5. WRITTEN EXPLANATION

Introduction

Extraction Oil & Gas, Inc. (Extraction) submits this application for an Administrative Use by Special Review Permit (AUSR) concerning the Warbler oil and gas location, or “pad.” The application seeks to permit the drilling, completing, and installation of related surface production equipment for one (1) well pad, (1) one access road and up to twenty-two (22) horizontal wells on property located in Adams County, Colorado. The drilling schedule is subject to change due to economic conditions, business development priorities, and contract availability.

These wells and associated production facilities have been proposed on a single pad in the southeast quarter of Section 13-1S-66W on parcel number 0156900000161. The horizontal drilling technique eliminates the need to develop additional well pads, thus reducing the overall footprint needed on the surface if otherwise developed with vertical and or directional wells. This well pad and the subsequent 22 wells will produce a 3360-acre drilling unit in the Niobrara and Codell formations of the Denver-Julesburg (DJ) Basin.

The AUSR, pursuant to Section 4-10-02-04-02 of the Adams County Development Standards and Regulations, includes a full description of the site preparation, drilling, completion, production, maintenance and final abandonment processes.

Operating plan

The Operating Plan is divided into the site preparation, drilling phase, protection of fresh water, completion phase, production phase, and the abandonment and reclamation of wells and the site. All operations will be consistent with Adams County code and Colorado Oil and Gas Conservation Commission (“COGCC”) rules and regulations, specifically those set forth in the following series:

- 300 Series: Drilling, Development, Producing, and Abandonment
- 600 Series: Safety Regulations
- 800 Series: Aesthetic and Noise Control Regulations
- 1000 Series: Reclamation Regulations
- 1100 Series: Flowline Regulations

Site Preparation (21-34 days)

The proposed pad will be approximately 15.6 acres in size during construction and drilling and completions operations. Site preparation will include removal of current grass vegetation and stockpiling of topsoil, earthwork operations to grade the pad level for drilling operations, platting the pad with road base material, and improvements to the access road where necessary. Additionally, storm water controls and mitigation BMPs will be installed during construction of the pad.
Drilling Phase

A drilling prognosis will be prepared prior to drilling which details the landing points, formation tops, total depths, mud design, and wellbore logging and casing programs for each well.

The drilling phase typically proceeds as follows:

- A conductor rig is moved onto the location to set conductor casing for each well; typically, conductor casing takes one day for every two wells to set. Conductor casing is set at depths of 75-200’ and hold back the loose gravels and soil types from falling into the hole. The conductor casing is then cemented to the surface.

- After the conductor casing is set, a surface, or “spudder,” rig is moved onto location to set surface casing. It typically takes one day per well to set surface casing.

- The surface rig drills to approximate depths of 1500’ feet. For this site, surface casing will be set at least 50 feet below the deepest known fresh water Fox Hills water well in the area or the base of the mapped Fox Hills aquifer formation; whichever is deeper. Surface casing is then run and cemented from this depth to the surface. Typical surface casing designs in the basin are a minimum of 1500’ deep.

- Next, the drilling rig is moved onsite and rigged up. Mobilization of the drilling rig typically takes 2 to 4 days and a 24-hour drilling schedule is utilized. Under normal conditions, drilling is anticipated to take approximately 6 to 8 days per well.

- On multi-well pads, the wellheads are planned at 28 feet on center. The rig is set up on the first well to be drilled, then skids or walks to each subsequent well.

- Once the total depth is reached for a well, the drill string is removed from the hole.

- Prior to running production casing, one well per pad has open-hole logs run to meet COGCC requirements if an offset well’s logs are not available or are insufficient. Logs are run to determine sufficient cement coverage and the stratigraphy of the formation. The objective target formations for this project are mapped and estimated to be between 7000-7600’ deep.

- Production casing is then run, set in the hole, and cemented in place to provide integrity and isolate the deeper hydrocarbon bearing formations.

- Next, the blow out preventer is removed, the well is properly capped and secured and then the rig skids to the next well on the pad.

- Once all wells on site are drilled, cased, cemented and the well heads capped and secured, the drilling rig is demobilized and moved offsite.
Protection of Fresh Water

The COGCC sets forth specific requirements for casing setting depths necessary to protect ground water sources, and all drilling permits insure that those setting depths have been approved. The Fox Hills sands of the late Cretaceous age are important fresh water aquifers in the western portion of the DJ Basin. In addition, there are numerous discontinuous sands of secondary importance that lie directly below the Fox Hills formation. These ground water sands are found from the surface to a depth of approximately five hundred (500) feet in the north and eastern portions of the basin and from the surface to a depth of approximately one thousand (1,000) feet or more in the south and western parts of the basin.

In order to ensure the protection of all fresh water resources, 9-5/8” steel surface casing is set to a depth at least fifty (50) feet below the base of the deepest known Fox Hills sands or water well, whichever is deeper, as required by the COGCC and is cemented from the bottom of the pipe up to the surface. The COGCC reviews all drilling permit applications for adequate surface casing setting depths and cementing programs based on subsurface ground water maps prepared by the State Water Engineer, offset well data and all available water well data.

Completion Phase

Completion operations commence once the production casing cement has had sufficient time to cure. Typically, cement will cure to maximum strength within 72 hours. The quality is verified by a cement bond log (“CBL”).
Typically, the completion phase proceeds as follows:

- The well is perforated based on an open-hole log analysis. Perforation occurs at a specified intervals and pierces the steel casing, the cement and the formation.

- The well is then fractured hydraulically creating hairline cracks in the formation to produce tiny avenues that allow the hydrocarbons to flow from the formation. Sand is used as a propping agent to preserve the hairline cracks opened in the formation. Typically, six to nine fracturing operations or stages can be completed per day per well, at a rate of up to four wells simultaneously, including time to rig up, pump, and rig down. This process requires multiple, high-pressure, truck-mounted pumps and the associated portable equipment. Once the process is complete, all associated equipment is moved offsite.

- The well is then flowed back for 1-20 days to portable tanks. The length of this process is dependent on the number of wells and the length of the laterals. These flow back fluids are trucked offsite.

- If necessary, tubing is run inside the casing to increase production efficiency. This process typically takes 1 to 3 days.

**Production Phase**

New production facilities are constructed in accordance with COGCC rules and regulations as illustrated in the site plan.

The production facility in general consists of the following surface equipment:

- 8 Oil Tanks: Stores the produced oil, 400 bbl capacity each, welded steel, low profile at a height of less than 12.5 feet.
- 2 Water Tanks: Stores the produced water, up to 400 bbl capacity each, fiberglass or welded steel, a maximum of 12.5 feet in height.
- 22 Separators: Separates production fluid into their constituent components of oil, gas and water.
- Meter House: Measures the amount of produced gas.
- 2 Vapor Recovery Units (VRU): Compresses natural gas captured from the oil column and sent to the sales line.
- 4 Compressors
- 2 Enclosed Combustor Devices (ECDs): To be used only on an as-needed basis to incinerate natural gas that cannot be captured, processed and sold for commercial resale and/or in the event of an unplanned shut-down of the pad.
- 2 LACT Unit (Lease Automated Custody Transfer): Safely measures oil loaded out by reducing the utilization of hatches and reducing any uncontrolled releases of emissions.
- 2 Vapor Recovery Tower (VRT): If needed, this piece of equipment can collect gas in
a vertical separation format before oil goes to the tanks.

- 2 Modular Large Volume Tanks (MLVTs): temporary fresh water tanks for well completion operations will be used in lieu of historic in-ground pits or multiple mobile 500 bbl steel tanks. The use of MLVTs significantly reduces the number of truck trips and decrease time required for set-up of completion operations.

Per COGCC regulations, secondary containment will be constructed around all tanks, including an engineered containment system built to surround the tank battery. The walls will be 26 to 36 inches tall. Containment facilities will be painted in accordance with COGCC Rule 804.

The wellheads will be connected to the separators via flow lines that will be buried 3 to 4 feet deep. The flow lines are typically 2-inch-diameter schedule 160 welded steel, coated.

