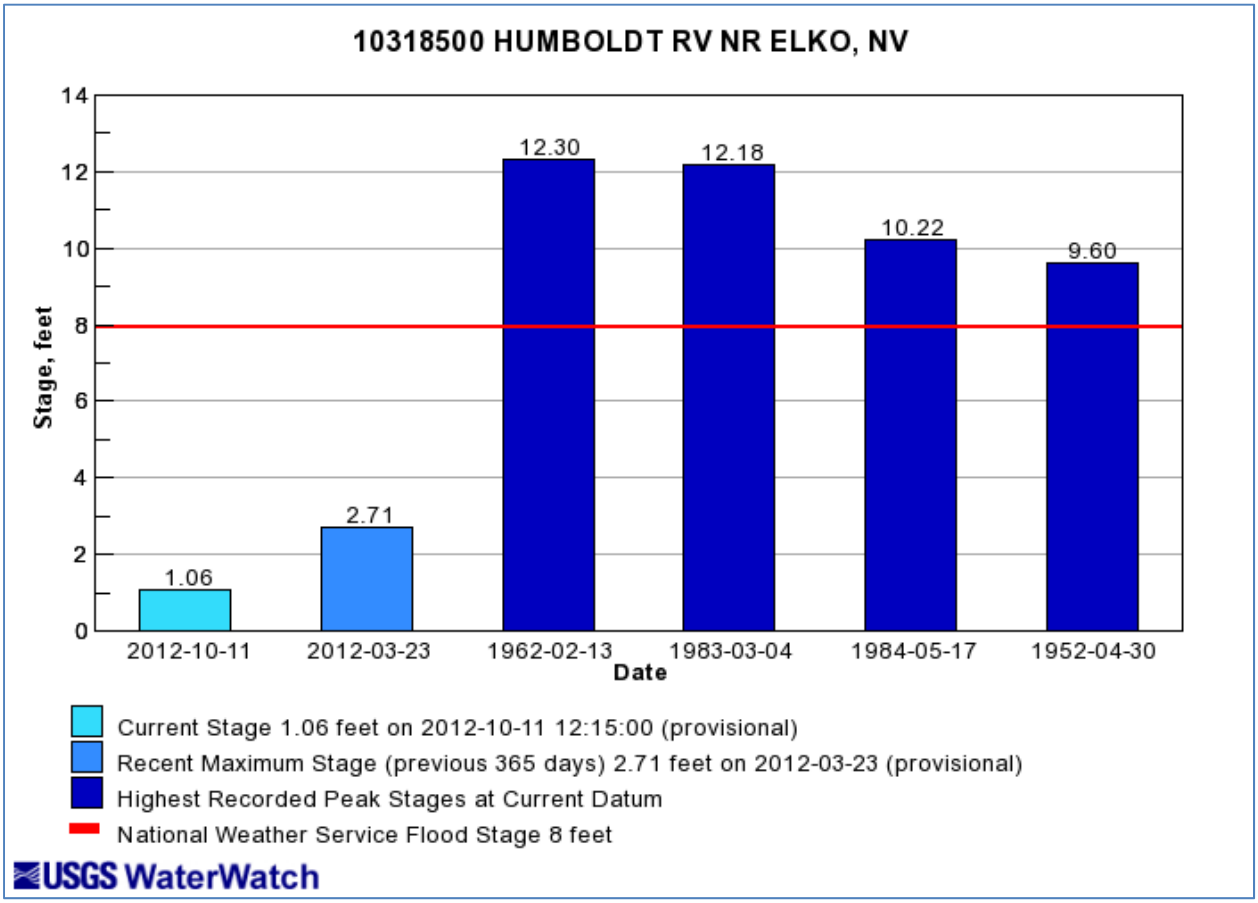
2.4.3.1 Flooding

Sediment and debris carried into streams and rivers from stormwater can restrict channels and cause flooding. The City of Elko has an average of 30 inches of snow each year which produces seasonal runoff to streams and rivers every spring and can potentially cause flooding. See Table 2-3 for the Flood Tracking Chart for the Humboldt River.

FIGURE 2-3

FLOOD TRACKING CHART



Source: USGS http://waterwatch.usgs.gov/index.php

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2.4.3.2 Erosion

High peak flows or flooding can erode channel banks destroying fish and wildlife habitats. Urban and suburban stormwater often contain sediment as a NPS pollutant. The City of Elko will experience an average of 30 inches of snow per year which causes erosion in the spring, when the snow melts carrying sediment to streams and rivers in the runoff. Soil erodibility, during construction activities and post-construction development, causes soil particles to become detached due to high winds and rainfall events. Natural drainage is the most effective means of filtering sediment and pollution from disturbed land runoff to water bodies. Limiting the amount of disturbed area reduces the amount of sediment pollution.

2.5 STORM WATER POLLUTION AND THE CITY OF ELKO

The primary water body in the City of Elko is the Humboldt River. The NDEP lists the Humboldt River from Osino to Palisade on Nevada's Assessed Water 2008-10 prepared in accordance with the requirements of Sections 303(d)/305(b)314 of the Clean Water Act. The list of impaired water bodies can be found on the website at http://ndep.nv.gov/bwqp/file/303d_draft_2008-10_IR%20.pdf.

The Humboldt River is fully supporting and meets all the qualifications of the following:

- Watering of livestock
- Industrial Supply
- Irrigation
- Municipal or Domestic Supply
- Propagation of Wildlife
- Recreation Not Involving Contact with Water

The EPA's goal through the NPDES program has been to achieve the nation's water quality goals of "fishable and swimmable" waters. By that measure, however, the Humboldt River fails to meet the program objective. The total level of phosphorus is too high to support aquatic life. Recreation involving contact with water is not recommended due to Escherichia coli. Escherichia coli was not listed in the 2006 report and is a new listing. The Humboldt River, water ID NV04-HR-02_00, from Osino to Palisade, is listed as a Category 5 on the

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Impaired Waters 303(d) List. The description of a water body listed as Category 5 is impaired or threatened by pollutant(s).

The EPA defines the Total Maximum Daily Load (TMDL) as "a calculation of the maximum amount of a pollutant that can be present in a segment and still allow attainment of water quality standards, and an allocation of that amount of the pollutant's sources." A TMDL is the sum of point sources and non-point sources plus a margin of safety. The TMDLs for the Humboldt River assessed in 2008/2010 are Total Suspended Solids (TSS) and Total Phosphorus. Use of the TMDL process to mitigate impairments or rehabilitate surface waters impacted primarily by non-point sources has been a continuing controversy in the national debate around water quality protection. Nevertheless, current regulations require that the City of Elko specifically address the pollutants of concern for this reach of the Humboldt River.

2.6 EVALUATING POLLUTANTS OF CONCERN

The City of Elko's Post-Construction Stormwater Management BMP program for NDSR projects focuses on managing stormwater quality and quantity. Specific pollutants of concern include TSS and Total Phosphorus, as well as overall stormwater runoff quantity. Chapters 3 – 5 focus on planning and design principles designed to minimize the post-construction effects of NDSR. Stormwater discharged from new developments and redevelopments are required to use BMPs to reduce the current TMDLs and prevent future pollution to the Humboldt River with the ultimate goal of restoring a fishable and swimmable water body.

2.7 REFERENCES AND ADDITIONAL RESOURCES

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3 CITY OF ELKO POST-CONSTRUCTION STORMWATER MANAGEMENT PROGRAM

As a Co-Permitee listed on the NDEP Small MS4 General Permit No. NV040000, the City of Elko is responsible for development, implementation and enforcement of a Post-Construction Stormwater Management BMP Program for new development and significant re-development (NDSR).

3.1 PROGRAM GOALS

The Post-Construction Stormwater Management BMP Program focuses on planning procedures intended to achieve the following goals:

- To prevent stormwater discharges from post-construction projects from causing or contributing to downstream violations of water quality standards of any pollutant of concern to the maximum extent practicable (MEP); and
- To promote the improvement of ambient water quality by reducing the discharge of pollutants in stormwater.

3.2 POST-CONSTRUCTION RUNOFF CONTROL PROGRAM ELEMENTS

3.2.1 Project Applicability

Projects seeking approval from the City of Elko are required to demonstrate compliance with planning and design principles described in Section 4. In accordance with the City's General Permit, the Post-Construction Stormwater Management BMP Program for NDSR applies to the following projects:

- Residential subdivisions five (5) acres or greater in size;
- Single-family residences subject to local ordinances governing hillside development;
- 100,000 square foot commercial and industrial developments;
- Automotive repair shops (with Standard Industrial Classification ("SIC") codes 5013, 7532, 7533, 7534, 7537, 7538, and 7539);

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- Retail gasoline outlets disturbing greater than one (1) acre;
- Restaurants disturbing greater than one (1) acre;
- Parking lots greater than one (1) acre potentially exposed to urban runoff;
- Other new development and re-development projects requiring approval by the City of Elko Engineering Department;
- All projects defined in the City of Elko Ordinance No. 776, Section 9-8-3 Applicability.

Questions regarding project applicability may be directed to:

Development Manager
City of Elko Development Department
1755 College Avenue
Elko, NV 89801

Phone: (775) 777-7217
Email: sawilkinson@ci.elko.nv.us

or

Environmental Coordinator
City of Elko Development Department
1755 College Avenue
Elko, NV 89801

Phone: (775) 777-7213
Email: jpaxson@ci.elko.nv.us

3.2.2 Program Implementation and Enforcement

Implementation and enforcement of the program is the responsible charge of the City of Elko Development Department, and is accomplished through the site plan review process. Projects which do not meet the program requirements will not receive approval by the Development Department. Development Department approval is required for final plan approval.

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3.2.3 Planning and Design

Planning and design resources for potential developers related to Low Impact Development (LID) are outlined in Section 4.2.1. This section focuses on LID measures which are identified as appropriate and effective for the City of Elko's climate and hydrology.

Further specific discussion on Best Management Practices and LID measures relevant to the City of Elko are described in Section 5, BMP Selection. This section outlines a list of BMPs which are determined to be applicable to the City of Elko's environment and are effective at targeting specific sources of stormwater pollutants.

As part of the Development Application process, applicants are required to submit forms and checklists, located in Appendix B of this manual, which require analysis of applicable BMPs, selection of effective and appropriate design elements and a schedule for implementation, maintenance and monitoring.

3.2.4 Flood Management Controls

The City of Elko regulates development in flood hazard areas through administration and enforcement of Title 3, Chapter 8 – Floodplain Management. This regulation purpose is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. All development in the City of Elko, including developments subject to these guidelines, must conform to the Floodplain Management ordinance where applicable.

3.2.5 Post-Construction Ordinance

The City of Elko Ordinance No. 776 entitled "Post Construction Stormwater Run-Off Control and Water Quality Management" regulates discharges to the Elko municipal stormwater conveyance systems and stormwater from completed construction projects. The ordinance was promulgated specifically to meet the requirements of the NPDES General Permit and includes provisions stipulated in the permit. In conjunction with existing development regulations, the provisions of the ordinance ensure the continued protection of water quality

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from impacts due to land disturbance, increases in impervious area or other development activity.

3.2.6 BMP Maintenance Inspection, Inventory and Tracking

As part of the Development Application process, applicants are required to establish and maintain a schedule for BMP implementation, maintenance and monitoring.

The City of Elko will develop and maintain a database of current BMPs throughout the City which require periodic maintenance. Information stored in the database will include:

- Project or Property Owner Name (including City of Elko)
- Project Location
- Project Acreage
- BMP type and description
- Inspection or Contact Date
- Summary of Recommendations or Corrective Actions
- Date of Confirmation of Corrective Actions
- Planned BMP Maintenance Schedule

Upon entering project information into the database, a BMP inspector will be assigned to each project. The BMP inspector will review installation and long-term maintenance of post-construction structural Stormwater BMPs. The inspector will summarize recommendations or corrective actions and provide feedback to the BMP owner to be satisfied prior to approval by the Planning Department. The BMP inspector will also establish a maintenance contract with the BMP owner which will serve to document the agreed upon maintenance schedule and commitment by the owner to perform maintenance. A sample annual maintenance plan is appended to this Manual in Appendix B.

Private BMP owners will be required to provide annual confirmation of BMP maintenance in accordance with the maintenance schedule submitted during the design review process. The database will be reviewed and updated quarterly, and a list of outstanding maintenance will be generated and reviewed. Private BMP owners will be notified of non-compliance if their BMP maintenance lapses for more than six months.

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3.2.7 Mapping

The City maintains a Geographic Information System (GIS)-based drainage system map and database which includes all MS4 outfall locations and piped systems. The City requires that project owners subject to development regulations provide the City with "as-built" plans for any stormwater management facilities located on-site after final construction is completed. This requirement is applicable regardless of whether the stormwater facilities are to be conveyed (dedicated) to the City, or privately maintained. One hard copy and a digital copy of the plan must be provided to the City before release of any performance securities will occur. The digital copy of the as-built plans allows the City to incorporate structural BMPs into the GIS database for continuous maintenance of an accurate and current record of both public and private stormwater facilities that contribute to the City's MS4.

3.3 LOCAL POLICIES AND PROCEDURES

3.3.1 Applications for New Construction and Redevelopments

Applicants for new development and significant redevelopment (NDSR) must submit appropriate applications to the City of Elko.

As part of the City of Elko review process, the applicant must also submit additional documentation, included in Appendix B, which describes the potential impacts that the NDSR will have on the City of Elko, specifically related to stormwater quantity and quality.

The City of Elko Development Department is responsible for review and approval of proposed site design BMPs. Projects which do not meet the program requirements will not receive approval by the Development Department. Development Department approval is required for final plan approval.

3.3.2 Public Resources

This Manual is intended to be used as a resource for potential applicants when evaluating appropriate BMPs for NDSR. Additional resources on the City of Elko's Plan Review

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policies and procedures can be found online at http://www.ci.elko.nv.us/commdev/planning.htm.

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4 PLANNING AND SITE DESIGN PRINCIPLES

The City's Stormwater Management Program has been established to achieve two main goals, as outlined in the MS4 Permit:

- To prevent stormwater discharges from post-construction projects from causing or contributing to downstream violations of water quality standards of any pollutant of concern; and
- To promote the improvement of ambient water quality by reducing the discharge of pollutants in stormwater.

To this end, this Manual shall serve to identify and guide proper development planning activities. BMPs identified herein do not constitute an exhaustive list of available stormwater management tools. Alternative BMPs may be included in planning and design submissions, unless explicitly prohibited by this Manual. BMPs which require excessive maintenance, particularly where those structures may ultimately become the property of the City, are not recommended. Generally, management practices that retain and infiltrate stormwater within private site or parcel boundaries will remain the property and responsibility of property owners.

4.1 WATER QUALITY PLANNING AND DESIGN CRITERIA

The principles and standards discussed herein are intended to focus on minimizing the post-construction effects of NDSR. As discussed in Section 2.5, the City of Elko faces challenges of maintaining surface water quality in the Humboldt River. Planning and design of NDSR projects should focus on managing stormwater quality and quantity. Specific pollutants of concern include TSS and Total Phosphorus, as well as overall stormwater runoff quantity. Stormwater discharged from new developments and redevelopments are required to use BMPs to meet the current TMDLs and prevent future pollution to the Humboldt River. The TMDL process is predicated on the principal that implementation of the management practices will allow the Humboldt River to achieve applicable water quality standards in the future.

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There are a variety of controls to manage stormwater runoff from a site. Stormwater management may be achieved through drainage systems or other physical structures, such as detention and infiltration basins, pretreatment devices, and swales. Non-structural approaches can also be used to control or reduce stormwater runoff.

Planning and design elements should address the various aspects of runoff: storage of runoff water, infiltration of stormwater to groundwater, and treatment of the pollutants in stormwater.

4.2 PLANNING PRINCIPLES

Site planning that integrates comprehensive stormwater management into the site development process from the outset is the most effective approach to reduce and prevent potential pollution and flooding problems. Early stormwater management planning will generally minimize the size and cost of structural solutions. Comprehensive site planning is critical to stormwater management because it can eliminate unnecessary increases in runoff and reduce sediment/ erosion problems. Stormwater management efforts which incorporate BMP structural technologies into the site design at the final stages frequently result in the construction of unnecessarily large and costly facilities, which may fail due to improper design, siting, engineering, or operation. Careful site designs will minimize the size and related material, construction, and maintenance costs of structural stormwater controls.

Several planning principles should be inherent to any site's planning process and are outlined herein. New development and re-development applications submitted to the City must demonstrate multiple elements of these planning principles as well as a statement of the stormwater quality control objectives of the design. Site planning should include the preparation of accurate and complete site plan maps and narratives. Certain components of site planning may require technical (hydrology or engineering) expertise, and in such cases, comprehensive site planning should be done by professional design engineers.

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4.2.1 Low Impact Development

The City of Elko strongly encourages new and re-development projects to explore and utilize LID measures to the maximum extent possible. LID measures are better defined under Section 4.3, Design Standards, however are discussed as a planning tool to emphasize the need for consideration early in the design process. Understanding that each site is unique and challenging, this Manual has been developed to recommend various LID measures which can be easily incorporated into a proposed plan. The LID measures are intended to remain in effect after construction and through the life of the development. Despite the design nature of these measures, it is imperative that LID goals are established early in the planning process and integrated into the design. When planned appropriately, LID design elements are streamlined and become a natural addition to the overall site design while achieving goals of water quality and water quantity control.

4.2.2 Minimize Impervious Cover

Quantity and quality of stormwater runoff is directly related to the total area of impervious cover constructed on a site. During development, vegetated and forested land with pervious surfaces is replaced by land uses with impervious surfaces. Once the development has been constructed, the increase in impervious area (rooftops, roads, driveways, and parking lots) reduces the amount of rainfall that can be infiltrated, which increases the volume of runoff.