Once the production phase of the wells commences, daily monitoring of the wells begins. Daily reports consist of tank measurements, gas production estimates, pressure readings, and general facility care and maintenance. This information is compiled and recorded in the COGCC monthly report. The production phase continues until a well is no longer productive, or it is no longer financially viable to continue production. It is estimated that the average life of each well at this location will be 20 to 30 years.

### Plugging and Abandonment of Wells & Facilities

Extraction will plug the wells, remove production equipment, and reclaim the pad when it becomes uneconomical to continue operating the wells. This will include installation of a series of required cement plugs in the wells to eliminate future flow from the well, in accordance with Section 1000 of COGCC rules and regulations. After the well has been plugged, flow lines will be flushed of all hydrocarbons and capped or removed in accordance with Rule 1103 of COGCC rules and regulations. If the separator and tanks on the property surface are no longer needed for other wells, they will be removed. Surface restoration will include removal of any above-ground casing and installation of regulation markers that will not interfere with future surface use.

### Site Reclamation

The Warbler pad will have an interim reclamation period which includes re-contouring and reseeding around the edges of the pad but such as to allow for daily operations of the oil and gas facility, access to the wells, maintenance of the facility and wells, work-overs, and normal production activity. The pad size will be reduced to 8.9 acres.

All tanks and equipment, lines and roads will be removed from the entire multi well pad location upon permanent cessation of the operator’s production and operations at the site. All reseeding shall be done with grasses consistent with the Rocky Mountain native mix or other grasses reasonably requested by the surface owner. All surface restoration shall be accomplished and completed to the reasonable
satisfaction of the surface owner or as soon as practical (weather permitting), and in accordance with regulatory agencies’ standards. All site reclamation will be in conformance with Adams County regulations as well as the COGCC regulations. However, this requirement may be waived with the permission of the surface owner at the time of final restoration.

**Water Source**

Extraction acquires water rights from various sources in surrounding counties, which can be used during drilling and completion operations. Extraction typically contracts with third parties to transport and store the water in temporary modular large volume tanks (MLVTs) in a central location for use during completion at the pad. Transportation of water to the MLVTs and the pad will be completed using temporary “lay flat” water lines on the surface topography and removed after use. This technology eliminates the need to truck water to the pad during completion operations.

**Weed Control**

All areas, including well heads and production facilities, will be kept free of weeds, rubbish, and other waste material. As much as possible, all areas will be kept free of noxious weeds. If noxious weeds are identified on-site, the area will be treated as soon as possible in an effort to prevent the weed from flowering and spreading. To the greatest extent possible, machinery and equipment will not be parked or staged in weed infested areas.

**Drainage & Erosion Control**

Proper storm-water controls will be installed around the tank battery and drilling pad during construction. The wellhead access road will be crowned, ditched and graveled, and culverts for cross drainage will be installed. Storm-water controls will also be installed around the spoil piles to prevent sediment migration. No changes in the current drainage patterns are anticipated. A Storm Water/Erosion Control BMP will also been filed with the COGCC as part of the Oil and Gas Location Assessment (COGCC Form 2A).

**Sanitary Facilities**

Extraction personnel and contractors will utilize portable sanitary toilets and wash stations. No personnel are on the location for a permanent period of time. No city services or permanent sanitary services of any kind are required. All personnel and contractors who visit the site are responsible for picking up and disposing of any debris.
Mitigation Measures and Best Management Practices

**Wildlife & Environmental**

The Warbler pad and its respective production facility are not located within USFWS (United States Fish and Wildlife Service) and CPW (Colorado Parks and Wildlife) mapped layers for sensitive species. The pad, wells and facilities outside of the FEMA mapped flood plain area. A full environmental site assessment was completed on November 15, 2018. A Natural Resource Conservation Overlay Review report is underway.

**Noise Control**

Any operations involving the use of a drilling rig, workover rig, or fracturing and any equipment used in the drilling, completion or production of a well are subject to and will comply with the noise regulations set forth by COGCC Rule 802.

**Visual Impacts/Screening**

The production facilities are painted in accordance with the COGCC Rule 804 regarding Visual Mitigation. The site was chosen in cooperation with the surface owner as there are no houses within 1000’. Screening choices will be negotiated between Extraction and the surface owner to match the surrounding scenery and provide visual barriers to production equipment.

**Odor**

All applicable COGCC regulations related to odor will be adhered to by Extraction. No noxious, prolonged or unusually high amounts of odor are expected from the proposed drilling of the wells.

**Air Pollution**

All drilling, well completion and production activities will be in compliance with the permit and control provision of the Colorado Air Quality Control Program, Title 25, Article 7, C.R.S.

**Signage**

Extraction maintains all signage pursuant to Adams County and COGCC Rules and Regulations.
Access Roads & Maintenance

Extraction maintains all access roads in compliance with Adams County Code. Extraction will obtain the appropriate engineering documentation to establish access. Please see attached Site Plan. Access road will be bladed to minimize wet weather damage. Fugitive dust will be kept to a minimum. All lease roads leading to the drilling site, tank battery and surface equipment will be designated and maintained to support fire vehicles, equipment and apparatus. Extraction will work with Adams County road department to ensure any damage caused by Extraction activity is properly repaired. A full baseline road study, traffic impact, and trip generation analysis will be done by a professional engineer prior to operations commencing. Extraction will enter into a Road Maintenance Agreement for the portion of East 144th Avenue that will be used for oil and gas operations.

Waste Disposal

Extraction will dispose of all wastes in accordance with COGCC and/or the Colorado Department of Public Health and Environment rules and regulations. Extraction will provide the County copies of all waste management reports upon request.

Light Mitigation

Temporary lighting will be on site for the drilling, completions and flow-back phases of the project. Wells generally do not have permanent lights but the facilities do for safety reasons. These are used for general maintenance, tanker truck loading, emergencies and other pertinent operations that require light for safety at times when additional light is needed. All permanent lighting of oil and gas well sites shall be directed downward and internally. Temporary lighting shall conform to the Commission’s Rules and Regulations.

Fencing

All equipment will be fenced as required by defined the COGCC 600 Series Rules.

Airport Height Overlay

The property lies approximately 35,000 feet (6.6 miles) northwest from the north end of existing Runway 16R at DEN.

Extraction Oil & Gas has no plans to utilize permanent or temporary equipment that will meet or exceed the 200 ft. height requirement. In the event this changes Extraction will obtain necessary permit from FAA prior to constructing and utilize such equipment. Extraction has filed an FAA determination.
Background Ambient Sound Level Survey Report
Warbler Pad
Adams County, Colorado

Prepared for:

Extraction Oil & Gas, Inc.
370 17th Street, Suite 5300
Denver, CO 80202

Prepared by:

Principle Environmental, LLC
201 West Ranch Ct.
Weatherford, TX 76088

March 4, 2019
Table of Contents

Executive Summary .................................................................................................................................................. 1
Ordinance Summary ............................................................................................................................................... 1
Site Information ..................................................................................................................................................... 2
Sound Level Meter Specifications ....................................................................................................................... 4
Acoustics Overview .............................................................................................................................................. 4
Ambient Monitoring Data and Results ................................................................................................................... 6
Attachments ..........................................................................................................................................................
    Photo Log ...................................................................................................................................................... Attachment 1
    Manufacturer’s Specifications ......................................................................................................................... Attachment 2
    Data and Charts ........................................................................................................................................... Attachment 3
Executive Summary

Principle Environmental, LLC (TruHorizon) prepared this report to document the background ambient sound level survey conducted at the site for the proposed Warbler pad in Adams County, Colorado. From March 1 through March 4, 2019, TruHorizon conducted sound monitoring south of the coordinates for the planned site. Table 1 shows the overall A-weighted and C-weighted averages produced by the study:

<table>
<thead>
<tr>
<th>Description</th>
<th>LAeq (dB)</th>
<th>LCeq (dB)</th>
<th>Wind Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>46.43</td>
<td>70.74</td>
<td>6.31</td>
</tr>
</tbody>
</table>

TruHorizon recommends further site evaluation to determine the sound impact of operations at nearby structures. TruHorizon recommends completing predictive sound modeling to confirm the operational sound impact on the surrounding area and make recommendations for mitigation if necessary.