Careful site planning can reduce the impervious area created by pavement and roofs and the volume of runoff and pollutant loading requiring control. Certain site planning methods will minimize impervious surfaces and reduce the volume of runoff. These include:

- Maintain natural buffers and drainageways. Natural buffers located between development sites and wetlands infiltrate runoff, reduce runoff velocity, and remove some suspended solids. Natural depressions and channels act to slow and store water, promote sheet flow and infiltration, and filter pollutants.
- Minimize steep slopes: Steep slopes have significant potential for erosion and increasing sediment loading. Slopes steeper than 2:1 should be avoided unless stringent stabilization methods are employed.

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- Minimize placement of new structures or roads over porous or erodible soils: Porous soils provide the best and cheapest mechanism for infiltrating stormwater and reducing runoff volume and peak discharge, as well as providing ground water recharge and treatment by infiltration and adsorption through the soil strata. Disturbance of unstable soils should be avoided due to their greater erosion potential.
- Limit the density of development while maximizing the amount of undisturbed open space. Clusters or group buildings closer together to maximize the amount of undisturbed open space.
- Reduce the horizontal footprint of buildings and parking areas. Footprint size can be reduced by constructing a taller building, including parking facilities within the building itself, while maintaining the same floor to area (FAR) ratio.
- Reduce to one lane, or eliminate if practical, on-street parking lanes on local access roads.
- Limit sidewalks to one side, or eliminate if practical, on local low traffic roads.
- Use shallow grassed roadside swales and parking lot islands with check dams instead of curb and gutter storm drainage systems to handle runoff and snow storage. Guidelines for the use of drainage channels and water quality swales can be found in Chapter 6 of this Manual.
- Utilize “turf pavers,” gravel, or other porous surfaces when possible for sidewalks, driveways, transition areas between pavement edge and swales, or overflow parking areas.
- Maintain as much of the pre-development vegetation as possible, especially larger trees that may be on site. Vegetation absorbs water, which will reduce the amount of stormwater runoff. Proposed structures should be sited to minimize shading effects on vegetation and roots should be protected from damage during the construction phase.

4.2.3 Source Controls

As described in Chapter 2, addressing stormwater quality is best achieved at the source of the identified pollutant. Source control BMPs are generally less expensive to design, construct and maintain, not to mention are far more efficient than end-of-pipe controls. Appropriate advance planning is necessary to ensure that source controls are fully

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integrated into a design, and are easily maintained through construction and post-construction.

4.2.3.1 Material Storage/Sheltered Pollutant Sources

Many stormwater pollutants identified in Chapter 2 can be considered point source pollutants in their initial form. For example, lawn fertilizers are generally stored in bulk containers prior to being spread. Therefore, protecting these pollutant sources during storage can exponentially help to control pollutants from entering the stormwater system. Some recommended practices for managing pollutant sources include:

- Store compounds on sheltered (protected from precipitation and wind), impervious pads;
- Direct internal flow within the shelter to a collection system and route external flow around the shelter
- Uncovered storage of salt is discouraged, and is precluded entirely in buffer zones and other water resource protection areas

4.2.4 Snow and Snowmelt Management

Proper management of snow and snow melt, in terms of snow removal and storage, use of de-icing compounds, and other practices can prevent or minimize the major runoff and pollutant loading impacts. Comprehensive snow management while maintaining runoff quality can be achieved by:

- Use alternative de-icing compounds such as $CaCl_2$ and calcium magnesium acetate (CMA)
- Place plowed snow in pervious areas where it can slowly infiltrate
- Remove sediments from the snow storage areas every spring
- Choose areas with adequate soil permeability to prevent ponding.
- Blow snow from paved areas to grassed or pervious areas
- Use level spreaders and berms to spread meltwater evenly over vegetated areas
- Plan intensive street and catch basin cleaning in early spring

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4.3 DESIGN STANDARDS

4.3.1 Peak-Discharge Runoff Design

Because increased post-development runoff rates and volume can result in flooding and channel erosion, as well as convey pollutants off-site, controlling post-development stormwater rates and volumes to approximate a site's pre-development (natural cover) hydrology is the primary goal of stormwater quantity management. The City of Elko strongly encourages design standards which achieve the goal of matching pre-development hydrologic conditions. As discussed in Section 4.2.2, post-development peak discharges, runoff volume, infiltration recharge, and water quality are directly related to the amount and location of impervious area within a development.

Site plan review applicants must identify approximate peak discharge rates for pre-development conditions to establish a baseline, as well as anticipated post-development peak discharge rates. Calculation of the peak discharge rates from pre- and post-development conditions must be evaluated for specific storms. Precipitation data from the 2-, 10- and 100-year storm events should be used to calculate peak discharge rates.

Peak discharge rates can be calculated through several means, and in many cases, engineers will utilize models to conduct these calculations. The NRCS TR-55 is a common guidance document. Refer to the National Resources Conservation Service (NRCS) publication, Urban Hydrology for Small Watersheds for additional information on runoff calculations.

Following calculation of pre- and post-development peak runoff rates, stormwater quantity BMPs must be identified to mitigate the increase in site runoff, if any. Calculation of stormwater volumes required to be retained to match pre-development conditions proposed developments are also required to confirm that sizing of selected BMPs is appropriate to match pre-development peak runoff conditions.

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4.3.2 Pollutant Removal Design

The proposed development must also be evaluated to identify potential sources of pollution, as identified in Chapter 2. Project proponents must select stormwater quality BMPs to match the anticipated site pollutants. Using anticipated runoff calculations, stormwater quality BMPs must be evaluated to ensure that anticipated pollutant sources on-site are treated before leaving the site. Anticipated pollutant concentrations and BMP design removal rates must be calculated to determine the quality of the stormwater runoff.

4.3.3 Low Impact Development

Low Impact Development (LID) techniques use the natural site features to influence the final design plan. Through an emphasis on conservation and small scale controls, LID techniques assist the developer in achieving the peak discharge runoff and pollutant removal goals described above. LID principles include utilizing runoff prevention strategies, runoff mitigation strategies and pollution controls to address the overall stormwater management needs for a site. Implementation of LID techniques requires the combination of the planning and design principles presented herein, including:

- Identify pre-development hydrologic conditions and establish post-construction runoff goals.
- Identify anticipated pollution sources and establish treatment goals.
- Evaluate applicable BMPs and select appropriate water quality and quantity BMPs to achieve site specific goals.
- Implement and design selected BMPs to meet site constraints, including identifying maintenance and monitoring goals. Additional information on BMP design and maintenance is provided in Section 5.2 and 5.3, respectively.

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5 BMP SELECTION

Nonstructural and structural BMPs are recognized as the most effective and practical measures to reduce or prevent pollutants from reaching water bodies and to control the quantity of runoff from a site. However, stormwater BMP technologies range in their ability and effectiveness to treat specific pollutant types. This Chapter outlines the selection process for Best Management Practices to be incorporated into new and retrofitted developments.

5.1 SELECTION

Proper selection of appropriate structural Best Management Practices (BMPs) requires a detailed analysis of the pollutants of concern and the site specific challenges related to available space, land use, hydrology and project cost considerations. Each BMP technology has certain limitations. When designing a stormwater management system for any site, the project proponent, working together with planners and design engineers, should ask the following questions:

- How can the stormwater management system be designed to meet the standards for stormwater quantity and quality most effectively?
- What are the opportunities to meet the stormwater quality standards and the stormwater recharge and peak discharge standards simultaneously?
- What are the opportunities to utilize comprehensive site planning in order to minimize the need for structural controls?
- Are there critical areas on or adjacent to the project site?
- Does the project involve stormwater discharge from an area with a higher potential pollutant load?
- What are the physical site constraints?
- Is the future maintenance reasonable and acceptable for this type of BMP?
- Is the BMP option cost effective?

The project proponent should consider whether a system of several BMPs is more appropriate for a site than a single BMP structure. Too often, stormwater controls are added

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into a site plan in its final stages. Planning for stormwater management as an afterthought does not take into account the fact that a system of BMPs may be a more effective way to control runoff from a site.

Site suitability is a major factor in choosing BMPs. Physical constraints at a site may include soil conditions, watershed size, depth to water table, depth to bedrock and slope. In some cases, a BMP may be eliminated as an option because of site constraints. Often, however, BMPs can be modified or combined with other BMPs to adapt to site conditions and to create an efficient system capable of meeting the water quality and quantity standards. The following sections briefly discuss the physical site conditions which will affect BMP selection.

5.1.1 Soil Suitability

Basic soil requirements for each should be evaluated as part of the BMP selection process. Generally, detention/retention technologies are applicable to a broad range of soil conditions, but wet ponds may have difficulty maintaining water levels in very sandy soils. Soil type is of particular importance to infiltration BMPs, and some native soils in the City of Elko may be too restrictive for wide application of infiltration practices. Specifically, infiltration technologies should not be applied in areas with soils exhibiting low permeability. Where infiltration technologies are planned, soils must be checked and adequate permeability confirmed.

5.1.2 Drainage Area/Watershed To Be Served

The size of the contributing area may be a limiting factor in selecting the appropriate BMP technology. Pond BMPs typically require large contributing drainage areas in order to function properly, while infiltration BMPs require smaller drainage areas. For technologies that require large contributing watersheds, additional offsite runoff may be routed to the BMP to increase flows. Conversely, portions of the total runoff can be routed to smaller individual BMPs to allow for the use of lower capacity BMPs; however this decision should be evaluated in terms of maintenance required for each option.

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5.1.3 Depth to Water Table

Depth to the seasonal high water table is an important factor for stormwater technologies, especially infiltration BMPs. If the seasonal high water table extends to within two feet of the bottom of an infiltration BMP, the site is seldom considered suitable. The water table acts as an effective barrier to exfiltration through the BMP media and soils below and can reduce the ability of an infiltration BMP to drain properly. Contamination potential of the water table is of concern. For constructed wetlands and wet ponds, a water table at or near the surface is desirable. Areas with high water tables are generally more conducive to siting these types of detention/retention BMPs.

5.1.4 Depth to Bedrock

The depth to bedrock (or other impermeable layers) is a consideration for facilities which rely upon infiltration. The downward exfiltration of stormwater is impeded by bedrock that is near the surface, because infiltration BMPs will not drain properly. A site is generally not suitable for infiltration BMPs if the bedrock is within two feet of the bottom of the BMP. Similarly, pond BMPs are not feasible if bedrock lies within the area that must be excavated to provide stormwater storage due to the expense of excavation.

5.1.5 Slopes

The slope of a site can restrict the type of BMP that can be used. Water quality swales and infiltration trenches are not practical when slopes exceed 20%. To achieve water quality benefits, wet and dry swales and drainage channels must not be sited on slopes greater than 5%. Where there are slopes, the BMPs must be very carefully designed to avoid erosion and flooding off site due to runoff discharges that bypass water quality treatment BMPs.

5.1.6 Proximity to Foundations

Infiltration of stormwater can cause seepage into foundations when BMPs are located too close to buildings; a ten foot setback is recommended.

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5.2 DESIGN

Designing a stormwater management system requires precise sizing to ensure that runoff is controlled at the project site. The following is a list of the types of calculations that are necessary to address both the water quality and volumetric standards:

- Water Quality and Recharge Calculations
    - The expected TSS removal with selected BMPs
    - The volume of stormwater that is to be treated for water quality
    - The volume of stormwater that is to be recharged into the groundwater
- Peak Discharge Rate Calculations
    - The peak discharge rates from pre- and post-development conditions and the volume of stormwater that must be retained onsite to control peak discharge rates during specified storm events.

Additional information on the above calculations and specific design considerations can be found through the references listed in the tables provided in Chapters 6, 7 and 8.

5.3 MAINTENANCE

BMPs must be maintained in order to operate properly. For this reason, the City of Elko requires that all stormwater management facilities for commercial, industrial or large residential development have an operation and maintenance plan. Waivers from this requirement may be allowed at the sole discretion of the City. Typically, small residential development is exempt, however, if the developer is not sure if the operation and maintenance plan is required, consultation with the City is encouraged. At a minimum, operation and maintenance plans should identify:

- BMP(s) owner(s)
- Party or parties responsible for operation and maintenance
- Source(s) of funding for continued operation and maintenance of the BMP(s)
- Schedule for inspection and maintenance
- Routine and infrequent maintenance tasks.

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Too often, BMPs are constructed without plans or obligations for long term maintenance. The maintenance requirements for BMP structures must be considered during the selection process, and the operation and maintenance plan must be submitted for review along with the BMP design.

For most BMPs, the maintenance requirements include visual tasks (e.g., inspection of sediment chambers/traps) and physical upkeep tasks (e.g., sediment removal and disposal, and mowing of grassed swales).

For the developer, the most difficult part of developing a maintenance plan may be identifying a responsible party to perform and pay for the long term maintenance of the BMP. The plan must clearly address the following BMP maintenance issues: how and when maintenance is to be performed, how and when inspections will be performed, and how these tasks will be financed.

For the above reasons, BMPs should be designed to minimize maintenance needs, wherever possible. Future maintenance problems should be anticipated and plans should be developed to alleviate them as much as possible. Preventative design measures, such as the use of forebays to trap sediment inputs, can reduce the future maintenance costs and requirements.

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6 NON-STRUCTURAL BMP SOURCE CONTROLS

Non-structural BMP source controls prevent and regulate pollution at the source and are less expensive than installation of structural controls. Sediment and erosion is controlled by maintaining slopes at a minimum of 2:1. Note that a minimum 3:1 slope is required in some areas subject to the City's Hillside Development Regulations. Applicants are responsible for ensuring that slopes meet requirements for all applicable ordinances based on zone/area of development. Maintenance programs include street sweeping, catch basin cleaning, and snow melt management to remove sediments from entering runoff. Runoff volume is reduced by minimizing the area of roofs, pavement, and other impervious surfaces and maintaining natural buffers and natural depressions. Non-point source pollutants, including fertilizers, pet waste, chemical storage and disposal, and litter, can be controlled by prevention and education to reduce exposure. Table 6-1 provides non-structural BMP source controls appropriate for the City of Elko's weather patterns and soil types. This list is not intended to be encompassing of available BMPs.

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TABLE 6-1

PLANNING AND NON-STRUCTURAL BMP SOURCE CONTROLS

BMP	Considerations	Site Applicability	Additional Design Information*
Roof Runoff Control	Vegetated swales, buffer, sand filter, store for irrigation	Widely Applicable	Truckee Meadows Control Manual SC-10
Efficient Irrigation	Rain and wind-triggered shutoff devices, automatic line break detection shutoff valves and soil moisture sensors. Choose plants for climate. Use environmentally friendly fertilizers.	Widely Applicable at any location that uses an irrigation system.	Truckee Meadows Control Manual SC-11
Snow and Snowmelt Management	Individual property management	Widely Applicable	See Section 4.2.4
Street and Parking Lot Sweeping	Private lot or roadway sweeping	Widely Applicable	
Storm Drain Labeling	Label storm drains to educate public that the system conveys water to rivers without treatment.	Widely Applicable	Truckee Meadows Control Manual SC-12

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7 STRUCTURAL BMP TREATMENT CONTROLS

Structural BMP treatment controls are effective at filtering pollutants from runoff if sized correctly and properly installed. The table below is prepared to aid in the selection of the most applicable BMP for each site condition whether residential, commercial, or industrial. Structural BMPs must be properly maintained or stormwater could be untreated or discharging pollutants, which can result in state or local agencies issuing fines.

When implementing porous pavements as a BMP, they are not applicable in areas with a high volume of traffic or heavy loads. Snow plows should not be used on this pavement as they may cause damage due to the uneven porous material.

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TABLE 7-1

STRUCTURAL BMP TREATMENT CONTROLS

BMP	Pollutant Removal Effectiveness	Longevity	Maintenance Requirement	Site Applicability	Additional Reference Material
Detention Basin	Moderate	20+ Years	Low	Widely Applicable	Truckee Meadows Control Manual TC-40 and TC-41
Wet Retention Pond	Moderate to high	20+ Years	Low to Moderate	Widely Applicable	Truckee Meadows Control Manual TC-30 and TC-50
Constructed Stormwater Wetland	Moderate to high	20+ Years	Low to Moderate	Widely Applicable	Truckee Meadows Control Manual TC-40 and TC-51
Water Quality Swale or Buffer Strip	Moderate	20+ Years	Low to Moderate	Widely Applicable	Truckee Meadows Control Manual TC-10 and TC-11
Infiltration Trench	Moderate to high	High failure rates within first 5 years	High	Highly Restricted	Truckee Meadows Control Manual TC-20
Infiltration Basin	Moderate	High failure rates within first 5 years	High	Highly Restricted	Truckee Meadows Control Manual TC-21

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BMP	Pollutant Removal Effectiveness	Longevity	Maintenance Requirement	Site Applicability	Additional Reference Material
Sand Filters	Moderate to High	20+ Years	High	Widely Applicable	Truckee Meadows Control Manual TC-60 and TC-61
Water Quality Inlets	Low	20+ Years	Moderate to High	Applicable to small sites	
Sediment Trap [Forebay]	Low	20+ Years	Moderate	Widely Applicable	
Drainage Channel	Low	20+ Years	Low to Moderate	Applicable to low density development	
Deep Sump [Modified] Catch Basin	Low	20+ Years	Moderate	Applicable to small sites	
Porous Pavements	Low	20+ Years	Moderate	Widely Applicable	Truckee Meadows Control Manual TC-62

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8 MANUFACTURED (PROPRIETARY) TREATMENT CONTROLS

Manufactured or proprietary treatment controls are prefabricated structures designed and sold by private companies. The criteria supplied by the manufacturer should be cross checked with the City of Elko standards. The City of Elko standards for acceptable pollutant removal rates must be adhered to.

This table does not include every manufactured treatment control available. This list has been selected based on regional climate and soils, but does not limit the selections for manufactured treatment controls.