Ordinance Summary

In December 2005 Ordinance No. 1R-99 was enacted for the State of Colorado by the Colorado Oil and Gas Commission which regulates the environmental performance standards. Section 802 sets regulations to establish a process for reasonable noise control.

Section 802 states that “Sound levels shall be measured at a distance of three hundred and fifty (350) feet from the noise source”, or “sound levels shall be measured at a point twenty-five (25) feet from the structure towards the noise source.”
In situations where measurement of noise levels at three hundred and fifty (350) feet is impractical or unrepresentative due to topography, the measurement may be taken at a lesser distance and extrapolated to a 350-foot equivalent using the following formula:

$$dB(A)_{DISTANCE_2} = dB(A)_{DISTANCE_1} - \left(20 \times \log_{10}\left(\frac{distance_2}{distance_1}\right)\right)$$

Noise levels not to exceed designated limits in Table 2 during the stated time frames:

**Table 2: COGCC Zones and Designated Limits for Oil and Gas Operations**

<table>
<thead>
<tr>
<th>ZONE</th>
<th>7:00 a.m. – 7:00 p.m.</th>
<th>7:00 p.m. – 7:00 a.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>55 dB(A)</td>
<td>50 dB(A)</td>
</tr>
<tr>
<td>Commercial</td>
<td>60 dB(A)</td>
<td>55 dB(A)</td>
</tr>
<tr>
<td>Light industrial</td>
<td>70 dB(A)</td>
<td>65 dB(A)</td>
</tr>
<tr>
<td>Industrial</td>
<td>80 dB(A)</td>
<td>75 dB(A)</td>
</tr>
</tbody>
</table>

- Sound level measurements shall be taken four (4) feet above ground level.
- Sound levels shall be determined by averaging minute-by-minute measurements made over a minimum fifteen (15) minute sample duration.
- Sound levels that are C-weighted for low frequency shall not exceed 65 dB(C) when measured twenty-five (25) feet from the exterior wall of the residence or occupied structure nearest to the noise source, in the event of a complaint.

**Site Information**

The Warbler pad is to be located east of Picadilly Rd and south of 152\textsuperscript{nd} Ave. From Friday, March 01, 2019 through Monday, March 04, 2019, TruHorizon conducted approximately 72 hours of monitoring at the location. The approximate coordinates for the monitoring point are 39°57'31.21"N, 104°43'11.79"W. The approximate coordinates for the site are 39°57'40.80"N, 104°43'12.36"W. The monitoring point is approximately 900 feet south or the provided pad coordinates. The closest roads are small local dirt roads. The next closest road is Picadilly Rd which is approximately 3,700 feet west of the monitor. There were railroad tracks about 1.6 miles northwest of the monitor. Also, Denver International Airport was about 4.5 miles southeast of the monitor.
monitor. Air traffic and train horns could be heard at the monitoring point while on location. **Figure 1** below shows the monitoring location marked by a green pin; photographs of the location are provided in **Attachment 1**.

**Figure 1**: Aerial View of Warbler Location

With respect to the monitoring point, the closest residential structure was approximately 2,600 feet west of the monitor. The monitor was placed in an open area with no significant changes in elevation and no major obstructions. There was a creek that ran along the southeast side of the monitor. While on location, there was noticeable noise from air traffic and birds. The closest town (Lochbuie) was approximately 3.4 miles to the north. Wind data was measured for the area at the KCOBRIGH76 weather station located about 2.1 miles northeast of the monitor. The coordinates for the weather station are approximately 39°59'6.00"N, 104°41'56.40"W.
**Sound Level Meter Specifications**

A Brüel & Kjær Type 2250, 4th generation, hand-held analyzer (S/N: 3010878) with transducer (S/N: 3080399) measured sound levels at the monitoring location. **Attachment 2** lists the manufacturer’s specification for this meter. The software modules in the Type 2250 allows for real-time frequency analysis, analysis of time histories for broadband parameters and spectra, and documentation of measurements through recording of measured sound. The 2250 sound level meter continuously sampled sound levels logging the specified data every minute; therefore, each one hour period provided 60 readings.

Prior to beginning the monitoring, TruHorizon calibrated the 2250 meter using a Brüel & Kjær Type 4231 Acoustical Calibrator (S/N: 3006473). The calibrator emits a reference sound pressure level of 94 dB. The calibrator attaches to the transducer to verify the meter accurately measures the reference sound level. Full manufacturer calibration documentation is available upon request.

After monitoring, the data collected by the 2250 sound level meter was downloaded to a computer using Brüel & Kjær BZ-5503 Utility Software for Hand-held Analyzers Version 3.11.0.389. TruHorizon used the manufacturer’s software, coupled with Excel spreadsheets, to summarize the data.

**Acoustics Overview**

Sound pressure level measurements are commonly weighted in relation to their frequency components in order to provide a consistent basis for comparison to other measurements of the same type. **Figure 2** depicts three common weighting curves plotted together for reference.
The study utilized A-weighted and C-weighted filters. An A-weighted filter corresponds to the human ear’s response at low to medium sound levels. Time weighting defines how the exponential averaging in root-mean-square measurement is done. The A-weighted filter with fast time weighting is common for environmental noise measurement. The C-weighted filter is used for very high sound level measurements and does not filter out low or high frequency sounds. It approximates the human ear at very high sound levels and is typically used for measuring traffic, machinery and other loud sound sources. B-weighting is no longer commonly used and was developed to filter the mid-range frequencies between A and C weighting.

The sound level meter recorded the following weighted averages:

- **L_{AEq}** – The equivalent continuous sound level over a specified period of time that represents the same energy as the actual time varying sound signal; The ‘A’ in the above variables denotes that the A-weighting has been included.

- **L_{CEq}** – The equivalent continuous sound level over a specified period of time with C weighting applied.

Decibels (dB) are a measure of sound energy based on a logarithmic scale. A sound level of 60 dB contains 10 times more sound energy relative to a sound level of 50 dB, and a sound level of 70 dB contains 100 times more sound energy relative to a sound level of 50 dB.

For comparison, **Table 3** presents a summary of typical decibel levels for multiple types of sounds.
### Table 3: Typical Sound Levels (dBA)

<table>
<thead>
<tr>
<th>Description of Sound</th>
<th>Sound Level (dBA)</th>
<th>Human Perception of Loudness*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold of Hearing</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rustling Leaves</td>
<td>20</td>
<td>Just Audible</td>
</tr>
<tr>
<td>Quiet Whisper (3 feet away)</td>
<td>30</td>
<td>Very Quiet</td>
</tr>
<tr>
<td>Quiet Home</td>
<td>40</td>
<td>Quiet (1/8 as loud)</td>
</tr>
<tr>
<td>Quiet Street</td>
<td>50</td>
<td>(1/4 as loud)</td>
</tr>
<tr>
<td>Normal Conversation</td>
<td>60</td>
<td>(1/2 as loud)</td>
</tr>
<tr>
<td>Inside Car</td>
<td>70</td>
<td>Moderately Loud (Reference Loudness)</td>
</tr>
<tr>
<td>Automobile (25 feet away)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Train Whistle (500 feet away)</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Level at which sustained exposure may result in hearing loss</td>
<td>90 – 95</td>
<td></td>
</tr>
<tr>
<td>Diesel Truck (30 feet away)</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Pile Driver (50 ft.)</td>
<td>100</td>
<td>Very Loud (8 times as loud)</td>
</tr>
<tr>
<td>Power Mower (3 feet away)</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Amplified Rock and Roll (6 feet away)</td>
<td>110</td>
<td>(16 times as loud)</td>
</tr>
<tr>
<td>Jet Airplane (100 feet away)</td>
<td>120</td>
<td>Threshold of pain (32 times as loud)</td>
</tr>
<tr>
<td>Civil defense siren (100 ft.)</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Firearm shots near ear</td>
<td>140</td>
<td>Painfully Loud</td>
</tr>
<tr>
<td>Even short term exposure can cause permanent damage – Loudest recommended exposure WITH hearing protection</td>
<td>140</td>
<td></td>
</tr>
</tbody>
</table>