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TABLE 8-1

MANUFACTURED (PROPIETARY) TREATMENT CONTROLS

BMP	Site Applicability	Additional Reference Material	
Hydrodynamic Separators	Industrial: Hydrodynamic Separators (Vortex separators or swirl concentrators)	Truckee Meadows Control Manual MTC-10	See Manufacturer's Guidance for: • Pollutant Removal Effectiveness • Longevity • Maintenance Requirements
Wet Vaults	Commercial/Industrial: Wet Vaults	Truckee Meadows Control Manual MTC-20	
Catch Basin Inserts	Wide Applicability: Catch basin insert: trays, boxes, or socks (See also Table 7-1)	Truckee Meadows Control Manual MTC-30	
Modular Wetlands	Installation will depend on location. Need a perennial water source. Generally not applicable for industrial sites.	Truckee Meadows Control Manual MTC-40	
Media Filtration Systems	Commercial/Industrial	Truckee Meadows Control Manual MTC-50	
Landscape Filtration Systems	Commercial/Industrial: Landscape Filtration Systems, manufactured biofiltration systems	Truckee Meadows Control Manual MTC-60	
Gross Solids Removal Devices	Wide Applicability: Gross Solids Removal Devices (GSRDs)	Truckee Meadows Control Manual MTC-70	

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Appendix A

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NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

National Pollutant Discharge Elimination System

General Permit for Discharges from

Small Municipal Separate Storm Sewer Systems

Permit No. NVS040000

Operators of the following small municipal separate storm sewer systems are authorized to discharge stormwater to waters of the United States under the National Pollutant Discharge Elimination System in compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et. seq.) and in accordance with the conditions and requirements set forth in this permit:

> **Carson City, Portions of Douglas County, Lyon County and the Indian Hills General Improvement District Located within the Carson City Urbanized Area, the City of Elko, Nellis Air Force Base and the Coyote Springs Development.**

This permit becomes effective on **July 6, 2010.**

This permit and the authorization to discharge expire at midnight, **July 5, 2015**.

Signed and issued this 6th day of July, 2010.

Steve McGoff, P.E.
Staff Engineer III
Bureau of Water Pollution Control

I. Permit Coverage and Authorized Discharges

I.A. This permit covers all or part of any Urbanized Area ("UA") within the State of Nevada, as defined in the Definitions in Part VIII. The Permittees currently covered under this permit are: Carson City, portions of Douglas County, Lyon County and the Indian Hills General Improvement District located within the Carson City UA, the City of Elko, Nellis Air Force Base and the Coyote Springs Development.

I.B. This permit authorizes the discharge of stormwater from small municipal separate storm sewer systems ("MS4s"), as defined in 40 CFR§122.26(b)(16). The Permittee is authorized to discharge stormwater under the terms and conditions of this General Permit if the Permittee:

I.B.1. Operates a small MS4 within the permit area described in Part I.A;

I.B.2. Is not a "large" or "medium" MS4 as defined in 40 CFR§122.26(b)(4) or (7);

I.B.3. Submits a Notice of Intent ("NOI") in accordance with Part III of this permit; and

I.B.4. Is located fully or partially within an UA as determined by the latest Decennial Census by the Bureau of Census; or

I.B.5. Is a small MS4 located outside of a UA, serving a jurisdiction with a population of at least 10,000 and has population density of at least 1,000 people per square mile as determined by the latest Decennial Census by the Bureau of Census; or

I.B.6. Is designated for permit authorization by the Nevada Division of Environmental Protection ("NDEP") pursuant to 40 CFR§122.32.

I.C. Operators of unregulated small MS4s wishing to obtain coverage under this permit may apply for coverage under this permit at any time.

I.D. This permit authorizes stormwater discharges to waters of the United States from designated small MS4s, except those discharges excluded in Part I.F.

I.E. The Permittees are authorized to accept, pass through, and discharge, without requiring Best Management Practices ("BMP") or other measures, the following non-stormwater sources provided that NDEP has not determined these sources to be substantial contributors of pollutants to the Permittee's MS4:

I.E.1. Potable water line flushing during testing or fire hydrant testing;
I.E.2. Diverted stream flows not requiring a separate permit;
I.E.3. Springs or rising ground waters;

I.E.4. Uncontaminated groundwater infiltration (infiltration is defined as water other than wastewater that enters a sewer system, including sewer service connections and foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow);

I.E.5. Discharges from potable water sources not requiring a separate permit;

I.E.6. Residential foundation and footing drains;

I.E.7. Air conditioning condensate;

I.E.8. Irrigation water from lawns and landscaping;

I.E.9. Water from residential crawl space pumps;

I.E.10. Individual residential car washing;

I.E.11. Flows from natural riparian habitats and wetlands not requiring a separate permit;

I.E.12. De-chlorinated swimming pool discharges;

I.E.13. Water incidental to street sweeping (including associated side walks and medians) and that is not associated with construction activities;

I.E.14. Discharges or flows from fire fighting activities; and

I.E.15. Dewatering activities not requiring a separate permit.

I.F. This permit does not authorize the following discharges:

I.F.1. Discharges that are mixed with sources of non-stormwater unless such non-stormwater discharges are:

I.F.1.a In compliance with a separate National Pollutant Discharge Elimination System ("NPDES") permit; or

I.F.1.b Determined not to be a substantial contributor of pollutants to waters of the U.S.

I.F.2. Stormwater discharges associated with industrial activity as defined in 40 CFR §122.26(b)(14)(i)-(ix) and (xi). The discharges are authorized under NDEP's General Permit NVR050000;

I.F.3. Stormwater discharges associated with construction activity as defined in 40 CFR §122.26(b)(14)(x) or 40 CFR§122.26(b)(15). These discharges are authorized under NDEP's General Permit NVR100000;

I.F.4. Stormwater discharges currently covered under another NPDES permit;

I.F.5. Discharges that would cause or contribute to an instream exceedance of water quality standards. The Permittee's Stormwater Management Program ("SWMP") must include a description of the Best Management Practices ("BMPs") that will be used to ensure that this will not occur. NDEP may require corrective action or an application for an individual NPDES permit or

alternative general permit if an MS4 is determined to cause an instream exceedance of water quality standards;

I.F.6. Discharges of any pollutant into any water for which a Total Maximum Daily Load ("TMDL") has been either established or approved by NDEP unless the Permittee's discharge is consistent with that TMDL. Information on TMDLs can be found on NDEP's website. This eligibility condition applies at the time the Permittee submits an NOI for coverage. If conditions change after the Permittee has permit coverage, the Permittee may remain covered by this General Permit provided the Permittee complies with the applicable requirements of Part II. The Permittee must incorporate any limitations, conditions and requirements applicable to the Permittee's discharges, including monitoring frequency and reporting required, into the Permittee's SWMP in order to be eligible for permit coverage. For discharges not eligible for coverage under this permit, the Permittee must apply for and receive an individual or other applicable general NPDES permit prior to discharging; and

I.F.7. Discharges that do not comply with NDEP's anti-degradation policy for water quality standards.

II. Discharges to Water Quality Impaired Waters

II.A. Impaired Waters Listing on 303(d) List

II.A.1 The Permittees must evaluate whether stormwater discharges from any part of the MS4 contributes directly or indirectly to the listing of a waterbody on the most current 303(d) list (i.e., impaired waterbody). Information concerning the most current 303(d) list can be found on NDEP's website. If Permittees have discharges meeting this criterion, or if there is a TMDL on receiving waters, the Permittees must comply with Part II.B. Part II does not apply if the Permittees do not have discharges meeting this criterion.

II.B. Total Maximum Daily Load

II.B.1 The Permittees must determine whether the MS4 discharges to a waterbody for which a TMDL has been developed and approved by NDEP. If there is a TMDL, the Permittees must comply with Part II.B.2.

II.B.2 If a TMDL is approved for any waterbody into which the Permittees discharge, the Permittees shall:

II.B.2.a Determine and report whether the approved TMDL is for a pollutant likely to be found in stormwater discharges from the Permittees' MS4;

II.B.2.b Determine and report whether the TMDL includes a pollutant wasteload allocation or other performance requirements specifically for stormwater

discharge from the Permittees' MS4. If there is no waste load allocation ("WLA") or other performance requirements specifically for stormwater from the Permittee's MS4, the Permittee must comply with Part II.B.3;

II.B.2.c Determine and report whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge;

II.B.2.d Assess whether the WLAs are being met through implementation of existing stormwater control measures or if additional control measures are necessary;

II.B.2.e Document all control measures that are currently being implemented or planned to be implemented and are consistent with the WLA. These measures shall be reported in the Annual Report. A schedule of implementation for all planned controls shall be included in the Stormwater Management Program ("SWMP") as described in Sections IV and V.

II.B.2.f Estimate reductions of pollutants through established and accepted BMP performance studies, calculations, models or other evidence that shows that the WLA will be addressed through the implementation of the approved SWMP, and shall be reported in the Annual Report;

II.B.2.g The Monitoring Program required by Section V shall be customized to determine whether the stormwater controls are adequate to meet the WLA to the Maximum Extent Practicable ("MEP"); and,

II.B.2.h If no WLA currently exists, but is developed during the term of this permit, then the Permittees' BMPs outlined in the approved, updated SWMP are expected to be sufficient for the duration of the existing permit period; and

II.B.2.i The need for an iterative approach to control pollutants in stormwater discharges is recognized. If the Permittees determine that additional or modified controls are necessary, the SWMP will be updated pursuant to Part VI.I and will describe the type and schedule for the control additions and/or revisions, and an analysis that demonstrates the overall effectiveness.

II.B.3 The Permittees must determine whether the MS4 discharges to a water on the current State of Nevada 303(d) List of Impaired Waters. If a waterbody is listed, the Permittees shall include a section in the Annual Report describing the conditions(s) for which the water(s) was listed, evaluating possible BMPs that might practicably be implemented, examining whether these BMPs would make a substantial improvement on water quality, and identifying any BMPs that are selected for implementation.

III. Obtaining Coverage for New Applicants

III.A. If the Permittee is automatically designated under 40 CFR§122.32(a)(1) or designated by NDEP in this permit, the Permittee is required to submit an NOI form along with a description of the Permittee's SWMP within ninety (90) days after designation. The NOI form can be obtained by contacting NDEP.

III.B. If a Permittee is designated as a regulated Small MS4 by NDEP after the issuance date of this General Permit, the Permittee is required to submit an NOI form along with a description of the Permittee's SWMP to NDEP within ninety (90) days of notice by NDEP.

III.C. If a late NOI is submitted, the Permittee's coverage is only for discharges that occur after permit coverage is granted. NDEP reserves the right to take appropriate enforcement actions for any unpermitted discharges.

III.D. Unless notified by NDEP to the contrary, Permittees who submit an initial NOI in accordance with the requirements of this permit are authorized to discharge stormwater from small MS4s under the terms and conditions of this General Permit thirty (30) days after the date the NOI is postmarked. NDEP may deny coverage under this permit and require submittal of an application for an individual NPDES permit based on a review of the NOI or other information as discussed in Part VII.S.

III.E. The Permittee may also jointly submit an NOI to NDEP with one or more MS4s. Each MS4 shall fill out its own separate NOI.

III.F. The Permittee shall submit the completed NOI, which has been signed in accordance with the signatory requirements of Part VII.I of this General Permit, and the required filing fee to NDEP at the following address:

Stormwater Coordinator
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
901 S. Stewart St., Suite 4001
Carson City, NV 89701

IV. Stormwater Management Program Requirements for New Permittees

IV.A. The new Permittee shall develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the Permittee's small MS4 to the MEP, to protect water quality, and to satisfy the appropriate water quality requirements of the CWA. The SWMP shall include management practices; control techniques and system, design, and engineering methods; and such other provisions as NDEP determines appropriate for the control of such pollutants. The Permittee's initial

SWMP must include the following information and comply with each of the six minimum control measures ("MCMs") described in Part VI:

IV.A.1. The BMPs that the Permittee or another entity will implement for each of the stormwater MCMs;

IV.A.2. The measurable goals for each of the BMPs including, as appropriate, the months and years in which the Permittee will undertake required actions, including interim milestones and the frequency of the action; and

IV.A.3. The person(s) responsible for implementing or coordinating the BMPs for the Permittee's SWMP.

IV.B. In addition to the requirements listed above, the new Permittee shall provide a rationale for how and why the Permittee selected each of the BMPs and the measurable goals for the Permittee's SWMP. The information required for such a rationale is described in the section for each minimum measure. The new Permittee shall develop and fully implement the Permittee's program within five (5) years from the issuance date of the new permit.

IV.C. The initial SWMP shall be submitted to NDEP for review and approval one (1) year from the issuance date of the NOI.

IV.D. Prior to submitting the initial SWMP to NDEP, the Permittee shall make the draft SWMP available to the public for review and comment. The Permittee shall comply with all public noticing requirements pursuant to Nevada Revised Statutes ("NRS") 241.020 concerning this draft SWMP. The draft must be made available to the public with sufficient time to meet the minimum noticing period, hold the public meeting and allow time necessary to review and incorporate the public comments. This can be done:

IV.D.1. At a meeting that is open to the public, where the public attendees are able to ask questions about and make comments on the proposed SWMP. This may be a regular meeting of an existing board. It may also be a separate meeting, specifically to deal with the initial SWMP. If multiple Permittees are working together, they may have a group meeting to discuss the draft SWMP;

IV.D.2. On the internet by making the draft SWMP available to the public on a website, providing the public the opportunity to provide comments on the internet or some other method, and making available the opportunity for the public to request an open meeting to ask questions about and make comments on the draft SWMP;

IV.D.3. Include a summary of comments received and intended responses with the final SWMP; and

IV.D.4. Make a copy of the final SWMP available for public inspection, either at a municipal office or on the internet.

IV.E. When the Permittee's initial SWMP has been approved by NDEP, the Permittee shall file an Annual Report with NDEP by December 1 of the year following NDEP's approval, and continue thereafter for the term of the permit. The Annual Report shall include the items outlined in Part VI.N and those listed on the Annual Report Template.

IV.F. New Permittees may partner with other MS4s to develop and implement the Permittee's SWMP. The description of the Permittee's SWMP must clearly describe which Permittees are responsible for implementing each of the MCMs.

IV.G. New Permittees within the Carson City UA shall also maintain a separate Clear Creek Master Stormwater Management Program ("CCSWMP") that is described in more detail in Part VI.G.

V. Stormwater Management Program Requirements for Existing Permittees

V.A. Existing Permittees shall revise, implement and enforce a SWMP designed to reduce the discharge of pollutants from the Permittees' MS4 to the MEP to protect water quality, and to satisfy the appropriate water quality requirements of the CWA;

V.B. The Permittees shall submit the revised SWMP to NDEP as a permit modification no later than eighteen (18) months after the effective date of this permit;

V.C. Prior to submitting the revised SWMP to NDEP, the Permittee shall make the draft SWMP available to the public for review and comment. The Permittee shall comply with all public noticing requirements pursuant to NRS 241.020 concerning this draft SWMP revision. The draft must be made available to the public with sufficient time to meet the minimum noticing period, hold the public meeting and allow time necessary to review and incorporate the public comments. This can be done:

V.C.1. At a meeting that is open to the public, where the public attendees are able to ask questions about and make comments on the revised SWMP. This may be a regular meeting of an existing board. It may also be a separate meeting, specifically for to deal with the revised SWMP. If multiple Permittees are working together, they may have a group meeting to discuss the draft SWMP;

V.C.2. On the internet by making the draft revised SWMP available to the public on a website, providing the public the opportunity to provide comments on the internet or some other method, and making available the opportunity for the public to request an open meeting to ask questions about and make comments on the draft revised SWMP;

V.C.3. Include a summary of comments received and intended responses with the final revised SWMP; and

V.C.4. Make a copy of the final revised SWMP available for public inspection, either at a municipal office or on the internet.

V.D. The Permittees shall fully implement the updated SWMP as soon as practicable, but in no case later than two (2) years after approval of the revised SWMP by NDEP, unless NDEP establishes an alternative implementation date for one of the MCMs. While the SWMP is being updated in accordance with this permit, the Permittee shall continue to fully implement its existing SWMP;

V.E. The revised SWMP shall identify existing BMPs and any new BMPs that the Permittees or another entity will implement;

V.F. The revised SWMP shall identify the measurable goals for the new BMPs, as appropriate, including the months and years in which the Permittees will undertake required actions;

V.G. The revised SWMP shall provide information explaining how and why the Permittees selected each new BMP and measurable goals for the SWMP;

V.H. Implementation of new and existing BMPs consistent with the provisions of the SWMP as required by this permit and approved by NDEP constitutes compliance with the standard of reducing pollutants to the MEP; and

V.I. Permittees may partner with other MS4s to develop and implement the Permittee's SWMP. The description of the Permittee's SWMP must clearly describe which Permittees are responsible for implementing each of the MCMs.

VI. Minimum Control Measures. The following six MCMs must be included in each Permittee's initial or revised SWMP:

VI.A. **Public Education and Outreach**

VI.A.1. **Permit requirement**. The Permittee shall implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps the public can take to reduce pollutants in stormwater runoff.

VI.A.2. **Decision process**. The Permittee shall document the Permittee's decision process for the development of a stormwater public education and outreach program. The Permittee's rationale statement shall address the overall public education program and the individual BMPs, measurable goals and persons

responsible for the program. The rationale statement, at a minimum, must include the following information:

VI.A.2.a The plan the Permittee will use to inform individuals and households about the steps available to reduce stormwater pollution;

VI.A.2.b The plan the Permittee will use to inform individuals and groups about how to become involved in the stormwater program;

VI.A.2.c The selected target audiences for the Permittee's education program that are likely to have significant stormwater impacts (including commercial, industrial and institutional entities) and the reason(s) those target audiences were selected;

VI.A.2.d The target pollutant sources that the Permittee's public education program is designed to address;

VI.A.2.e The plan the Permittee will use for public outreach, including the mechanisms (e.g., printed brochures, newspapers, media, workshops, etc.) the Permittee will use to reach the Permittee's target audiences, and the number of people expected to be reached by the public outreach plan during the term of the permit;

VI.A.2.f The person(s) responsible for overall management and implementation of the Permittee's stormwater public education and outreach program and, if different, is the person(s) responsible for each of the BMPs identified in this program; and

VI.A.2.g The measures the Permittee will use to evaluate the success of this minimum measure, including how the Permittee selected the measurable goals for each of the BMPs.

VI.B. Public Involvement/Participation

VI.B.1. **Permit requirement.** The Permittee shall, at a minimum, comply with all State and local public noticing requirements when implementing a public involvement/participation program.

VI.B.2. **Decision process.** The Permittee shall document the decision process for the development of a stormwater public involvement/participation program. The Permittee's rationale statement must address the overall public involvement/participation program and the individual BMPs, measurable goals, and person(s) responsible for the program. The rational statement shall include the following information, at a minimum:

VI.B.2.a The steps taken by the Permittee to involve the public in the development and submittal of the Permittees NOI and SWMP;

VI.B.2.b The plan the Permittee will use to actively involve the public in the development and implementation of the program;

VI.B.2.c The target audiences for the Permittee's public involvement program, including a description of the types of ethnic and economic groups engaged. The Permittee is encouraged to actively involve all potentially affected stakeholder groups, including commercial and industrial businesses, trade associations, environmental groups, homeowners associations, and educational organizations, among others;

VI.B.2.d The types of public involvement activities included in the Permittee's program. These pubic involvement activities may include:

VI.B.2.d.i Citizen representatives on a stormwater management panel;
VI.B.2.d.ii Public hearings;

VI.B.2.d.iii Working with citizen volunteers willing to educate others about the program; and

VI.B.2.d.iv Volunteer monitoring for stream or lake clean-up activities.

VI.B.2.e The person(s) responsible for the overall management and implementation of the Permittee's stormwater public involvement/participation program and, if different, the person(s) responsible for each of the BMPs identified for this program.

VI.B.2.f Metrics the Permittee will use to evaluate the success of this MCM, including how the Permittee selected the measurable goals for each of the BMPs.

VI.C. **Illicit Discharge Detection and Elimination**

VI.C.1. **Permit requirement**. The Permittee shall:

VI.C.1.a Develop, implement and enforce a program to detect and eliminate illicit discharges (as defined in 40 CFR§122.26(b)(2)) into the Permittee's MS4;

VI.C.1.b Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the U.S. that receive discharges from those outfalls;

VI.C.1.c To the extent allowable under State, or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-stormwater

discharges into the Permittee's MS4 and implement appropriate enforcement procedures and actions;

VI.C.1.d Develop and implement a plan to detect and address non-stormwater discharges, including illegal dumping, into the Permittee's MS4;

VI.C.1.e Inform public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste;

VI.C.1.f Address the discharges listed in Part I.E or flows (i.e., illicit discharges) only if the Permittee identifies them as significant contributors of pollutants to the Permittee's MS4; and

VI.C.1.g The Permittee may also develop a list of other similar occasional incidental non-stormwater discharges (e.g. non-commercial or charity car washes, etc.) that will not be addressed as illicit discharges. These non-stormwater discharges must not be reasonably expected to be significant sources of pollutants to the MS4 either because of the nature of the discharges or conditions the Permittee has established for allowing these discharges to the Permittee's MS4 (e.g., a charity car wash with appropriate controls on frequency, proximity to sensitive waterbodies, BMPs on the wash water, etc.). The Permittee shall document in the SWMP any local controls or conditions placed on the discharges. The Permittee shall include a provision prohibiting any individual non-stormwater discharge that is determined to be contributing significant amounts of pollutants to the MS4.

VI.C.2. **Decision process.** The Permittee shall document the decision process for the development of a stormwater illicit discharge detection and elimination ("IDDE") program. The Permittee's rationale statement must address the overall IDDE program and the individual BMPs, measurable goals, and person(s) responsible for administering the program. The rational statement shall include the following information, at a minimum:

VI.C.2.a The plan the Permittee will use to develop a storm sewer map showing the location of all outfalls and the names and location of all receiving waters. Describe the sources of information the Permittee will use for the maps, and how the Permittee plans to verify the outfall locations with field surveys. If the Permittee has already completed the map, describe how the map was developed. Also, discuss how the Permittee will update the map and the frequency of the updates;

VI.C.2.b The mechanism (ordinance or other regulatory mechanism) the Permittee will use to effectively prohibit illicit discharges into the MS4 and why the mechanism was chosen. If the Permittee needs to develop this mechanism, describe the plan and the schedule to do so. If the Permittee's

ordinance or regulatory mechanism has already been developed, include a copy of the relevant sections with the SWMP;

VI.C.2.c The Permittee's plan to ensure that by using appropriate enforcement procedures and actions the illicit discharge ordinance (or other regulatory mechanism) is implemented;

VI.C.2.d The Permittee's plan to detect and address illicit discharges to the system, including discharges from illegal dumping and spills. The Permittee's plan shall include dry weather field screening for non-stormwater flows and field tests of selected chemical parameters as indicators of discharge sources. The Permittee's plan shall also address on-site sewage disposal systems that overflow ("Sanitary Sewer Overflows") into the storm drainage system. The Permittee's description must address the following, at a minimum:

VI.C.2.d.i Procedures for locating priority areas which include areas with a higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines, for example) or ambient sampling to locate impacted reaches;

VI.C.2.d.ii Procedures for tracing the source of an illicit discharge, including the specific techniques that will be used to detect the location of the source;

VI.C.2.d.iii Procedures for removing the source of the illicit discharge;

VI.C.2.d.iv Procedures for program evaluation and assessment;

VI.C.2.d.v The plan the Permittee will use to inform public employees, businesses, and the general public of the hazards associated with illegal discharges and improper disposal of waste. Discuss how this plan will coordinate with the public education minimum measure and the pollution prevention/good housekeeping minimum measure programs;

VI.C.2.d.vi The person(s) responsible for overall management and implementation of the stormwater IDDE program and, if different, is the person(s) responsible for each of the BMPs identified for this program; and

VI.C.2.d.vii Discuss how the Permittee will evaluate the success of this MCM, including how the Permittee selected the measurable goals for each of the BMPs.

VI.D. **Construction Site Stormwater Runoff Control**

VI.D.1. **Permit requirement.** The Permittee shall develop, implement, and enforce a program to reduce pollutants from any stormwater runoff to the Permittee's MS4 from construction activities that result in a land disturbance of greater than or equal to one (1) acre. Reduction of stormwater discharges from construction activity disturbing less than one (1) acre must be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one (1) acre or more. If NDEP waives the requirements for stormwater discharges associated with small construction activity in accordance with 40 CFR§122.26(b)(15)(i), the Permittee is not required to develop, implement, and/or enforce a program to reduce pollutant discharges from such sites. The Permittee's program must include the development and implementation of, at a minimum:

VI.D.1.a An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, or local law;

VI.D.1.b Requirements for construction site operators to implement appropriate erosion and sediment control BMPs;

VI.D.1.c Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

VI.D.1.d Procedures for site plan review which incorporate consideration of potential water quality impacts;

VI.D.1.e Procedures for receipt and consideration of information submitted by the public; and

VI.D.1.f Procedures for site inspection and enforcement of control measures.

VI.D.2. **Decision process.** The Permittee shall document the decision process for the development of a construction site stormwater control program. The Permittee's rationale statement must address the overall construction site stormwater control program and the individual BMPs, measurable goals, and responsible person(s) for the program. The rationale statement must include the following information, at a minimum:

VI.D.2.a The mechanism (ordinance or other regulatory mechanism) the Permittee will use to require erosion and sediment controls at construction sites and why that mechanism was chosen. If the Permittee needs to develop this mechanism, describe the plan and the schedule to do so. If the Permittee's

ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the SWMP;

VI.D.2.b The Permittee's plan to ensure compliance with the erosion and sediment control regulatory mechanism, including the sanctions and enforcement mechanisms that will be used to ensure compliance. Describe the procedures the Permittee will use when imposing certain sanctions. Possible sanctions include monetary penalties such as fines and non-monetary penalties such as stop-work orders, bonding requirements, and/or permit denials for non-compliance;

VI.D.2.c The Permittee's requirements for construction site operators to implement appropriate erosion and sediment control BMPs and control waste at construction sites that may cause adverse impacts to water quality. Such waste includes discarded building materials, concrete truck washouts, chemicals, litter, and sanitary waste;

VI.D.2.d The Permittee's procedures for site plan reviews, including reviews of pre-construction site plans which incorporate potential water quality impacts. Describe the Permittee's procedures and the rationale for how the Permittee will identify certain sites for site plan review, if not all plans are reviewed. Describe the estimated number and percentage of construction sites that will have pre-construction site plans reviewed;

VI.D.2.e The Permittee's procedures for receipt and consideration of information submitted by the public. Consider coordinating this requirement with the Permittee's public education program;

VI.D.2.f The Permittee's procedures for site inspection and enforcement of control measures, including how the Permittee will prioritize sites for inspection;

VI.D.2.g The person(s) responsible for overall management and implementation of the construction site stormwater control program and, if different, the person(s) responsible for each of the BMPs identified for this program; and

VI.D.2.h Describe how the Permittee will evaluate the success of this minimum measure, including how the Permittee selected the measurable goals for each of the BMPs.

VI.E. Post-Construction Stormwater Management Requirements for New Development and Significant Redevelopment Projects

VI.E.1. The Permittees shall develop a post-construction stormwater management BMP program for new development and significant redevelopment ("NDSR") projects that is suited for the unique hydrologic, hydrogeologic and regional

conditions of the Permittee's locality. The program shall focus on planning procedures consistent with the goals identified in Part VI.E.2.

VI.E.2. The post-construction stormwater management program shall have the following goals:

VI.E.2.a To prevent stormwater discharges from post-construction projects from causing or contributing to downstream violations of water quality standards of any pollutant of concern to the MEP; and

VI.E.2.b To promote the improvement of ambient water quality by reducing the discharge of pollutants in stormwater.

VI.E.3. The post-construction stormwater management program shall address at a minimum the following elements:

VI.E.3.a Describe how the Permittees will review and enhance the SWMP post-construction program requirements in a manner appropriate for the unique hydrologic, hydrogeologic and regional conditions and needs of the Permittee's locality. The review shall address the following elements:

VI.E.3.a.i Describe how the Permittees will develop, implement and enforce a program to address post-construction urban runoff from NDSR projects that disturb areas ≥1 acre, including projects <1 acre that are part of a larger common plan of development or sale, that discharge into the MS4 by ensuring that NDSR projects are complying to the MEP with the requirements of this program;

VI.E.3.a.ii Describe how the Permittees will develop low-impact development ("LID") measures that will remain in effect after construction is complete and are effective and appropriate for the Permittee's locality and its environment. The program will outline the selected LID measures found effective and appropriate for the Permittee's locality along with a summary and schedule for implementation in the MS4;

VI.E.3.a.iii Describe how the Permittees will develop any additional structural and non-structural BMPs that will remain in effect after construction is complete and are effective and appropriate for Permittee's locality and its environment. The program will outline the selected BMP measures found effective and appropriate for the Permittee's locality along with a summary and schedule for implementation in the MS4;

VI.E.3.a.iv Describe procedures to assure that future regional flood management projects assess the impacts on the water quality of receiving water bodies;

VI.E.3.a.v Describe how the Permittees will develop and implement an ordinance or other regulatory mechanism to address urban stormwater runoff from NDSR projects;

VI.E.3.a.vi Describe how the Permittees will provide verification of maintenance provisions for structural BMPs located on private property that are subject to post-construction structural BMP requirements;

VI.E.3.a.vii Describe how the Permittees will develop and implement an inventory and tracking system for post-construction structural stormwater BMPs. The inventory and tracking system shall use at a minimum the following items: project or property owner's name, project location, project acreage, BMP type and description, inspection or contact date and summary of recommendations or any necessary corrective actions undertaken;

VI.E.3.a.viii Describe how the Permittees will inspect and enforce the proper installation and long-term maintenance of post-construction structural stormwater BMPs ; and

VI.E.3.a.ix Describe how the Permittees will update its MS4 maps to show areas of NDSR, including any new stormwater major infrastructure that was constructed to serve these areas.

VI.E.3.b All NDSR projects submitted to the permitting authority subsequent to program implementation as identified in VI.E.3.b.i that fall into one of the following categories shall be subject to one or more of the SWMP design standards developed in accordance with Part VI.E.4:

VI.E.3.b.i Residential subdivisions five (5) acres or greater in size;

VI.E.3.b.ii Single-family residences subject to local ordinances governing hillside development;

VI.E.3.b.iii 100,000 square foot commercial and industrial developments;

VI.E.3.b.iv Automotive repair shops (with Standard Industrial Classification ("SIC") codes 5013, 7532, 7533, 7534, 7537, 7538, and 7539);

VI.E.3.b.v Retail gasoline outlets disturbing greater than one (1) acre;

VI.E.3.b.vi Restaurants disturbing greater than one (1) acre;

VI.E.3.b.vii Parking lots greater than one (1) acre potentially exposed to urban runoff; and

VI.E.3.b.viii Any other NDSR projects the Permittees deem necessary to be included in this part.

VI.E.4. **Design Standards.** The post-construction stormwater management program shall describe how NDSR projects specified in the previous section will implement the design standards outlined in this section. Subject to Section VI.E.4.e, the design standards program shall address at minimum the following criteria:

VI.E.4.a **Peak-Urban Runoff Discharge Rates.** Describe how the Permittees will develop design standards for peak-urban runoff from NDSR projects that will provide protection against downstream erosion;

VI.E.4.b **Site Design BMPs.** Describe how the post-construction stormwater management program will develop and implement site design BMPs in the site layout during the design and approval process to meet the goals of this program identified in Part VI.E.2;

VI.E.4.c **Source Control BMPs.** The post-construction stormwater management program shall describe how source control BMPs will be implemented. The design standards program shall include the following source-control BMPs that are consistent with the goals of this program:

VI.E.4.c.i Slopes and channel design or protection to minimize erosion;

VI.E.4.c.ii Outdoor material storage areas designed to minimize the risk of stormwater runoff contacting and carrying away pollutants to the MS4; and

VI.E.4.c.iii Trash storage areas designed to minimize the risk of stormwater runoff contacting and carrying away pollutants to the MS4.

VI.E.4.d **Structural Treatment Control BMPs.** The post-construction stormwater management program shall describe how treatment control BMPs will be developed and implemented. "Treatment control BMPs" and "treat" refer to any onsite or offsite process that provides for infiltration or detention of stormwater or that removes pollutants through any physical, chemical, or biological process. The design standards program shall describe in sufficient detail how the Permittees will size treatment control BMPs using accepted hydrologic engineering quantitative methods and the following design criteria:

VI.E.4.d.i **Volumetric Treatment Control BMP design criteria.** The post-construction stormwater management program shall describe how the Permittees will design volume-based BMPs to treat the increase of stormwater discharges from projects listed in Part VI.E.3.b. The

Permittees shall use one of the following conditions to develop the volumetric treatment control BMP design criteria:

VI.E.4.d.i.1 Historical rainfall records for the Permittee's locality to determine the maximized capture stormwater volume for the area for the 24-hour event using the formula recommended in Urban Runoff Quality Management, Water Environment Federation Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

VI.E.4.d.i.2 The volume of annual runoff based on unit basin storage water quality volume, to achieve at least 80% of volume treatment by the method recommended in hydrology manuals, textbooks or similar technical publications; or

VI.E.4.d.i.3 An alternative treatment design criteria, appropriate for the unique hydrologic, hydrogeologic and regional conditions of the Permittee's locality. Any alternative design criteria shall be submitted to NDEP with sufficient technical data to establish the appropriateness of the alternative treatment design criteria.

VI.E.4.d.ii **Flow-Based BMP design criteria.** The post-construction stormwater management program shall describe how the Permittees will design flow-based BMPs to treat stormwater discharges from projects listed in Part VI.E.3.b. The Permittees shall use one of the following conditions to develop flow-based BMP design criteria:

VI.E.4.d.ii.1 Historical rainfall data for the Permittee's locality to determine the maximum flow rate of runoff from rainfall per hour, for each hour of a storm event; or

VI.E.4.d.ii.2 The maximum flow rate of runoff produced by the 80th percentile hourly rainfall intensity (for each hour of the storm event), as determined from the local historical rainfall record; or

VI.E.4.d.ii.3 The maximum flow rate of runoff for each hour of a storm event, as determined from the local historical rainfall record that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 80th percentile hourly rainfall intensity; or

VI.E.4.d.ii.4 An alternative treatment design criteria, appropriate for the unique hydrologic, hydrogeologic and regional conditions of the Permittee's locality. Any alternative design criteria shall be submitted to NDEP with sufficient technical data to establish the appropriateness of the alternative treatment design criteria.

VI.E.4.e If the Permittees will not use some or all of the design standards described in this section, the Permittees shall provide justification using documentation and engineering analyses, and propose reasonable alternatives that are appropriate for the unique hydrologic, hydrogeologic and regional conditions in Permittee's locality.

VI.E.4.f **Effect of the Post-Construction Stormwater Management Program on Water Quality Standards and Drinking Water Supply**

VI.E.4.f.i The Permittees shall provide a written evaluation whether the criteria developed as part of the post-construction stormwater management program will tend to cause or contribute to elevated levels of pollutants of concern in surface waters within Permittee's locality and shall submit the evaluation to NDEP as part of the post-construction program; and

VI.E.4.f.ii If any criteria developed under the post-construction stormwater management program in accordance with the provisions of this permit would have a reasonable potential of causing or contributing to any water quality or water quantity impairment, or violates Nevada law, they shall be rescinded, and the Permittees shall determine whether alternate criteria can be implemented without causing water quality or water quantity impairments or violating Nevada law.

VI.F. Pollution Prevention/Good Housekeeping for Municipal Operations

VI.F.1. **Permit requirement.** The Permittee shall:

VI.F.1.a Develop and implement an O&M program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations; and

VI.F.1.b Using training materials that are available from EPA, NDEP, or other organizations, the Permittee's program must include employee training to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance.