*Relative to a Reference Loudness of 70 Decibels – Various Sources: Barnek, 1998, Barnes et al., USEPA, 1971

### Ambient Monitoring Data and Results

TruHorizon conducted the background ambient sound level survey from approximately 12:00 a.m. on Friday, March 01, 2019 to 12:00 a.m. on Monday, March 04, 2019. **Table 4** summarizes the logarithmic averages of the study.
Table 4: Daily and Overall Study Sound Level Averages (dBA, dBC)

<table>
<thead>
<tr>
<th>Description</th>
<th>LAeq (dB)</th>
<th>LCeq (dB)</th>
<th>Wind Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday, March 1, 2019</td>
<td>48.74</td>
<td>73.52</td>
<td>7.35</td>
</tr>
<tr>
<td>Saturday, March 2, 2019</td>
<td>45.57</td>
<td>70.88</td>
<td>9.13</td>
</tr>
<tr>
<td>Sunday, March 3, 2019</td>
<td>43.22</td>
<td>59.28</td>
<td>2.46</td>
</tr>
<tr>
<td>Average</td>
<td>46.43</td>
<td>70.74</td>
<td>6.31</td>
</tr>
</tbody>
</table>

Attachment 3 contains the hourly average summary table and charts obtained from the background ambient evaluation.

Common sounds for the Warbler site primarily included noise from aircraft, trains, ducks and birds. The sounds are characteristic of a residential area. The overall study averages are comparable to sound levels on a quiet street. The overages that did occur were due to the noise from train horns, air traffic and wind. The A-Weighted data charts, attached, illustrate the overages and their causes.

The maximum study LAeq at the monitoring location was 63.7 dBA which occurred on Friday, March 01, 2019 at approximately 10:05 a.m. The sound level meter recorded all LAeq signals greater than or equal to 55 dB. From the recordings, the source of the maximum LAeq value was an aircraft flying near the monitor. All sound clips are identified to the best of TruHorizon personnel’s ability.

The services provided for this project were performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions. No warranty, expressed or implied, is made or intended by rendition of these consulting services or by furnishing oral or written reports of the findings made. This report has been prepared by Principle Environmental, LLC for the exclusive use by Extraction Oil & Gas, Inc.
ATTACHMENT 1

PHOTO LOG
Photo 1: View of Monitoring Location looking north

Photo 2: View of Monitoring Location looking east
**Photo 3:** View of Monitoring Location looking south

**Photo 4:** View of Monitoring Location looking west
ATTACHMENT 2

MANUFACTURER’S SPECIFICATIONS
Hand-held Analyzer — Type 2250, with Sound Level Meter Software BZ-7222, Frequency Analysis Software BZ-7223, Logging Software BZ-7224, Enhanced Logging Software BZ-7225 and Sound Recording Option BZ-7226

Type 2250 is the innovative, 4th generation, hand-held analyzer from Brüel & Kjær. The design philosophy is based on extensive research which concluded that the instrument should be easy and safe to use, while at the same time incorporating clever features. Type 2250 has been awarded several prizes for its combination of excellent ergonomics and attractive design.

Type 2250 can host a number of software modules, including frequency analysis, logging (profiling) and recording of the measured signal. These are available separately at any time — or you can order a fully pre-configured instrument from the factory.

The combination of software modules and innovative hardware makes the instrument into a dedicated solution for performing high-precision measurement tasks, in environmental, occupational and industrial application areas. As a result, you get the functionality you need now, plus the option of opening up for more functionality later — and your investment is securely protected.

**Uses and Features**

**USES**
- Environmental noise assessment and monitoring
- Occupational noise evaluation
- Selection of hearing protection
- Noise reduction
- Product quality control
- Class 1 sound measurements to the latest international standards
- Real-time analysis of sound in 1/1- and 1/3-octave bands
- Analysis of time histories for broadband parameters and spectra (Logging)
- Documentation of measurements using text and voice annotations
- Documentation of measurements through recording of measured sound

**FEATURES**
- Large, high-resolution, touch-sensitive colour screen
- Data storage on plug-in memory-cards
- Standard USB (On-the-Go) computer interface
- Dynamic range in excess of 120 dB
- 3 Hz – 20 kHz broadband linear frequency range
- Real-time frequency analysis in 1/1- or 1/3-octave bands
- Broadband and spectral data can be logged to obtain a time history for later analysis
- Sound recording of measured signal during all or parts of a measurement
- Personal measurement, display and job setup
- PC software included for setup, archiving, export and reporting
- Automatic detection of, and correction for, windscreen
- Robust and environmentally protected (IP-44)
ATTACHMENT 3

MONITORING LOCATION
STUDY SUMMARY DATA AND CHARTS
<table>
<thead>
<tr>
<th>Timestamp</th>
<th>LAeq (dBA)</th>
<th>LCeq (dBC)</th>
<th>Timestamp</th>
<th>LAeq (dBA)</th>
<th>LCeq (dBC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/19 12:00 AM</td>
<td>42.71</td>
<td>58.51</td>
<td>3/1/19 1:00 AM</td>
<td>43.45</td>
<td>59.48</td>
</tr>
<tr>
<td>3/1/19 1:00 AM</td>
<td>46.43</td>
<td>61.42</td>
<td>3/1/19 2:00 AM</td>
<td>48.79</td>
<td>64.26</td>
</tr>
<tr>
<td>3/1/19 2:00 AM</td>
<td>47.15</td>
<td>63.25</td>
<td>3/1/19 3:00 AM</td>
<td>47.99</td>
<td>62.54</td>
</tr>
<tr>
<td>3/1/19 3:00 AM</td>
<td>47.99</td>
<td>61.09</td>
<td>3/1/19 4:00 AM</td>
<td>50.16</td>
<td>76.96</td>
</tr>
<tr>
<td>3/1/19 4:00 AM</td>
<td>51.55</td>
<td>79.57</td>
<td>3/1/19 5:00 AM</td>
<td>44.95</td>
<td>65.47</td>
</tr>
<tr>
<td>3/1/19 5:00 AM</td>
<td>50.78</td>
<td>78.41</td>
<td>3/1/19 6:00 AM</td>
<td>44.96</td>
<td>69.69</td>
</tr>
<tr>
<td>3/1/19 6:00 AM</td>
<td>49.40</td>
<td>75.76</td>
<td>3/1/19 7:00 AM</td>
<td>46.22</td>
<td>70.17</td>
</tr>
<tr>
<td>3/1/19 7:00 AM</td>
<td>46.20</td>
<td>72.04</td>
<td>3/1/19 8:00 AM</td>
<td>46.21</td>
<td>61.61</td>
</tr>
<tr>
<td>3/1/19 8:00 AM</td>
<td>44.95</td>
<td>65.47</td>
<td>3/1/19 9:00 AM</td>
<td>51.38</td>
<td>64.24</td>
</tr>
<tr>
<td>3/1/19 9:00 AM</td>
<td>49.40</td>
<td>67.54</td>
<td>3/1/19 10:00 AM</td>
<td>51.97</td>
<td>66.86</td>
</tr>
<tr>
<td>3/1/19 10:00 AM</td>
<td>51.99</td>
<td>64.73</td>
<td>3/1/19 11:00 AM</td>
<td>50.16</td>
<td>76.96</td>
</tr>
<tr>
<td>3/1/19 11:00 AM</td>
<td>51.38</td>
<td>64.26</td>
<td>3/1/19 12:00 PM</td>
<td>47.99</td>
<td>61.09</td>
</tr>
<tr>
<td>3/1/19 12:00 PM</td>
<td>50.78</td>
<td>78.41</td>
<td>3/1/19 1:00 AM</td>
<td>44.96</td>
<td>69.69</td>
</tr>
<tr>
<td>3/2/19 1:00 AM</td>
<td>46.43</td>
<td>61.42</td>
<td>3/2/19 2:00 AM</td>
<td>48.79</td>
<td>64.26</td>
</tr>
<tr>
<td>3/2/19 2:00 AM</td>
<td>47.15</td>
<td>63.25</td>
<td>3/2/19 3:00 AM</td>
<td>47.99</td>
<td>62.54</td>
</tr>
<tr>
<td>3/2/19 3:00 AM</td>
<td>47.99</td>
<td>61.09</td>
<td>3/2/19 4:00 AM</td>
<td>50.16</td>
<td>76.96</td>
</tr>
<tr>
<td>3/2/19 4:00 AM</td>
<td>51.55</td>
<td>79.57</td>
<td>3/2/19 5:00 AM</td>
<td>44.95</td>
<td>65.47</td>
</tr>
<tr>
<td>3/2/19 5:00 AM</td>
<td>50.78</td>
<td>78.41</td>
<td>3/2/19 6:00 AM</td>
<td>44.96</td>
<td>69.69</td>
</tr>
<tr>
<td>3/2/19 6:00 AM</td>
<td>49.40</td>
<td>75.76</td>
<td>3/2/19 7:00 AM</td>
<td>46.22</td>
<td>70.17</td>
</tr>
<tr>
<td>3/2/19 7:00 AM</td>
<td>46.20</td>
<td>72.04</td>
<td>3/2/19 8:00 AM</td>
<td>46.21</td>
<td>61.61</td>
</tr>
<tr>
<td>3/2/19 8:00 AM</td>
<td>44.95</td>
<td>65.47</td>
<td>3/2/19 9:00 AM</td>
<td>51.38</td>
<td>64.24</td>
</tr>
<tr>
<td>3/2/19 9:00 AM</td>
<td>49.40</td>
<td>67.54</td>
<td>3/2/19 10:00 AM</td>
<td>51.97</td>
<td>66.86</td>
</tr>
<tr>
<td>3/2/19 10:00 AM</td>
<td>51.99</td>
<td>64.73</td>
<td>3/2/19 11:00 AM</td>
<td>50.16</td>
<td>76.96</td>
</tr>
<tr>
<td>3/2/19 11:00 AM</td>
<td>51.38</td>
<td>64.26</td>
<td>3/2/19 12:00 PM</td>
<td>47.99</td>
<td>61.09</td>
</tr>
</tbody>
</table>
Patterson 284 Traditional Drilling Operations (A-Weighted Levels)
Chart 1: A-Weighted sound levels with minute resolution
Chart 2: A-Weighted sound levels with minute resolution
Chart 3: A-Weighted sound levels with minute resolution
Chart 4: C-Weighted sound levels with minute resolution
Chart 5: C-Weighted sound levels with minute resolution
Chart 6: C-Weighted sound levels with minute resolution
Chart 7: A & C-Weighted sound levels with hour resolution
NATRUAL RESOURCES CONVERVATION OVERLAY REVIEW