VI.F.2. **Decision process.** The Permittee shall document the decision process for the development of a pollution prevention/good housekeeping program for municipal operations. The Permittee's rationale statement must address both the overall pollution prevention/good housekeeping program and the individual BMPs, measurable goals, and person(s) responsible for the program. The rationale statement must include the following information, at a minimum:

VI.F.2.a The Permittee's O&M program to prevent or reduce pollutant runoff from the Permittee's municipal operations. The Permittee's program shall specifically list the municipal operations that are impacted by this O&M program. The Permittee shall also include a list of industrial facilities the Permittee owns or operates that are subject to NDEP's Industrial Stormwater General Permit or individual NPDES permits for discharges of stormwater associated with industrial activities that ultimately discharge to the Permittee's MS4. Include the NDEP permit number or a copy of the Industrial NOI form for each facility.

VI.F.2.b Any employee training program the Permittee will use to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance. Describe any existing, available materials the Permittee plans to use. Describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure.

VI.F.2.c The Permittee's program description shall specifically address the following areas:

VI.F.2.c.i Maintenance activities, maintenance goals, and long-term inspection procedures for controls to reduce floatables and other pollutants to the Permittee's MS4;

VI.F.2.c.ii Controls for mitigating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas the Permittee operates. These measures shall include:

VI.F.2.c.ii.1 A description of salt and salt/sand storage piles at any of the Permittee's facilities. Salt and salt/sand piles shall be enclosed or covered by a storm resistant shelter to prevent exposure to rain, snow, snowmelt and/or runoff. If applicable, describe any temporary practices used to prevent exposure of salt and salt/sand piles to rain, snow, snowmelt and/or runoff. Sand may be stored outside and uncovered if BMPs such as setback from the storm sewer inlet, drop inlet protection, perimeter controls, or sedimentation basins are maintained to prevent discharge of sand to the MS4;

VI.F.2.c.ii.2 Permittees must develop and implement standard operating procedures ("SOP") for vehicle fueling, and receiving of bulk fuel deliveries at maintenance yard operations;

VI.F.2.c.ii.3 Permittees shall develop and implement an SOP for vehicle maintenance and repair activities that occur at municipal maintenance yard operations; and

VI.F.2.c.ii.4 Permittees shall eliminate the unpermitted discharge of equipment and vehicle wash wastewater to waters of the U.S. from municipal maintenance yard operations by either installing a vehicle wash reclaim system, capturing and hauling the wastewater for proper disposal, connecting to sanitary sewer (where applicable and approved by local authorities), ceasing the activity and/or applying for and obtaining a separate NPDES permit.;

VI.F.2.c.ii.5 Procedures for the proper disposal of waste removed from the Permittee's MS4 and the Permittee's municipal operations, including dredge spoil, accumulated sediments, floatables, and other debris;

VI.F.2.c.ii.6 The person(s) responsible for overall management and implementation of the pollution prevention/good housekeeping program and, if different, the person(s) responsible for each of the BMPs identified for this program; and

VI.F.2.c.ii.7 Describe how the Permittee will evaluate the success of this minimum measure, including how the Permittee selected the measurable goals for each of the BMPs.

VI.G. **Carson City UA Discharges to Clear Creek**

VI.G.1. Permittees within the Carson City UA shall also maintain a separate Clear Creek Master Stormwater Management Program ("CCSWMP"). The CCSWMP must be developed, implemented, and enforced to reduce the discharge of pollutants to the MEP, to protect water quality, and to satisfy the appropriate water quality requirements of the CWA. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of a construction area, unless a sediment basin providing storage for a calculated volume of runoff from a 2-year, 24-hour storm or 3,600 cubic feet of storage per acre drained, shall be provided. The CCSWMP shall include the following:

VI.G.1.a A detailed description of BMPs that have been, or will be, implemented on construction projects located in the Clear Creek watershed;

VI.G.1.b A detailed description of sediment controls for all down-slope boundaries (and for those side-slope boundaries deemed appropriate as dictated by

individual site conditions) that have been, or will be, used on construction areas located in the Clear Creek watershed;

VI.G.1.c A detailed description of control techniques that have been or will be used by the Permittee to the MEP to ensure no illicit discharge of pollutants into Clear Creek;

VI.G.1.d A detailed description of system design and/or engineering methods the Permittee has used, or plans to use, to protect Clear Creek from illicit discharges of pollutants;

VI.G.1.e A schedule of implementation for all future short-term and long-term activities describing program development, implementation and maintenance;

VI.G.1.f An annual monitoring program to ensure the overall quality and health of Clear Creek;

VI.G.1.g An inventory and tracking program for all maintenance yards that have the potential to discharge pollutants into Clear Creek;

VI.G.1.h The Permittee's inspection program on its MS4 or construction sites to ensure that no illicit discharges of pollutants enter Clear Creek; and

VI.G.1.i The Permittee may partner with other MS4s to develop and implement the CCSWMP.

VI.H. **Sharing Responsibility for MCMs**

VI.H.1. Implementation of one or more of the MCMs may be shared with another MS4, or the Permittee may fully take over the MCM. The Permittee may rely on another entity only if:

VI.H.1.a The other entity, in fact, implements the control measure;

VI.H.1.b The particular control measure, or component of that measure, is at least as stringent as the corresponding permit requirement; and

VI.H.1.c The other entity agrees to implement the control measure on the Permittee's behalf. Written acceptance of this obligation is required. This obligation must be maintained as part of the description of the Permittee's SWMP. If the other entity agrees to report on the MCM, the Permittee must supply the other entity with the reporting requirements contained in Part VI.N of this permit. If the other entity fails to implement the control measure on the Permittee's behalf, then the Permittee still remains liable for any discharges due to that failure to implement the MCM.

VI.I. **Reviewing and Updating the SWMP**

VI.I.1. The Permittee shall complete an annual review of its SWMP in conjunction with preparation of the Annual Report required under Part VI.N of this permit.

VI.I.2. The Permittee may change or update the SWMP during the life of the permit in accordance with the following procedures:

VI.I.2.a Changes adding (but not subtracting or replacing) components, controls, or requirements to the SWMP may be made at any time upon written notification to NDEP.

VI.I.2.b Changes replacing an ineffective or unfeasible BMP specifically identified in the SWMP with an alternate BMP may be requested at any time. Unless denied by NDEP, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented sixty (60) days from submittal of the request. If the request is denied, NDEP will send the Permittee a written response giving a reason for the decision. The Permittee's modification requests must include the following:

VI.I.2.b.i An analysis of why the BMP is ineffective or infeasible (including cost prohibitive);

VI.I.2.b.ii Expectations on the effectiveness of the replacement BMP; and

VI.I.2.b.iii An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

VI.I.2.c Change requests or notifications must be made in writing to NDEP and signed in accordance with Part VII.I of this permit.

VI.J. **SWMP Updates Required by NDEP.**

VI.J.1. NDEP may require changes to the SWMP as needed to:

VI.J.1.a Address impacts on receiving water quality caused, or contributed to, by discharges from the MS4;

VI.J.1.b Include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements; or

VI.J.1.c Include such other conditions deemed necessary by NDEP to comply with the goals and requirements of the CWA.

VI.J.2. Changes requested by NDEP must be made in writing, set forth the time schedule for the Permittee to develop the changes, and offer the Permittee the opportunity to propose alternative program changes to meet the objective of the requested modification. All changes required by NDEP will be made in accordance with 40 CFR§124.5, 40 CFR§122.62, or, as appropriate, 40 CFR§122.63.

VI.K. **Transfer of Ownership, Operational Authority, or Responsibility for SWMP Implementation.**

VI.K.1. The Permittee shall implement the SWMP on all new areas added to the Permittee's portion of the MS4 (or for which the Permittee becomes responsible for implementation of stormwater quality controls) as expeditiously as practicable, but not later than one (1) year from the addition of the new areas. Implementation may be accomplished in a phased manner to allow additional time for controls that cannot be implemented immediately;

VI.K.2. Within ninety (90) days of a transfer of ownership, operational authority, or responsibility for SWMP implementation, the Permittee shall have a plan for implementing the SWMP on all affected areas. The plan may include schedules for implementation. Information on all new annexed areas and any resulting updates required to the SWMP must be included in the Annual Report;

VI.K.3. Only those portions of the SWMP that are specifically required as permit conditions shall be subject to the modification requirements of 40 CFR§124.5. Addition of components, controls, or requirements by the Permittee(s) and replacement of an ineffective or infeasible BMP implementing a required component of the SWMP with an alternate BMP expected to achieve the goals of the original BMP shall be considered minor changes to the SWMP and not modifications to the permit.

VI.L. **Water Quality Monitoring**

VI.L.1. The Permittee must evaluate program compliance, the appropriateness of identified BMPs, and progress toward achieving identified measurable goals. If the Permittee discharges to an impaired waterbody for which a TMDL has been approved and has no WLA developed for stormwater, the Permittee will comply with Part II.B.3.

VI.L.2. Permittees shall submit a stormwater monitoring plan for the following year on or before November 1 each year.

VI.L.3. When the Permittee conducts monitoring at the Permittee's permitted small MS4, the Permittee shall comply with the following:

VI.L.3.a **Representative monitoring.** Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

VI.L.3.b **Test Procedures.** Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the CWA, under which such procedures may be required unless other procedures are approved by NDEP.

VI.L.4. Records of monitoring information shall include:

VI.L.4.a The date, exact place, and time of sampling or measurements;

VI.L.4.b The names(s) of the individual(s) who performed the sampling or measurements and the firm where the individual works;

VI.L.4.c The date(s) analyses were performed;

VI.L.4.d The names of the individuals who performed the analyses;

VI.L.4.e The analytical techniques or methods used; and

VI.L.4.f The results of such analyses.

VI.L.5. Monitoring results must be reported on a Discharge Monitoring Report ("DMR");

VI.L.6. Analyses shall be performed by a State of Nevada-certified laboratory. Results from this lab must be included in the Annual Report; and

VI.L.7. After considering monitoring data, stream flow, discharge flow and receiving water conditions, NDEP may, for just cause, modify the monitoring frequency and/or sample type by issuing an order to the Permittee.

VI.M. **Record Keeping**

VI.M.1. The Permittee shall retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of DMRs, a copy of the NPDES permit, and records of all data used to complete the NOI for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application, or for the term of this permit, whichever is longer. This period may be extended by request of NDEP at any time; and

VI.M.2. The Permittee shall submit the records to NDEP only when specifically asked to do so. The Permittee must retain a description of the SWMP required by this permit (including a copy of the permit language) at a location accessible to NDEP. The Permittee must make the records, including the NOI and the description of the SWMP, available to the public if requested to do so in writing.

VI.N. **Annual Reporting and Fees**

VI.N.1. Permittees shall submit an Annual Report to NDEP by December 1 of each year of the permit term using the Annual Report Template found on NDEP's website;

VI.N.2. New Permittees shall remit an Annual Report by December 1 of the year following the initial approval of the SWMP by NDEP;

VI.N.3. If the Permittee performs any additional monitoring beyond that required by the stormwater monitoring plan the results of such monitoring shall be reported in the Annual Report;

VI.N.4. Permittees shall also remit an annual permit renewal fee in accordance with Nevada Administrative Code ("NAC") 445A.232 on or before July 1 of every year until the permit is terminated;

VI.N.5. New Permittees shall also remit a service fee in accordance with NAC 445A.232 on or before July 1 of the year following initial approval of the NOI and every year thereafter until the permit is terminated;

VI.N.6. Permittees working together to develop and/or implement their SWMPs may complete a shared Annual Report. The shared Annual Report is one report outlining and explaining group activities with the tasks performed by individual Permittees (BMPs, measurable goals, schedules of planned activities, etc.) included. Individual Permittees activities may be incorporated into the Annual Report in one of two ways, either:

VI.N.6.a Providing the details specific to their MS4 to a person(s) who incorporates that information into the group Annual Report, or

VI.N.6.b Providing the details specific to their MS4 on a separate sheet that will be attached to the group Annual Report.

VI.N.7. An original signed copy of all reports required herein shall be submitted to NDEP at the following address:

Stormwater Coordinator
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
901 S. Stewart, Suite 4001
Carson City, NV 89701

VII. Standard Permit Conditions

VII.A. Duty to Comply

VII.A.1. The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of CWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

VII.B. Penalties for Violations of Permit Conditions

VII.B.1. NRS 445A.675 provides that any Permittee who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445A.690 through 445A.705.

VII.C. Continuation of the Expired General Permit

VII.C.1. If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedures Act and remain in force and effect. Any Permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

VII.C.1.a Reissuance or replacement of this permit, at which time the Permittee must comply with the renewal NOI conditions of the new permit to maintain authorization to discharge; or

VII.C.1.b Issuance of an individual permit for the Permittee's discharges; or

VII.C.1.c A formal permit decision by NDEP not to reissue this General Permit, at which time the Permittee must seek coverage under an alternative General Permit or an individual permit.

VII.D. Continuing Permit Coverage for Existing Permittees

VII.D.1. To continue coverage under this General Permit, Permittees currently covered under the expired General Permit NVS040000 shall submit a renewal NOI to NDEP within ninety (90) days of the effective date of this permit to remain included under the original NOI. The Permittee must verify that their information on the renewal NOI is valid and accurate before submitting the

renewal NOI for continued coverage. No additional filing fee is required to file this renewal NOI.

VII.E. **Need to Halt or Reduce Activity Not a Defense**

VII.E.1. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

VII.F. **Duty to Mitigate**

VII.F.1. The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

VII.G. **Duty to Provide Information**

VII.G.1. The Permittee shall furnish any information to NDEP that is requested to determine compliance with this permit or other information.

VII.H. **Other Information**

VII.H.1. If the Permittee becomes aware that it has failed to submit any relevant facts in the Permittee's NOI or submitted incorrect information in the NOI or in any other report to NDEP, the Permittee must promptly submit such facts or information.

VII.I. **Signatory Requirements**

VII.I.1. All NOIs, reports, certifications, or information submitted to NDEP, or that this permit requires be maintained by the Permittee shall be signed and certified as follows:

VII.I.1.a **NOIs.** All NOIs shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA);

VII.I.1.b **Reports and other information.** All reports required by the permit and other information requested by NDEP or an authorized representative of NDEP shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

VII.I.1.b.i **Signed authorization.** The authorization is made in writing by a person described above and submitted to NDEP.

VII.I.1.b.ii **Authorization with specified responsibility.** The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility for environmental matter for the regulated entity.

VII.I.1.b.iii **Changes to authorization.** If an authorization is no longer accurate because a different operator has the responsibility for the overall operation of the MS4, a new authorization satisfying the requirement of Part VII.I shall be submitted to NDEP prior to or together with any reports, information, or NOIs to be signed by an authorized representative.

VII.I.1.c **Certification.** Any authorized person as defined in Parts VII.I signing documents under Part VII.I shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

VII.J. **Property Rights**

VII.J.1. The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

VII.K. **Proper Operation and Maintenance**

VII.K.1. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit and with the conditions of the SWMP. Proper O&M also includes adequate laboratory controls and appropriate quality assurance procedures. Proper O&M requires the operation of backup or auxiliary

facilities or similar systems, installed by the Permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

VII.L. **Inspection and Entry**

VII.L.1. The Permittee shall allow NDEP or an authorized representative (including an authorized contractor acting as a representative of NDEP) upon the presentation of credentials and other documents as may be required by law, to do any of the following:

VII.L.1.a Enter the Permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

VII.L.1.b Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;

VII.L.1.c Inspect at reasonable times any facilities or equipment (including monitoring and control equipment) practices, or operations regulated or required under this permit; and

VII.L.1.d Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

VII.M. **Permit Actions**

VII.M.1. This permit may be modified, revoked and reissued, or terminated for cause. The Permittee's filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

VII.N. **Permit Transfers**

VII.N.1. This permit is not transferable to any person except after written notice to NDEP. NDEP may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the CWA.

VII.O. **Anticipated Noncompliance**

VII.O.1. The Permittee shall give advanced written notice to NDEP of any planned changes in the permitted small MS4 or activity which may result in noncompliance with this permit.

VII.P. **State Environmental Laws**

VII.P.1. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the CWA; and

VII.P.2. No condition of this permit releases the Permittee from any responsibility or requirements under other environmental statutes or regulations.

VII.Q. **Severability**

VII.Q.1. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit in any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

VII.R. **Procedures for Modification or Revocation**

VII.R.1. Permit modification or revocation will be conducted according to 40 CFR §122.62, §122.63, §122.64 and §124.5.

VII.S. **Requiring an Individual Permit or an Alternative General Permit**

VII.S.1. **Request by NDEP.** NDEP may require any person authorized by this permit to apply for and/or obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition the permitting authority to take action under this paragraph. Where NDEP requires the Permittee to apply for an individual NPDES permit, NDEP will notify the Permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the Permittee to file the application, and a statement that on the effective date of issuance or denial of the individual NPDES permit or the alternative general permit as it applies to the individual Permittee, coverage under this General Permit shall automatically terminate. NDEP may grant additional time to submit the application upon request of the applicant. If the Permittee fails to submit in a timely manner an individual NPDES permit application as required by NDEP under this paragraph, then the applicability of this permit to the Permittee is automatically terminated at the end of the day specified by NDEP for application submittal.

VII.S.2. **Request by Permittee.** Any discharger authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. In such cases, the Permittee must submit an individual application in accordance with the requirements of 40 CFR§122.33(b)(2), with reasons

supporting the request, to NDEP at the address listed in Part VI.N.7. The request may be granted by issuance of any individual permit or an alternative General Permit if the reasons cited by the Permittee are adequate to support the request.

VII.S.3. **General permit termination.** When an individual NPDES permit is issued to a discharger otherwise subject to this permit, or the Permittee is authorized to discharge under an alternative NPDES general permit, the applicability of this permit to the individual NPDES Permittee is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative General Permit, whichever the case may be. When an individual NPDES permit is denied to an operator otherwise subject to this permit, or the operator is denied for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES Permittee is automatically terminated on the date of such denial, unless otherwise specified by the permitting authority.

VII.T. **Transfer of Ownership or Control**

VII.T.1. In the event of any change in control or ownership of storm drain systems covered by this permit, the Permittee shall notify the succeeding owner or controller of the existence of this permit, by letter, a copy of which shall be forwarded to NDEP. All transfer of permits shall be approved by NDEP.

VII.U. **Availability of Reports**

VII.U.1. Except for data determined to be confidential under NRS 445A.665, all reports and plans prepared in accordance with the terms of this permit shall be available for public inspection at NDEP's office. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NRS 445A.710.

VII.V. **Furnishing False Information and Tampering with Monitoring Devices**

VII.V.1. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained by the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, or who falsifies, tampers with or knowingly renders inaccurate any monitoring device or method required to be maintained under the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, is guilty of a gross misdemeanor and shall be punished by a fine of not more than $25,000 or by imprisonment. This penalty is in addition to any other penalties, civil or criminal, pursuant to NRS 445A.300 to 445A.730, inclusive.

VII.W. **Penalty for Violation of Permit Conditions**

VII.W.1. NRS 445A.675 provides that any person who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445A.690 through 445A.710.

VII.W.2. **Permit Modification, Suspension or Revocation**

VII.W.2.a After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

VII.W.2.a.i Violation of any terms or conditions of this permit;

VII.W.2.a.ii Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

VII.W.2.a.iii A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

VII.X. **Liability**

VII.X.1. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable Federal, State or local laws, regulations, or ordinances.

VII.Y. **Property Rights**

VII.Y.1. The issuance of this permit does not convey any property rights, in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

VII.Z. **Severability**

VII.Z.1. The provisions of this permit are severable, and if any provision of this permit, or the application of any provisions of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

VIII. Definitions

VIII.A. All applicable definitions contained in Section 502 of the CWA and 40 CFR §122 shall apply to this permit and are incorporated herein by reference. For

convenience, simplified explanations of some regulatory/statutory definitions have been provided.

VIII.A.1. **Best Management Practices ("BMPs")** means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

VIII.A.2. **Clean Water Act ("CWA" or "The Act")** means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq.

VIII.A.3. **Control Measure,** as used in this permit, refers to any BMP or other method used to prevent or reduce the discharge of pollutants to Waters of the United States.

VIII.A.4. **Discharge,** when used without a qualifier, refers to "discharge of a pollutant" as defined at 40 CFR §122.2.

VIII.A.5. **Illicit Connection** means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer.

VIII.A.6. **Illicit Discharge** is defined at 40 CFR §122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of stormwater, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities. For the purposes of this permit, illicit discharges do not include discharges into the MS4 authorized in Part I.D.

VIII.A.7. **Low Impact Development** ("LID") features are considered public domain treatment controls. LID is an approach to land development or redevelopment that works to manage stormwater close to its source. LID employs principles and techniques used in designing sites (starting from site layout, and grading and compaction phases of construction) that disturb only the smallest area necessary, minimize soil compaction and imperviousness, preserve natural drainages, vegetation and buffer zones, and utilize on-site storm water treatment techniques. LID sites reduce and compensate for development's impact(s) on hydrology and water quality. Rather than conventional hardpiping from impervious surfaces, implementing LID principles and practices, stormwater can be managed in a way that reduces the impact of built-up areas and promotes the natural movement of stormwater within an

ecosystem or watershed. Applied on a broad scale, LID can support and promote a watershed's hydrologic and ecological functions.

VIII.A.8. **Maximum Extent Practicable** ("MEP") - Refers to the technology-based discharge standard for MS4s to reduce pollutants in stormwater discharges that was established by CWA §402(p).

VIII.A.9. **Municipal Separate Storm Sewer System** ("MS4") means a Large, Medium, or Small MS4 (e.g. "the Truckee Meadows MS4"). The term is used to refer to either the system operated by a single entity, or a group of systems within an area that are operated by multiple entities (e.g. the Truckee Meadows MS4 includes MS4s operated by the City of Reno, the City of Sparks and Washoe County). MS4 is defined at 40 CFR§ 122.26(b)(8) and means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

VIII.A.10. **Notice of Intent ("NOI")** means an entity files an NOI with NDEP requesting coverage under this permit.

VIII.A.11. **Non-Structural BMP**: Refers to techniques that aim to change human behavior to reduce the amount of pollutants that enter stormwater systems (pollution prevention). Non-structural measures may include minimization and/or disconnection of impervious surfaces; development design that reduces the rate and volume of runoff; public outreach and education; restoration or enhancement of natural areas.

VIII.A.12. **"The Permittee" and "The Permittees"** as used in this permit is intended to refer to the Permittee and that party's responsibilities to meet the requirements of this permit.

VIII.A.13. **Permitting Authority** means the Nevada Division of Environmental Protection.

VIII.A.14. **Post-Construction Stormwater** is a term used to distinguish stormwater practices used during site construction (otherwise known as "construction

stormwater" or "erosion and sediment control") from those that are used on a permanent basis to control runoff once construction is complete and a Notice of Termination has been approved by NDEP.

VIII.A.15. **Sites that are tributary** are defined as sites that discharge directly into a CWA section 303(d)-listed waterbody segment.

VIII.A.16. **Small Municipal Separate Storm Sewer System** is defined at 40 CFR§ 122.26(b)(16) and refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States, but is not defined as "large"' or "medium" municipal separate storm sewer system. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

VIII.A.17. **Source Control** means techniques that aim to reduce the quantity and improve the quality of stormwater at or near its source by using infrastructure, natural physical resources, or changes in practices.

VIII.A.18. **Stormwater BMP** is a generic term that has been used interchangeably with stormwater practice or stormwater treatment practice. Stormwater BMPs can be either "structural" or "non-structural."

VIII.A.19. **Stormwater** is defined at 40 CFR §122.26(b)(13) and means stormwater runoff, snowmelt runoff, and surface runoff and drainage.

VIII.A.20. **Stormwater Management Program ("SWMP")** refers to a comprehensive program to manage the quality of stormwater discharged from the MS4.

VIII.A.21. **Structural BMPs or Structural Treatment Controls** can be public domain treatment controls or manufactured (proprietary) treatment controls. Public domain treatment controls are those that can be designed by an engineer and have been implemented and tested by numerous communities throughout the nation. Manufactured (proprietary) treatment controls are patented devices that have been engineered and constructed by private companies. In either case, engineering plans must be developed.

Appendix B

SITE PLAN REVIEW SUPPLEMENT
POST CONSTRUCTION STORMWATER MANAGEMENT

Project Name: _____
Project Location: _____

A. Calculated Pre-Construction Runoff (attach calculations)			
B. Anticipated Post Construction Runoff (attach calculations)			
C. Site Soil Suitability (attach soil map with project location identified)			
D. Potential Site Pollutants and Probable Sources			Probable Source
	☐	Nutrients	
	☐	Total Suspended Solids	
	☐	Total Dissolved Solids	
	☐	Gross Solids	
	☐	Bacteria	
	☐	Other	
E. Proposed Stormwater Quantity Management Plan (identify specific Best Management Practices to mitigate increase in site runoff if Item B is greater than Item A)	1.		
	2.		
	3.		
	4.		
	5.		

F. Proposed Stormwater Quality Management Plan
(provide project site map indicating potential pollutant sources and BMPs)

The checklist that follows identifies the BMPs that can be used post-construction to meet each of the Performance Standards noted in Sections 6-8 of the City of Elko Post-Construction Stormwater Controls Best Management Practices Handbook. It is the responsibility of the person who fills out this checklist to ensure that the BMPs selected reduce pollutants to the Maximum Extent Practicable (MEP). If the project site has characteristics that make meeting a performance standard infeasible or inapplicable (e.g. size of site, slope of site), please explain these characteristics at the bottom of the form.

Performance Standard	Check if Selected	BMPs	Comments (List pollutant(s) being removed or reduced)
1 – Roof Runoff Control	☐	Vegetated swales	
	☐	Buffer	
	☐	Sand filter	
	☐	Runoff storage for irrigation	
2 – Efficient Irrigation	☐	Rain and wind triggered shutoff devices	
	☐	Automatic line break detection shutoff valves	
	☐	Soil moisture sensors	
3 – Drain labeling	☐	Storm drains labeled	
4 – Vegetative Treatment Systems	☐	Vegetated Swales	
	☐	Buffer Strips	
5 – Sedimentation Basins	☐	Sedimentation Basins	
6 – Storm Water ponds and wetlands	☐	Storm water ponds	
	☐	Storm water wetlands	
7 – Media Filtration System	☐	Surface Sand Filters	
	☐	Underground sand filter	

Performance Standard	Check if Selected	BMPs	Comments
8 – Porous Pavements	☐	Porous pavement detention	
	☐	Open-celled block pavers	
	☐	Open-jointed block pavers	
	☐	Porous concrete and asphalt	
	☐	Porous turf pavement	
	☐	Porous gravel pavement	
	☐	Open-celled plastic grids	
9 – Oil and water separators	☐	Oil and water separators	
10 – Hydrodynamic Separators	☐	Vortex separators	
	☐	Swirl Concentrator	
11 – Wet Vaults	☐	Wet Vaults	
12 – Catch Basin Inserts	☐	Trays	
	☐	Boxes	
	☐	Socks	
13 – Modular Wetlands	☐	Modular Wetlands	
14 – Media Filtration Systems	☐	Media Filtration Systems	
15 – Landscape Filtration Systems	☐	Landscape Filtration Systems	
	☐	Manufactured biofiltration System	
16 – Gross Solids Removal Devices	☐	Gross Solids Removal Devices (GSRDs)	

Explanation why performance standard(s) cannot be met:

_____

_____

_____

_____

_____

CITY OF ELKO POST-CONSTRUCTION STORMWATER CONTROL PROGRAM

ANNUAL BMP MAINTENANCE INSPECTION CHECKLIST

During Site Plan Review, a sample Annual BMP Maintenance Inspection Checklist shall be provided relevant to the Proposed Project. This sample represents the full scope of potential maintenance items. Proposed project shall tailor the maintenance items to specific BMPs located on the project site.

Inspection checklists shall be maintained at the City of Elko Engineering Department office.

Project Name and File Number: _____

Project Location: _____

Date: _____ **Inspected by:** _____

(Name and Company)

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Roof Runoff Controls		
1. Inspect and maintain rain barrels at least twice a year		
2. Inspect and maintain vegetated swales and buffers		
3. Inspect and maintain infiltration trenches and basins		
2. Efficient Irrigation		
1. Monitor and maintain the irrigation system to minimize runoff		
2. Repair or replace broken pipes or nozzles		
3. Environmental fertilizers used		
3. Storm Drain Labeling		
1. Inspect labels every two years		
4. Vegetated Swales		
1. Grass height is not cut shorter than the design flow depth		
2. Inspect swales twice a year for damage to vegetation, erosion, sediment accumulation and ponding water standing longer than 7 days		
3. Periodic litter removal		
4. Remove sediments when depths exceed 3 inches		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. Buffer Strips		
1. Maintain grass height of 2-4 inches		
2. Remove weeds, litter, rocks and branches		
3. Inspect buffer strips for pools of standing water that may breed mosquitos		
4. Inspect Buffer strips twice a year		
5. Remove sediment accumulation at least once a year along upstream edge of buffer strips and in level spreaders		
6. Sedimentation Basins		
1. Inspect after the first large storm event to ensure that the basin is draining as designed.		
2. Inspect before and after the rainy season for standing water, accumulation of sediments, debris and trash, presence of animal burrows, and the stability of surrounding slopes.		
3. Remove debris from screen covering perforations and overflow grate as needed.		
4. Vector control, vegetation maintenance, and debris removal comprise the majority of maintenance activities.		
5. When the volume of accumulated sediments exceeds 10 percent of the basin volume, the sediments should be removed and the area should be regraded.		
7. Sand Filter Basins		
1. Routinely remove debris and litter from the sand filter basin to minimize clogging and to maintain aesthetics.		
2. Replace vegetation and perform maintenance on the sand filter		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
basin every 2 – 5 years by removing vegetation and the top 3 inches of the sand layer.		
3. Rake the top 3 – 5 inches of the filter surface a minimum of once a year.		
4. Inspect at least twice a year (with one inspection following a significant storm event) to ensure proper drainage and no ponding of water.		
8. Storm Water Ponds		
1. Biannual performance and maintenance inspections should be conducted.		
2. Cut and remove wetland plants every 5 - 15 years to remove nutrients and metals retained in the vegetation.		
3. Sediments may need to be removed from the pond every 5 – 20 years.		
4. To maintain an attractive pond, litter and debris must be regularly removed.		
5. A non-clogging outlet such as the reverse-slope pipe or a weir outlet with a trash rack should be installed in the pond.		
6. Properly maintain the access road as well as the shoreline vegetation.		
9. Storm Water Wetlands		
1. Where permissible with local fish and game agencies, stock pond with mosquito fish (Gambusia sp.) to aid in controlling mosquitoes.		
2. Wetlands should be inspected semi-annually for structural integrity, sediment accumulation, and burrows.		
3. Cut and remove wetland plants annually to remove nutrients.		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
4. Sediments may need to be removed from the forebay every five years.		
5. Remove litter and debris from the wetland pond before the onset of the storm season.		
10. Media Filtration Systems (Surface Sand Filters)		
1. Inspect the system at least 3 times a year, once at the beginning of the rainy season and after major storm events to remove litter and debris and to keep the filter from clogging.		
2. Access must be provided for maintenance and repairs.		
3. Excess plant growth within the filter is not recommended.		
4. Rake the top 3 – 5 inches of sand once per year or when drainage begins to slow or pond. Remove sediments when accumulation exceeds 0.5 inches.		
5. If sand filter does not drain within 40 hours, maintenance is required.		
6. Every 2 – 5 years the vegetative cover should be removed for maintenance of the sand filter.		
7. Sand and gravel filter media may need to be replaced every 3 to 5 years.		
11. Media Filtration Systems (Underground Sand Filters)		
1. The life of a well-maintained underground sand filter is between 5 and 20 years.		
2. Upon installation, water levels should be monitored every 3 months and after each big storm for the first year. Once the system is functioning properly, monitor 3 times a year.		
3. Monitor and record the depth of oil and grease ponding in the first		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
chamber, depth of water over the sand medium, and the amount of material accumulated over the sand medium.		
4. Pump out the sediment chamber at least twice every year. After cleaning, refill the first chamber to a depth of 3 feet with clean water to reestablish the seals.		
5. The filter cloth and ballast gravel must be removed and replaced when drawdown takes longer than 72 hours.		
6. The three chambers need built-in ladders and manholes to allow access for cleaning and maintenance.		
7. Filter media may need to be replaced every 3 to 5 years.		
12. Porous Pavement Detention		
1. Accumulated debris and litter removal as needed.		
2. Maintenance is required to prevent clogging of the pervious surface.		
3. Inspect sand filter routinely and after storm events to insure proper infiltration and drainage.		
4. Frequently inspect the pavement to insure proper infiltration and drainage during the first wet season, and then once a year following that time.		
5. Replacement of surface sand filter layer may occur when runoff does not infiltrate readily into the surface.		
13. Open-celled block pavers & Open-joint block pavers		
1. Block pavers should not be washed to remove debris and sediment in the openings between pavers, rather sweeping with suction should be utilized annually.		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
Replace lost sand infill.		
2. Joints between block pavers may require occasional weed suppression.		
3. Pavers can be removed individually and replaced when utility work is needed.		
4. Top course aggregate can be removed or replaced in pavers if they become clogged or contaminated.		
5. Replace surface filter layer by vacuuming out sand media from blocks when it becomes evident that runoff does not rapidly infiltrate into the surface.		
6. For pavers planted with turf, regular turf maintenance will be necessary. However, pesticides, fertilizers and other chemicals can have adverse effects on concrete products, so their use should be restricted.		
7. If soils swell or subside, blocks can be removed individually, the base leveled, and blocks reset.		
14. Porous Concrete and Asphalt		
1. The overall maintenance goal is to avoid clogging of the void spaces.		
2. Accumulated debris and litter should be routinely removed as a source control measure.		
3. Inspect porous asphalt and concrete several times during the first few storms to insure proper infiltration and drainage. After the first year, inspect at least once a year.		
4. Permeable pavements and materials should be cleaned with a vacuum-type street cleaner a minimum of twice a year (before and after the winter).		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. Hand held pressure washers can be effective for cleaning the void spaces of small areas and should follow vacuum cleaning.		
6. Maintenance personnel must be instructed not to seal or pave with non-porous materials.		
7. Pavement must not be sanded in the winter to avoid clogging the void spaces.		
15. Porous Turf Pavement		
1. Porous turf requires regular maintenance associated with regular lawns such as irrigation, mowing, fertilization, aeration, topdressing, overseeding, disease control, insect control, and weed management.		
2. Soil testing should be conducted at least once every other year to determine proper fertilization, which will help to maintain turf stress tolerance.		
3. Routine mowing will be required in the growing season.		
4. Above ground biomass is important in wear tolerance, therefore high mowing can increase a grasses resistance to traffic stress. Mowing patters should also be altered regularly to limit wear from repetitive wheel action.		
5. Reseeding may be required to maintain a uniform turf cover.		
6. Topdressing material should be at least as coarse and open-graded as the root zone.		
7. To aid in water conservation, irrigation operations should be scheduled as follows: ▪ After the ground has thawed, or in the month of March – two deep		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
waterings ▪ As the weather begins to warm in April and May – once per week ▪ In June, July and August – up to twice per week ▪ As the weather begins to cool in September – cut back to deep watering once a week, then once every two weeks ▪ Do not water from November to March while lawn is dormant! ▪ Water in the early morning during the summer to reduce water lost to evaporation and spray drift caused by wind.		
8. Traffic routes can be spread out or rotated to give the turf time to recover between uses. Traffic control can also divert traffic away from areas which are showing signs of wear.		
9. Snow removal operations can damage turf surfaces. Equip snow plow blades with skids or rollers to keep the plow surface one or two inches above the turf surface.		
16. Porous Gravel Pavement		
1. Accumulated debris and litter removal as needed.		
2. Maintenance is required to prevent clogging of the pervious surface.		
3. Occasional weed suppression may be required.		
4. Periodic replenishing and/or raking of displaced gravel may be required.		
5. Inspect sand filter routinely and after storm events to insure proper infiltration and drainage.		
6. Frequently inspect the pavement to insure proper infiltration and drainage during the first wet season, and then once a year		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
following that time.		
7. Replacement of surface sand filter layer may occur when runoff does not infiltrate readily into the surface.		
8. Inspect surface gravels once a year. When inspections show accumulation of sediment and debris on top of gravel or slow infiltration, remove and replace top few inches of gravel.		
17. Open-Celled Plastic Grids		
1. Equip snow plow blades with skids or rollers to keep the plow surface one or two inches above the surface.		
2. Sections can be removed and replaced for utility access and pavement repair.		
3. Remove and replace grid segments where three or more adjacent rings are broken or damaged.		
4. Accumulated debris and litter removal as needed.		
5. Maintenance is required to prevent clogging of the pervious surface.		
6. Occasional weed suppression may be required.		
7. Periodic replenishing and/or raking of displaced gravel may be required.		
8. Inspect surface gravels once a year. When inspections show accumulation of sediment and debris on top of gravel or slow infiltration, remove and replace top few inches of gravel.		
9. For open-celled grids filled with turf, mechanical aeration of must be avoided, as this can damage the plastic material.		
18. Oil and Water Separators		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Maintenance is typically required every one to six months.		
2. Proper disposal of trapped sediment and oil and grease is required.		
3. In areas where high sediment loading is common, inlets should be inspected and cleaned after every major storm event and should be inspected monthly.		
4. Proprietary systems may have their own, specific maintenance requirements.		
5. Where appropriate, confined space entry procedures must be followed.		
19. Hydrodynamic Separators		
1. For most sites, hydrodynamic separators are cleaned annually.		
2. Hydrodynamic separators should be inspected twice a year.		
3. A dipstick can be used to measure sediment level.		
4. Hydrodynamic separators should be cleaned when collected sediments reach 25% of the storage capacity.		
5. Cleaning can be accomplished with a sump vac or a vacuum truck.		
6. Proper disposal of trash, debris, sediment, oil and grease is required.		
20. Wet Vault		
1. Recommended cleaning rates differ depending on the manufacturer and the land uses of the drainage area being treated. However, for most sites, wet vaults should be cleaned annually.		
2. Wet vaults should be inspected twice a year.		
3. A dipstick can be used to measure		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
sediment level.		
4. Units should be cleaned when sediment reaches 25% of the vault storage capacity.		
5. Cleaning can be accomplished with a sump vac or a vacuum truck.		
6. Proper disposal of trapped sediment and oil and grease is required.		
7. Internal wet vault maintenance or repairs must meet OSHA confined space entry requirements.		
21. Catch Basin Inserts		
1. Inspect several times during the first year to establish cleaning frequencies.		
2. At a minimum, inserts should be cleaned or replaced once or twice per year.		
3. Removal of sediment in catch basins may require a vactor truck.		
4. Many brands of inserts can be serviced in ten minutes or less.		
5. "Ultra Urban" brand filters recommend replacement of filter box every 1-3 years.		
22. Modular Wetlands		
1. Inspect periodically and remove any invasive wetland plant species.		
2. Inspect periodically to prevent water ponding standing longer than 7 days.		
3. Annual inspection and replacement of grit filter bag is required.		
4. Wetland vegetation should be harvested once a year during mid-summer before plants transfer phosphorus and metals from aboveground foliage to subsurface roots.		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. The entire plant mass (foliage and roots) should be harvested and replaced every three to five years.		
6. Sediment should be removed from the center tank every three to five years.		
7. A vacuum truck or a septic tank service truck can conduct sediment removal.		
23. Media Filtration Systems		
1. Inspect several times during the first year to establish loading and cleaning frequencies.		
2. Media filtration systems are typically cleaned once a year.		
24. Landscape Filtration Systems		
1. Inspect several times during the first year to establish cleaning frequencies.		
2. At a minimum, landscape filtration systems should be cleaned once a year.		
25. Gross Solids Removal Devices		
1. Annual maintenance is required at the end of the rainy season to remove accumulated trash, debris, and sediment.		
2. Designed to contain a full storm season amount of debris without impeding passage of storm water.		
3. Inspect at the beginning of the rainy season as well as a few times during the rainy season following significant storm events.		
4. Should be cleaned when accumulation is at 50 percent of capacity.		
5. Screens may need to be power washed to remove fine sediment.		
6. Litter can be removed at the job-site with a vacuum truck or screens can be taken offsite for cleaning.		