WARBLER OIL AND GAS LOCATION

ADAMS COUNTY, COLORADO

Prepared for:

EXTRACTION

370 17th Street #5300
Denver, CO 80202

Prepared by:

QUANDARY
CONSULTANTS

55 E. 4th Avenue
Denver, CO 80203
Background

Quandary Consultants, LLC (Quandary) conducted a site-specific Natural Resources Conservation Overlay (NRCO) review for Extraction Oil and Gas (Extraction) to meet NRCO requirements for the Adams County Community and Economic Development Department. This review was prepared for the Warbler Oil and Gas (Location) in accordance with Adams County Zoning Code Sections 3-38 and 4-11-02-03. The Location includes the proposed Oil and Gas Operation Area (OGOA), Facilities, and Oil and Gas Wells. The proposed access road was also included in the Location survey.

The proposed OGOA during drilling and hydraulic fracturing activities is 15.6 acres. As best practice following drilling and hydraulic fracturing, the OGOA will be reclaimed within six months to the minimum area needed to produce and maintain oil and gas wells.

The Location is in Adams County (Approximately 1.3-miles east of the intersection of Picadilly Road and E 144th Avenue.) in the southeast quarter of Section 13, Township 1 south, Range 66 west of the 6th Principal Meridian. The proposed access road approaches the Location from the southwest, from Picadilly Road.

A site-specific review was conducted for the Location since it is within in the general NRRO District Map. To confirm findings, Quandary also conducted an onsite field survey on November 1, 2018 for the proposed Location.

This NRRO includes a review of natural resources, including; waterbodies, 100-year floodplains, wetlands, hydric soils, and wildlife habitat areas. In addition, this review discusses potential cultural and agriculture resources.

Purpose

The purpose of this NRRO is to identify natural, scenic, cultural, and agricultural resources associated with oil and gas development at the Location to meet Adams County Development Standards and Regulations Parts 3-38 and 4-11-02-03. This NRRO was completed as an analysis, utilizing the best available data from various County, State, and Federal resources. To confirm data, an onsite field survey was conducted November 1, 2018.
Resource Review

Three maps were created to complete this review, and can be found in Attachment I. These include a Site Location Map (Figure 1), Water Resource Findings Map (Figure 2) and, Wildlife and Vegetation Findings Map (Figure 3). Site photos were taken during the onsite field survey and can be found in Attachment II.

Quandary reviewed Colorado Oil and Gas Conservation Commission (COGCC), Colorado Division of Water Resources (CDWR), United States Army Corp of Engineers (USACE), National Wetland Inventory (NWI), Federal Emergency Management Agency (FEMA), United States Fish and Wildlife Service (USFWS) and Colorado Parks and Wildlife (CPW) data.

100-Year Floodplains:

The proposed Location will not be constructed within a mapped 100-year floodplain (Figure 2).

Riparian Areas:

The proposed Location will not be constructed within a riparian area. Riparian areas are associated with irrigation canals to the southeast and northwest of the proposed Location, but the proposed Location would be constructed outside of these areas (Figure 2).

Wetlands:

The Location will not be constructed within an NWI mapped wetland. Field surveys verified the location consists of previously planted dryland agriculture fields. No wetland characteristics such as vegetation, hydrology, or hydric soils were observed during field surveys. No surface water resources were observed at the proposed Location during field surveys.

Buffalograss (Bouteloua dactyloides), which is considered an upland species by the United States Department of Agriculture, Natural Resource Conservation Service, was the dominant vegetation species at the Location. Scattered Lambsquarters (Chenopodium album L), Field bindweed (Convolvulus arvensis), and Common sunflower (Helianthus
Field Bindweed anuus L.) were identified during the onsite field surveys of the Location. Field Bindweed is considered a CO noxious weed List C.

**Lakes/Reservoirs:**

The proposed Location would not directly impact any lakes, reservoirs, or other surface waters. The Location lies between an irrigation canal on the southeast and an irrigation canal on the northwest. At the time of the field survey these canals were dry, indicating water flow is seasonal. An access road currently exists adjacent to an irrigation canal east of the proposed Location. This existing gravel road will be utilized to access the proposed Location. Irrigation canals will not be disturbed during the construction of the proposed Location. Due to the proximity of seasonal water flows adjacent to the access road and proposed Location, Extraction will implement sediment controls to reduce the potential for sediment/pollutant discharge.

**Hydric Soils:**

Natural Resource Conservation Service (NRCS) data indicates the soil type for the Location and surrounding areas are dominated by Vona sandy loam, 3 to 5 percent slopes and Ascalon sandy loam, 1 to 3 percent slopes, which are not indicative of hydric soils. Soils at the Location are considered well drained and a runoff class that ranges from low to very low. FEMA’s Flood Map Service indicates the Location is in an area of minimal flood hazard.

**Wildlife Habitat:**

USFWS and CPW mapped layers indicate the Location is within Black-tailed prairie dog (Cynomys ludovicianus, BTPD) and Preble’s meadow jumping mouse overall range (Zapus hudsonius preblei, PMJM).

No prairie dogs or prairie dog burrows were identified during the onsite field survey conducted in November 2018.
The PMJM is listed as threatened by the U.S. Fish and Wildlife Service (USFWS 1998). In Colorado, they are listed as a threatened, Tier 1, Species of Greatest Conservation Need (CPW 2015). During summer months, the most important wetland types occupied by PMJM include riparian areas and adjacent wet meadows. During the summer, they prefer dense shrub, grass and forb ground cover along creeks, rivers, and associated waterbodies. From early fall through the spring, they hibernate underground in burrows that are typically at the base of vegetation and have a northerly aspect.