SAMPLE

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
7. Access to the interior through hatchways installed at the top of the screen. Additional access can also be provided via a perforated door at the downstream end of the device.		
8. Special fittings and access features can be installed to facilitate cleaning and maintenance.		

SAMPLE

Appendix C

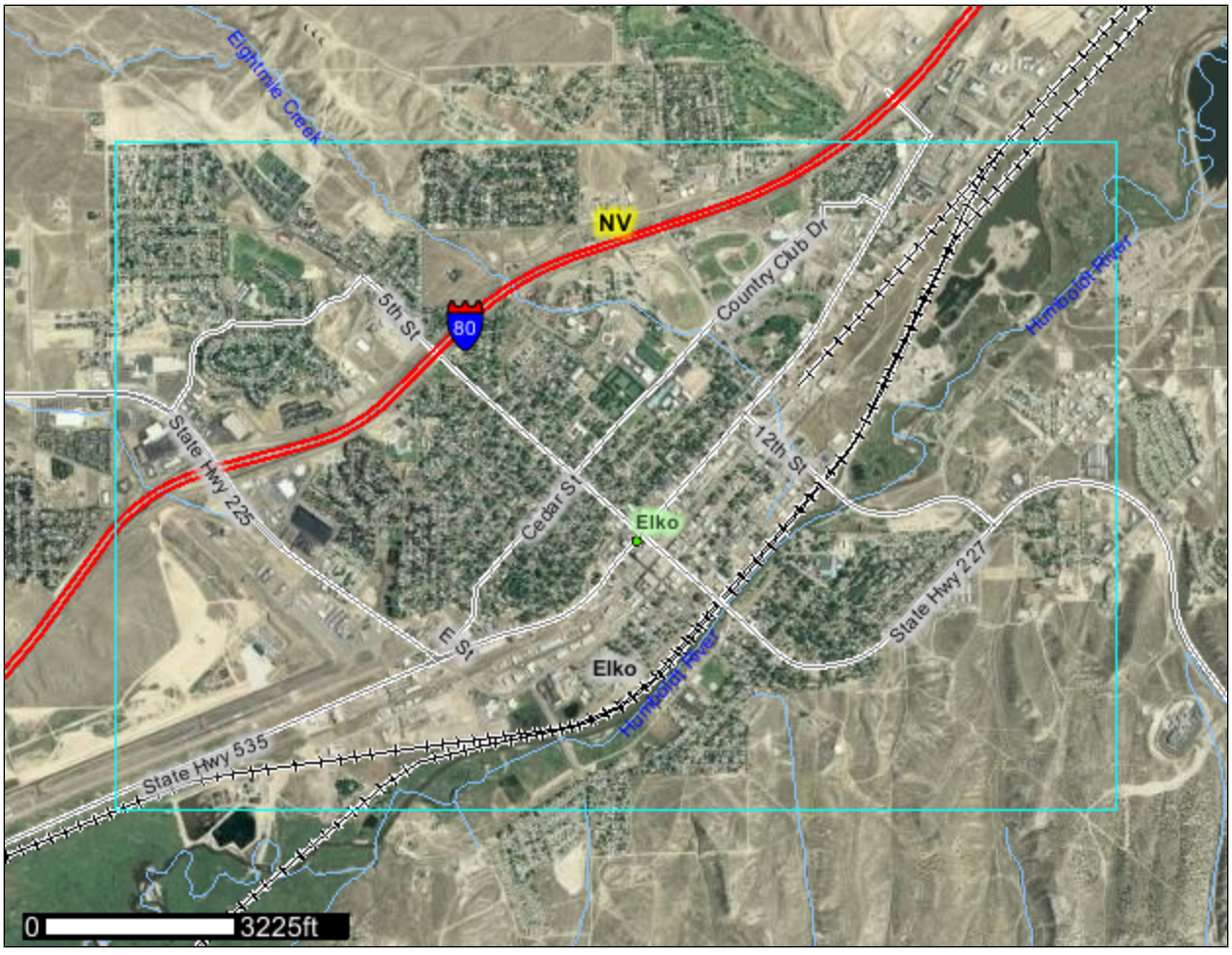
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Elko County, Nevada, Central Part



October 24, 2012

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Elko County, Nevada, Central Part
Survey Area Data: Version 6, Sep 10, 2012

Date(s) aerial images were photographed: 6/25/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Elko County, Nevada, Central Part (NV767)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
110	Moranch-Ocala-Orovada association	1,236.6	28.5%
323	Grina-Kelk-Orovada association	573.7	13.2%
370	Chiara-Cherry Spring-Orovada association	147.6	3.4%
440	Devilsgait-Woofus-Devilsgait, gravelly substratum association	479.7	11.1%
480	Hunnton-Wieland-Gance association	1,854.4	42.8%
W	Water	43.9	1.0%
Totals for Area of Interest		**4,335.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic

classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Elko County, Nevada, Central Part

110—Moranch-Ocala-Orovada association

Map Unit Setting

Elevation: 4,900 to 5,300 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 100 to 120 days

Map Unit Composition

Moranch and similar soils: 35 percent
Ocala and similar soils: 30 percent
Orovada and similar soils: 20 percent
Minor components: 15 percent

Description of Moranch

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rocks

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 200.0
Available water capacity: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability (nonirrigated): 7s
Ecological site: SODIC FLAT 8-10 P.Z. (R024XY008NV)

Typical profile

0 to 5 inches: Silt loam
5 to 20 inches: Very fine sandy loam
20 to 61 inches: Silt loam

Description of Ocala

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Silty alluvium derived from mixed rocks and volcanic ash

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 36 to 42 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to slightly saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 90.0
Available water capacity: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability (nonirrigated): 6w
Ecological site: SALINE BOTTOM (R024XY007NV)

Typical profile

0 to 20 inches: Silt loam
20 to 50 inches: Silt loam
50 to 60 inches: Silt loam

Description of Orovada

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess over alluvium derived from mixed rocks

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability (nonirrigated): 6c
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 7 inches: Loam
7 to 15 inches: Loam
15 to 60 inches: Fine sandy loam

Minor Components

Connel
Percent of map unit: 5 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Devilsgait
Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: LOAMY BOTTOM 8-14 P.Z. (R025XY003NV)

Bloor
Percent of map unit: 3 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SALINE BOTTOM (R024XY007NV)

Sonoma
Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: DRY FLOODPLAIN (R024XY006NV)

323—Grina-Kelk-Orovada association

Map Unit Setting
Elevation: 5,100 to 5,700 feet
Mean annual precipitation: 7 to 11 inches
Mean annual air temperature: 46 to 49 degrees F
Frost-free period: 100 to 120 days

Map Unit Composition
Grina and similar soils: 40 percent
Kelk and similar soils: 25 percent
Orovada and similar soils: 20 percent
Minor components: 15 percent

Description of Grina

Setting
Landform: Hills

Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum and colluvium derived from sedimentary rocks

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 14 to 20 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.8 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Ecological site: Juniperus osteosperma/Artemisia tridentata ssp. wyomingensis/ Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum (F025XY059NV)

Typical profile

0 to 7 inches: Gravelly loam
7 to 18 inches: Silty clay loam
18 to 60 inches: Bedrock

Description of Kelk

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium from volcanic rocks and loess

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 30.0
Available water capacity: High (about 11.9 inches)

Interpretive groups

Land capability (nonirrigated): 6s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 14 inches: Silt loam
14 to 51 inches: Silt loam
51 to 60 inches: Silt loam

Description of Orovada

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over alluvium derived from mixed rocks

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6c
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 7 inches: Silt loam
7 to 15 inches: Loam
15 to 60 inches: Fine sandy loam

Minor Components

Hunewill

Percent of map unit: 5 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Puett

Percent of map unit: 5 percent
Landform: Pediments
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CHALKY KNOLL (R025XY025NV)

Hunnton

Percent of map unit: 4 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Rock outcrop

Percent of map unit: 1 percent

Landform: Peaks
Down-slope shape: Linear
Across-slope shape: Convex

370—Chiara-Cherry Spring-Orovada association

Map Unit Setting

Elevation: 5,000 to 5,300 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 49 degrees F
Frost-free period: 100 to 120 days

Map Unit Composition

Chiara and similar soils: 35 percent
Cherry spring and similar soils: 30 percent
Orovada and similar soils: 25 percent
Minor components: 10 percent

Description of Chiara

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 4 inches: Very fine sandy loam
4 to 10 inches: Silt loam
10 to 14 inches: Cemented material

Description of Cherry Spring

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess over alluvium derived from mixed rocks

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 39 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 10 inches: Silt loam
10 to 23 inches: Loam
23 to 41 inches: Cemented material
41 to 63 inches: Very gravelly sandy loam

Description of Orovada

Setting

Landform: Fan aprons
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess over alluvium derived from mixed rocks

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6c

Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 7 inches: Fine sandy loam
7 to 15 inches: Loam
15 to 60 inches: Fine sandy loam

Minor Components

Enko

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Puett

Percent of map unit: 5 percent
Landform: Pediments
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CHALKY KNOLL (R025XY025NV)

440—Devilsgait-Woofus-Devilsgait, gravelly substratum association

Map Unit Setting

Elevation: 5,000 to 5,400 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 45 to 47 degrees F
Frost-free period: 80 to 110 days

Map Unit Composition

Devilsgait and similar soils: 40 percent
Woofus and similar soils: 25 percent
Devilsgait and similar soils: 20 percent
Minor components: 15 percent

Description of Devilsgait

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability (nonirrigated): 6w
Ecological site: MOIST FLOODPLAIN (R025XY001NV)

Typical profile

0 to 8 inches: Silt loam
8 to 43 inches: Silty clay loam
43 to 68 inches: Silt loam

Description of Woofus

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 8 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability (nonirrigated): 5w
Ecological site: MOIST FLOODPLAIN (R025XY001NV)

Typical profile

0 to 8 inches: Silty clay loam
8 to 30 inches: Loam
30 to 60 inches: Loamy fine sand

Description of Devilsgait

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability (nonirrigated): 5w
Ecological site: MOIST FLOODPLAIN (R025XY001NV)

Typical profile

0 to 13 inches: Silt loam
13 to 42 inches: Silty clay loam
42 to 54 inches: Silt loam
54 to 63 inches: Extremely gravelly coarse sand

Minor Components

Ocala

Percent of map unit: 7 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SALINE BOTTOM (R024XY007NV)

Woofus

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MOIST FLOODPLAIN (R025XY001NV)

Sonoma

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: DRY FLOODPLAIN (R024XY006NV)

Tweba

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MOIST FLOODPLAIN (R025XY001NV)

480—Hunnton-Wieland-Gance association

Map Unit Setting

Elevation: 5,000 to 6,000 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 47 to 49 degrees F
Frost-free period: 100 to 120 days

Map Unit Composition

Wieland and similar soils: 35 percent
Hunnton and similar soils: 35 percent
Gance and similar soils: 15 percent
Minor components: 15 percent

Description of Hunnton

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 20 to 39 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 6s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 6 inches: Loam
6 to 14 inches: Clay loam
14 to 28 inches: Gravelly clay
28 to 42 inches: Cemented material
42 to 60 inches: Very gravelly loamy sand

Description of Wieland

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 5 inches: Loam
5 to 26 inches: Gravelly clay
26 to 52 inches: Gravelly sandy clay loam
52 to 60 inches: Loam

Description of Gance

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from mixed rocks, loess and volcanic ash

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 7s
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Typical profile

0 to 4 inches: Very gravelly loam
4 to 29 inches: Very gravelly clay
29 to 68 inches: Extremely gravelly sandy loam

Minor Components

Orovada

Percent of map unit: 5 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Puett

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CHALKY KNOLL (R025XY025NV)

Chiara

Percent of map unit: 3 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

Kelk

Percent of map unit: 2 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: LOAMY 8-10 P.Z. (R025XY019NV)

W—Water

Map Unit Composition

Water: 100 percent

Description of Water

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

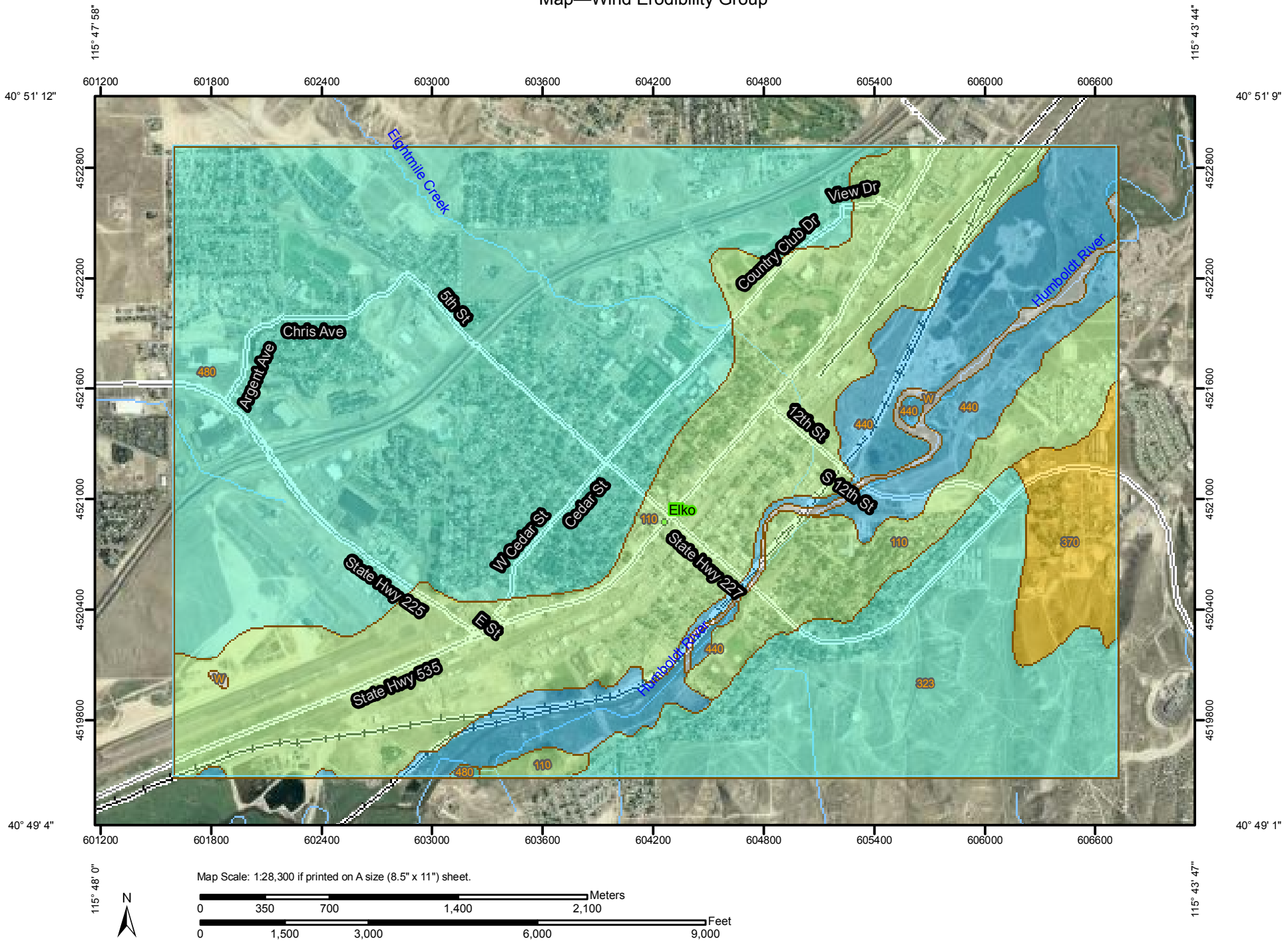
Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

Wind Erodibility Group

A wind erodibility group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Custom Soil Resource Report
Map—Wind Erodibility Group



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- 1
- 2
- 3
- 4
- 4L
- 5
- 6
- 7
- 8
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Elko County, Nevada, Central Part
Survey Area Data: Version 6, Sep 10, 2012

Date(s) aerial images were photographed: 6/25/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Wind Erodibility Group

Wind Erodibility Group— Summary by Map Unit — Elko County, Nevada, Central Part (NV767)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
110	Moranch-Ocala-Orovada association	4L	1,236.6	28.5%
323	Grina-Kelk-Orovada association	5	573.7	13.2%
370	Chiara-Cherry Spring-Orovada association	3	147.6	3.4%
440	Devilsgait-Woofus-Devilsgait, gravelly substratum association	6	479.7	11.1%
480	Hunnton-Wieland-Gance association	5	1,854.4	42.8%
W	Water		43.9	1.0%
Totals for Area of Interest			**4,335.8**	**100.0%**

Rating Options—Wind Erodibility Group

Aggregation Method: Dominant Condition

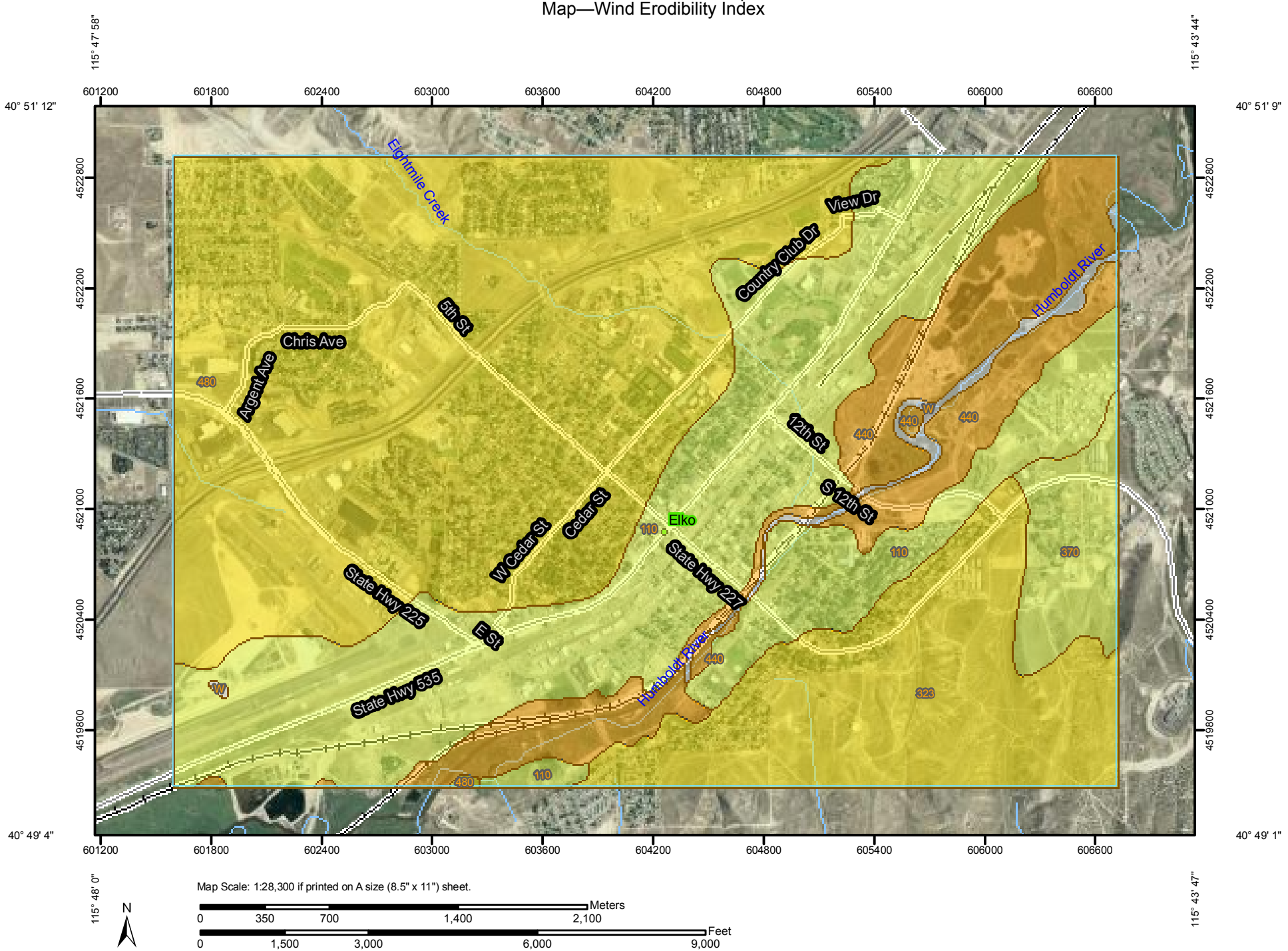
Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Wind Erodibility Index

The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Custom Soil Resource Report
Map—Wind Erodibility Index



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- 0
- 38
- 48
- 56
- 86
- 134
- 160
- 180
- 220
- 250
- 310
- Not rated or not available

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Elko County, Nevada, Central Part
Survey Area Data: Version 6, Sep 10, 2012

Date(s) aerial images were photographed: 6/25/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Wind Erodibility Index

Wind Erodibility Index— Summary by Map Unit — Elko County, Nevada, Central Part (NV767)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
110	Moranch-Ocala-Orovada association	86	1,236.6	28.5%
323	Grina-Kelk-Orovada association	56	573.7	13.2%
370	Chiara-Cherry Spring-Orovada association	86	147.6	3.4%
440	Devilsgait-Woofus-Devilsgait, gravelly substratum association	48	479.7	11.1%
480	Hunnton-Wieland-Gance association	56	1,854.4	42.8%
W	Water		43.9	1.0%
Totals for Area of Interest			**4,335.8**	**100.0%**

Rating Options—Wind Erodibility Index

Units of Measure: tons per acre per year

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

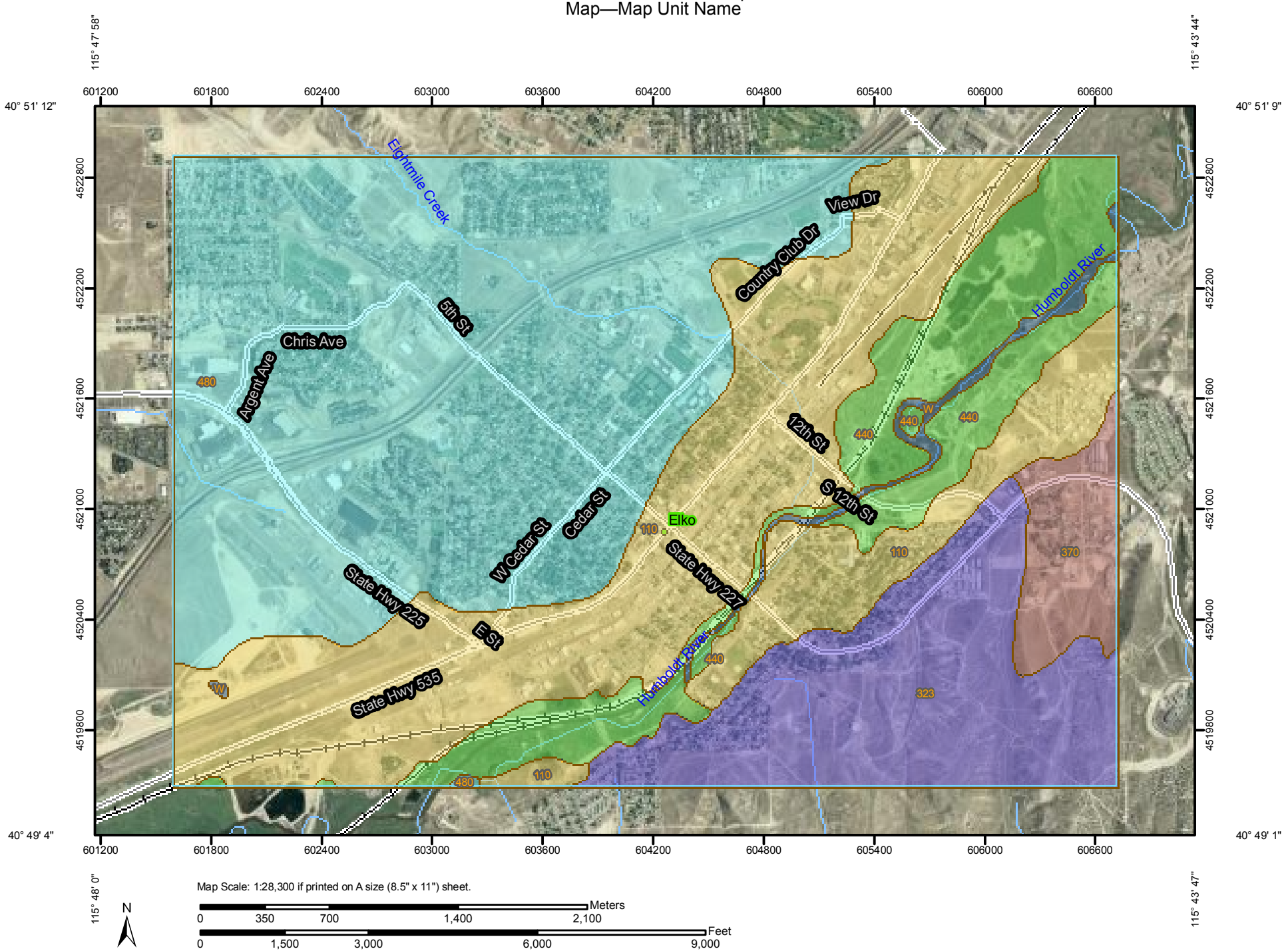
Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Map Unit Name

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Custom Soil Resource Report
Map—Map Unit Name



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Chiara-Cherry Spring-Orovada association
- Devilsgait-Woofus-Devilsgait, gravelly substratum association
- Grina-Kelk-Orovada association
- Hunnton-Wieland-Gance association
- Moranch-Ocala-Orovada association
- Water
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Elko County, Nevada, Central Part
Survey Area Data: Version 6, Sep 10, 2012

Date(s) aerial images were photographed: 6/25/2006

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Table—Map Unit Name

Map Unit Name— Summary by Map Unit — Elko County, Nevada, Central Part (NV767)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
110	Moranch-Ocala-Orovada association	Moranch-Ocala-Orovada association	1,236.6	28.5%
323	Grina-Kelk-Orovada association	Grina-Kelk-Orovada association	573.7	13.2%
370	Chiara-Cherry Spring-Orovada association	Chiara-Cherry Spring-Orovada association	147.6	3.4%
440	Devilsgait-Woofus-Devilsgait, gravelly substratum association	Devilsgait-Woofus-Devilsgait, gravelly substratum association	479.7	11.1%
480	Hunnton-Wieland-Gance association	Hunnton-Wieland-Gance association	1,854.4	42.8%
W	Water	Water	43.9	1.0%
Totals for Area of Interest			**4,335.8**	**100.0%**

Rating Options—Map Unit Name

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

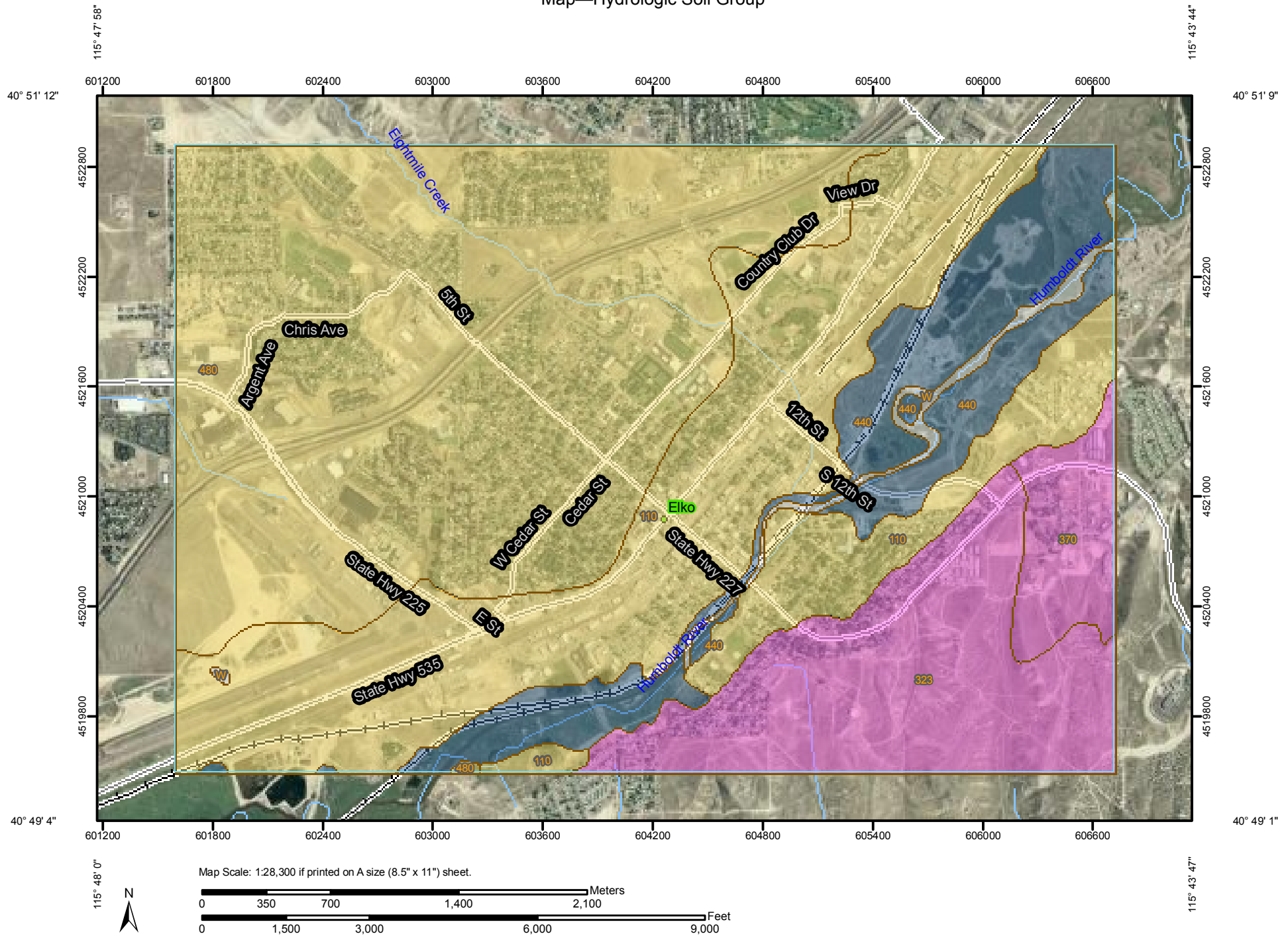
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

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Survey Area Data: Version 6, Sep 10, 2012

Date(s) aerial images were photographed: 6/25/2006

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Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Elko County, Nevada, Central Part (NV767)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
110	Moranch-Ocala-Orovada association	C	1,236.6	28.5%
323	Grina-Kelk-Orovada association	D	573.7	13.2%
370	Chiara-Cherry Spring-Orovada association	D	147.6	3.4%
440	Devilsgait-Woofus-Devilsgait, gravelly substratum association	C/D	479.7	11.1%
480	Hunnton-Wieland-Gance association	C	1,854.4	42.8%
W	Water		43.9	1.0%
Totals for Area of Interest			**4,335.8**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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