The Location has been disturbed/modified for agricultural purposes and cropland with an existing gravel road that has been established. Additional disturbance is planned to the west of the irrigation canal. No riparian vegetation or wetlands are located within the planned disturbance area. Based on lack of vegetation, quality of vegetation and an existing gravel road separating the planned disturbed area from a water source, Quandary does not believe PMJM habitat is present at the Location.

One unknown raptor species (non-eagle) nest was observed in a mature cottonwood tree, approximately 2,000 feet southwest of the Location (Figure 3). The non-eagle nest determination is based on field survey observations, such as nest size and appearance. At the time of the onsite field survey, the nest was observed to be inactive and no raptor species were observed in areas surrounding the Location.

Raptors are protected species where tolerance limits to disturbance can vary. As a result, CPW has established recommended buffer zones and seasonal restrictions to prevent disturbance of Colorado Raptors. Although the nest is inactive, it falls within the buffer zone of the most predominant Colorado Raptor species.

Since seasonal conditions could change, raptor surveys will be conducted prior to construction at the Location to determine if the nest is still inactive during egg laying and incubation periods for Raptors or whether development activities are within a half-mile radius of the nest. If an active raptor nest is observed within the recommended buffer zone outlined in CPW’s guidance for a particular species, stress monitoring or CPW consultation may be necessary prior to construction.
Cultural:

An onsite field survey and Class I cultural resource file search were conducted to assess cultural resources at the Location. Based on a file search on the Office of Archeology and Historic Preservation’s online COMPASS Database, the Location lies between the Denver Hudson Canal on the southeast and the Neres Canal on the northwest. Both of these resources have been officially determined eligible for inclusion in the National Register of Historic Places. Irrigation canals will not be disturbed during the construction of the proposed Location.

The location consists of previously planted dryland agriculture fields dominated by smooth brome. The area has been cultivated. Attachment II includes photographs showing the existing dryland agriculture nature of the Location. The proposed project would be constructed entirely on previously disturbed and planted dryland agriculture fields.

Agricultural:

The proposed project is located within agriculture lands identified by Adams County Zoning as A-1 Agriculture. As discussed above, the location is dominated by existing dryland agriculture pasture consisting of short and tall perennial grasses.

Extraction’s proposed OGOA is compatible with Adams County’s goal under its comprehensive development to preserve and maintain agricultural lands to the greatest extent possible. The development plan for the Location to drill multiple wells from one centralized OGOA, reduces Extraction’s footprint and leaves more land available for agriculture, wildlife and habitat. Restoring the surface to a minimum area is compatible with current and future land use and helps preserve historic agricultural lands in the rapidly urbanizing county.
Conclusions

Although the Location is within a NRCO District, no significant risks to natural, scenic, cultural, and agricultural resources are associated with oil and gas development at the Location. The OGOA has been designed in a way that reduces impacts to 100-year floodplains, riparian areas, wetlands and surface water resources. Drilling multiple wells from one centralized Location reduces Extraction’s footprint on lands within the NRCO District.

Based on field surveys, the Location may overlap with protected species habit. In accordance with CPW recommendations and guidance, additional wildlife surveys will be conducted to determine whether protected species are present prior to construction of the Location. If species are identified, appropriate mitigation measures will be implemented and or consultation with CPW will occur.

Attachment I

Figure 1. Site Location Map
Figure 2. Water Resource Findings Map
Figure 3. Wildlife and Vegetation Findings Map

Attachment II

Site Photographs
Attachment I
Maps
Attachment II
Site Photographs
Photo 1. Unknown raptor species nest located 2,000 ft. southwest of the Location.
Photo 2. Photo within the Location facing north.

Photo 3. Photo within the Location facing east.
Photo 4. Photo within the Location facing South.

Photo 5. Photo within the Location facing West.
Photo 6. Irrigation canal southeast of the Location.
Warbler Pad Facility

Adams County - Independent Traffic Impact Fee Study

Bill Zahniser, P.E.
March 12, 2019
Objectives

- Prepare an independent fee calculation for Extraction’s Warbler Pad using project specific inputs and geotechnical engineering assumptions
- Develop and apply impact methodologies consistent with the broader county-wide study
- Determine if preliminary independent study findings, and resulting fee adjustments, will satisfy the County

Methodology

- Defining the Study Parameters
  - Location of Access
  - Haul Route Specifics
  - Extraction’s Traffic Assumptions
- Adapt FHU’s applicable impact methodologies
- Compare findings and fee determinations for two potential pipeline scenarios
Study Considerations
Study Area Considerations

- Near intersection of 144th Ave and Picadilly Road
- Within the Western Transportation Fee District of unincorporated Adams County
- 22 well pad, enhanced frac/completion, to be developed in a single mobilization
- Freshwater pipelines will be used to facilitate completions
- Will also use pipelines to connect to Discovery’s pipeline nearby

Area of Interest

- Asphalt Paved
- Gravel Road, Maintained
- Gravel Road, Private Access
- Adopted fee structure for the West District would apply
- Warbler is being permitted as a 22 well pad development
- XOG is considering 2 of the pipeline scenarios
  - Permit will assume both freshwater and product pipelines will be used
  - Standard Fee would be $412,989
- Contingent on tie in to Discovery Pipeline
  - Without product pipeline, fee would be $771,501

<table>
<thead>
<tr>
<th>Pipeline Scenario</th>
<th>Adopted Fee Structure (West District)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pad Fee</td>
</tr>
<tr>
<td>Fresh Water Pipeline</td>
<td>$753</td>
</tr>
<tr>
<td>X</td>
<td>$753</td>
</tr>
<tr>
<td>X</td>
<td>$753</td>
</tr>
<tr>
<td>X X</td>
<td>$753</td>
</tr>
<tr>
<td>X</td>
<td>$753</td>
</tr>
<tr>
<td>X X</td>
<td>$753</td>
</tr>
<tr>
<td>X X X</td>
<td>$753</td>
</tr>
<tr>
<td>X X X X</td>
<td>$753</td>
</tr>
</tbody>
</table>
Summary of Study Approach

- Determine which FHU Methodologies are Applicable
  - Review of Location
  - Identify Methods to be used for Each Road Segment
- Determine Model Inputs
  - Haul Route Access Specifics
  - Trip Generation and Loading Estimates
- Determination of Traffic Based Impacts
  - HMA Overlay Requirements
  - Evaluate impact of different Resilient Modulus assumption
- Determination of Event Based Impacts
  - Shoulder Improvements
  - Development of Trip-Based Proportionality Factor
Location Specific Considerations

County Maintained Roads (FHU, Fig 5)

Existing Pavement Conditions (FHU, Fig 7)

Surface Types (FHU, Fig 6)

Shoulder Sufficiency (FHU, Fig 8)
## Determine which Regional Study Elements are applicable to each road segment

<table>
<thead>
<tr>
<th>Regional Study Methodologies</th>
<th>How is the Impact Estimated?</th>
<th>Warbler Access Route</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paved Road Impacts</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| HMA Pavement Methodology    | • Use traffic ESALs and design considerations for road classification to determine structural capacity necessary to support anticipated oilfield traffic (i.e., SN Deficiency).  
• Determine required HMA overlay dimensions needed to satisfy the SN deficiency.  
• Use FHU unit pricing, $85/ton, to calculate mitigation costs. | Applicable to 156th Ave and Picadilly Road |
| Poor Condition Asphalt Methodology | • Assume reconstruction of road segments currently rated as "poor" pavement condition.  
• Use FHU unit pricing, $30,000/mile, to calculate mitigation costs. | Not Applicable |
| Concrete Pavement Methodology | • Use proportional ESALs to determine reduction in service life (i.e., % of use), multiply that percentage by the cost to reconstruct ($580,000/lane/mile, 12-inch depth). | Not Applicable |
| **Safety Mitigation Methodology** | • Improve/widen shoulders, as necessary to provide bike lanes on road segments with designated bike routes.  
• Use FHU unit pricing ($23,000/mile, per foot of width added, plus $3,000/mile, per foot of pavement removed to construct) to estimate mitigation cost. | Applicable to the segment of the route using 156th Ave |
| **Unpaved Road Impact Methodology** | • Pave roads if VPD threshold is exceeded, account for added maintenance and rehabilitation costs.  
• Use FHU unit pricing ($23,000/mile, per foot of width paved; increased gravel maintenance costs) to estimate mitigation cost. | Assume Not Applicable |

While 144th Ave is Gravel road maintained by the County, it is not a throughway at this time, and as such the VPD threshold is very unlikely to be met.
Haul Route Specifics

- **152nd Ave**
  - Rural Arterial
  - 0.73 miles, 24ft wide
  - Asphalt Paved, 2 lane road
  - PCI Rating = Good
  - Designated bike route, but current shoulder width is insufficient

- **Picadilly Road**
  - Rural Arterial
  - 1.0 miles, 24ft wide
  - Asphalt Paved, 2 lane road
  - PCI Rating = Good
  - Not a bike route

- **144th Ave**
  - Section Line Arterial
  - 0.25 miles, 24ft wide
  - Gravel maintained, 2 lane road
### Traffic Considerations – Warbler Pad
(Using Extraction’s Trip and CDOT LEF Assumptions)

<table>
<thead>
<tr>
<th>Development Stage</th>
<th>Activity</th>
<th>Trip Generation</th>
<th>Flexible Pavement Loading Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Trips</td>
<td>Duration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy Light Days Heavy Light</td>
<td></td>
</tr>
<tr>
<td>Pad Construction</td>
<td>Pad and Road Construction</td>
<td>220 200 20</td>
<td>11.0 10.0</td>
</tr>
<tr>
<td>Facility Construction</td>
<td>Facility Construction</td>
<td>170 600 60</td>
<td>2.8 10.0</td>
</tr>
<tr>
<td>Drilling</td>
<td>Surface Rig</td>
<td>484</td>
<td>1.9 36.0</td>
</tr>
<tr>
<td></td>
<td>Drilling Rig</td>
<td>100</td>
<td>0.4 36.0</td>
</tr>
<tr>
<td></td>
<td>Drilling Fluid &amp; Materials</td>
<td>1,584</td>
<td>6.1 36.0</td>
</tr>
<tr>
<td></td>
<td>Drilling Equipment (casing, drill pipe, etc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion Operations</td>
<td>Completion Equipment</td>
<td>86</td>
<td>0.4 8.9</td>
</tr>
<tr>
<td></td>
<td>Completion Fluids &amp; Materials</td>
<td>550</td>
<td>2.8 8.9</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>7,848</td>
<td>39.6 8.9</td>
</tr>
<tr>
<td></td>
<td>Gel &amp; Fuel Loads</td>
<td>550</td>
<td>2.8 8.9</td>
</tr>
<tr>
<td></td>
<td>Flowback water disposal</td>
<td>2,640</td>
<td>31.3 20.9</td>
</tr>
<tr>
<td></td>
<td>Mill Out/Tubing Equipment</td>
<td>602</td>
<td>7.1 20.9</td>
</tr>
<tr>
<td>Flowback</td>
<td>Flowback (on production)</td>
<td>33</td>
<td>1.3 8.0</td>
</tr>
</tbody>
</table>

Development Phase Totals: 14,867 Heavy, 13,921 Light, 649 Days, Average/Day: 22.9 Heavy, 21.5 Light
Per Well Totals: 676 Heavy, 633 Light, 30 Days

- 28,696 ESALs will be used for study/calculation
- Notably this is approx. 5,600 ESAL less than what FHU’s trip numbers would be (34,285 ESAL)
- Scenario without Product Pipeline is provided for comparison purposes

FHU’s Production Phase Trip Assumptions

<table>
<thead>
<tr>
<th>Trip Generation</th>
<th>Flexible Pavement Loading Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Trips</td>
<td>Duration</td>
</tr>
<tr>
<td>Heavy Light Days Heavy Light</td>
<td></td>
</tr>
<tr>
<td>10 Year Production Phase Totals</td>
<td></td>
</tr>
<tr>
<td>Without Product Pipeline</td>
<td>16,060</td>
</tr>
<tr>
<td>With Product Pipeline</td>
<td>11,484</td>
</tr>
</tbody>
</table>

Combined Development and Production Phase Totals
- Freshwater Pipelines, without Product Pipeline: 33,670
- Freshwater Pipelines, with Product Pipeline: 28,696
## Determination of Overlay Thickness

### Eqn 1. AASHTO Design Equation

\[
\log_{10}(W_{18}) = Z_r * S_0 + 9.36 * \log_{10}(SN + 1) - 0.2 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2 - 1.5}\right)}{0.40 + \frac{1094}{(SN + 1)^{5.19}}} + 2.32 * \log_{10}(M_r) - 8.07
\]

Where:
- \(W_{18}\) = Predicted Number of 80kN ESALs
- \(Z_r\) = The Standard Normal Deviate
- \(S_0\) = Standard Deviation
- \(SN\) = Structural Number
- \(\Delta PSI\) = Serviceable Life
- \(M_r\) = Subgrade Resilient Modulus

### Scenario 1
(FW Pipelines Only)

<table>
<thead>
<tr>
<th>Assumed ESALs</th>
<th>Assumed (M_r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33,670</td>
<td>3,500</td>
</tr>
<tr>
<td>28,696</td>
<td>20,000</td>
</tr>
</tbody>
</table>

### Equation 2

Required Overlay Thickness = \(\frac{SN_{\text{Deficiency}}}{S_0}\)

<table>
<thead>
<tr>
<th>Adams County Road Classification</th>
<th>Design ESAL</th>
<th>Reliability</th>
<th>Standard Normal Deviate (Zr)</th>
<th>Resilient Modulus (Mr), psi</th>
<th>Initial Serviceability</th>
<th>Terminal Serviceability</th>
<th>Standard Deviation, Asphalt, (S_0)</th>
<th>Standard Deviation, Concrete, (S_0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterial</td>
<td>1,825,000</td>
<td>0.95</td>
<td>-1.645</td>
<td>3,500</td>
<td>4.5</td>
<td>2.5</td>
<td>0.44</td>
<td>0.35</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>1,460,000</td>
<td>0.9</td>
<td>-1.282</td>
<td>3,500</td>
<td>4.5</td>
<td>2.5</td>
<td>0.44</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>Rural Arterial</strong></td>
<td><strong>1,460,000</strong></td>
<td><strong>0.9</strong></td>
<td><strong>-1.282</strong></td>
<td><strong>3,500</strong></td>
<td><strong>4.5</strong></td>
<td><strong>2.5</strong></td>
<td><strong>0.44</strong></td>
<td><strong>0.35</strong></td>
</tr>
<tr>
<td>Collector</td>
<td>730,000</td>
<td>0.85</td>
<td>-1.037</td>
<td>3,500</td>
<td>4.5</td>
<td>2.5</td>
<td>0.44</td>
<td>0.35</td>
</tr>
<tr>
<td>Section Line Arterial</td>
<td>730,000</td>
<td>0.85</td>
<td>-1.037</td>
<td>3,500</td>
<td>4.5</td>
<td>2.5</td>
<td>0.44</td>
<td>0.35</td>
</tr>
<tr>
<td>Local</td>
<td>73,000</td>
<td>0.8</td>
<td>-0.841</td>
<td>3,500</td>
<td>4.5</td>
<td>2</td>
<td>0.44</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Overlay thickness will vary depending on applied ESALs, and \(M_r\) assumption used.
**Resilient Modulus – What’s Typical?**

<table>
<thead>
<tr>
<th>Material Classification</th>
<th>$M_R$ Range (psi)</th>
<th>Typical $M_R$ (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO Soil Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-1-a</td>
<td>38,500 - 42,000</td>
<td>40,000</td>
</tr>
<tr>
<td>A-1-b</td>
<td>35,500 - 40,000</td>
<td>38,000</td>
</tr>
<tr>
<td>A-2-4</td>
<td>28,000 - 37,500</td>
<td>32,000</td>
</tr>
<tr>
<td>A-2-5</td>
<td>24,000 - 33,000</td>
<td>28,000</td>
</tr>
<tr>
<td>A-2-6</td>
<td>21,500 - 31,000</td>
<td>26,000</td>
</tr>
<tr>
<td>A-2-7</td>
<td>21,500 - 28,000</td>
<td>24,000</td>
</tr>
<tr>
<td>A-3</td>
<td>24,500 - 35,500</td>
<td>29,000</td>
</tr>
<tr>
<td>A-4</td>
<td>21,500 - 29,000</td>
<td>24,000</td>
</tr>
<tr>
<td>A-5</td>
<td>17,000 - 25,500</td>
<td>20,000</td>
</tr>
<tr>
<td>A-6</td>
<td>13,500 - 24,000</td>
<td>17,000</td>
</tr>
<tr>
<td>A-7-5</td>
<td>8,000 - 17,500</td>
<td>12,000</td>
</tr>
<tr>
<td>A-7-6</td>
<td>5,000 - 13,500</td>
<td>8,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material Classification</th>
<th>$M_R$ Range (psi)</th>
<th>Typical $M_R$ (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USCS Soil Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GW</td>
<td>39,500 - 42,000</td>
<td>41,000</td>
</tr>
<tr>
<td>GP</td>
<td>35,500 - 40,000</td>
<td>38,000</td>
</tr>
<tr>
<td>GM</td>
<td>33,000 - 42,000</td>
<td>38,500</td>
</tr>
<tr>
<td>GC</td>
<td>24,000 - 37,500</td>
<td>31,000</td>
</tr>
<tr>
<td>GW-GM</td>
<td>35,500 - 40,500</td>
<td>38,500</td>
</tr>
<tr>
<td>GP-GM</td>
<td>31,000 - 40,000</td>
<td>36,000</td>
</tr>
<tr>
<td>GW-GC</td>
<td>28,000 - 40,000</td>
<td>34,500</td>
</tr>
<tr>
<td>GP-GC</td>
<td>28,000 - 39,000</td>
<td>34,000</td>
</tr>
<tr>
<td>SW</td>
<td>28,000 - 37,500</td>
<td>32,000</td>
</tr>
<tr>
<td>SP</td>
<td>24,000 - 33,000</td>
<td>28,000</td>
</tr>
<tr>
<td>SM</td>
<td>28,000 - 37,500</td>
<td>32,000</td>
</tr>
<tr>
<td>SC</td>
<td>21,500 - 28,000</td>
<td>24,000</td>
</tr>
<tr>
<td>SW-SM</td>
<td>24,000 - 33,000</td>
<td>28,000</td>
</tr>
<tr>
<td>SP-SM</td>
<td>24,000 - 33,000</td>
<td>28,000</td>
</tr>
<tr>
<td>SW-SC</td>
<td>21,500 - 31,000</td>
<td>25,500</td>
</tr>
<tr>
<td>SP-SC</td>
<td>21,500 - 31,000</td>
<td>25,500</td>
</tr>
<tr>
<td>ML</td>
<td>17,000 - 25,500</td>
<td>20,000</td>
</tr>
<tr>
<td>CL</td>
<td>13,500 - 24,000</td>
<td>17,000</td>
</tr>
<tr>
<td>MH</td>
<td>8,000 - 17,500</td>
<td>11,500</td>
</tr>
<tr>
<td>CH</td>
<td>5,000 - 13,500</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Default $M_R$ values for unbound granular and subgrade materials at unsoaked optimum moisture content and density conditions (NCHRP 1-37A, 2004)

- FHU’s study assumed 3,500 psi, which is highly unlikely
- 10,000 psi is a more reasonable worst case
- 15,000 to 25,000 psi is more probable considering existing PCI rating is “Good”
- Could be as high as 35,000 psi
Developing a Trip-Based Proportional Factor
Multi-Modal Safety Considerations

At most, Extraction should only be responsible for a portion of any shoulder improvement costs

- Per the County 2012 Transportation Plan, the segment of 152nd Ave between I-76 and Picadilly Road had average daily traffic volume of 5,000 VPD
  - Applying a 3% compounded growth rate to the 5,000 VPD
  - Estimate the current baseline traffic volume is approximately 6,150 VPD in 2019

- Over the next 10 years...
  - 10 years is the timeline basis used in FHU’s study
  - Ongoing growth rate of 3% to the 6,150 VPD
  - 72,610 total non O&G vehicle trips on this segment of 152nd Ave between 2019 and 2029

- Arguably, these factors could be 3-5% lower, considering:
  - Shoulders will last up to 20 years
  - Baseline traffic will continue to grow in years 10-20, whereas XOG’s traffic will decline
  - Other O&G development may access same portion of 152nd Ave

\[
\text{Trip Factor} = \frac{\text{Production Phase Trips}}{\text{Combined Trips}} \times 100\%
\]

<table>
<thead>
<tr>
<th>Scenario 1 (No Product Pipeline)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2019 to 2029</strong></td>
<td></td>
</tr>
<tr>
<td>Baseline Traffic Volume, 10yr period:</td>
<td>72,610</td>
</tr>
<tr>
<td>XOG Production Phase Trips:</td>
<td>19,710</td>
</tr>
<tr>
<td>Combined Traffic:</td>
<td>92,320</td>
</tr>
<tr>
<td>Trip Proportionality Factor:</td>
<td>21.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2 (With Product Pipeline)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2019 to 2029</strong></td>
<td></td>
</tr>
<tr>
<td>Baseline Traffic Volume, 10yr period:</td>
<td>72,610</td>
</tr>
<tr>
<td>XOG Production Phase Trips:</td>
<td>15,134</td>
</tr>
<tr>
<td>Combined Traffic:</td>
<td>87,744</td>
</tr>
<tr>
<td>Trip Proportionality Factor:</td>
<td>17.2%</td>
</tr>
</tbody>
</table>
Two Development Scenarios were evaluated

- **Scenario 1 (For Comparison)**
  - XOG Trip Estimates for 22 well, enhanced frac/completion
  - Freshwater Pipelines during Development
  - No Product Pipeline

- **Scenario 2 (Likely)**
  - XOG Trip Estimates for 22 well, enhanced frac/completion
  - Freshwater Pipelines during Development
  - Product Pipeline during Production

### Key Assumptions

- **Scenario 1**
  - 33,670 Total ESALs
  - 19,710 Production Phase Trips
  - Mr = 20,000 psi

- **Scenario 2**
  - 28,696 Total ESALs
  - 15,134 Production Phase Trips
  - Mr = 20,000 psi
# Scenario Fee Calculations

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Road Segments</th>
<th>Scenario 1 (Freshwater Pipelines Only)</th>
<th>Scenario 2 (Freshwater &amp; Product Pipelines)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>152nd Ave</td>
<td>Picadilly Road</td>
<td>152nd Ave</td>
</tr>
<tr>
<td>Length (ft)</td>
<td>3,854</td>
<td>5,280</td>
<td>3,854</td>
</tr>
<tr>
<td>Width (ft)</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Area (sqft)</td>
<td>92,506</td>
<td>126,720</td>
<td>92,506</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>126,720</td>
</tr>
<tr>
<td>Road Class.</td>
<td>Rural Arterial</td>
<td>Rural Arterial</td>
<td>Rural Arterial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rural Arterial</td>
</tr>
<tr>
<td>ESALs (W&lt;sub&gt;18&lt;/sub&gt;):</td>
<td>33,670</td>
<td>33,670</td>
<td>28,696</td>
</tr>
<tr>
<td>$Z_i$:</td>
<td>-1.28</td>
<td>0.00</td>
<td>-1.28</td>
</tr>
<tr>
<td>$S_0$:</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>DPSI:</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>$M_r$:</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Required SN:</td>
<td>1.30</td>
<td>1.30</td>
<td>1.14</td>
</tr>
<tr>
<td>HMA Thickness (inches):</td>
<td>2.96</td>
<td>2.96</td>
<td>2.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.59</td>
</tr>
<tr>
<td>Overlay Volume (ft&lt;sup&gt;3&lt;/sup&gt;):</td>
<td>22,818</td>
<td>31,258</td>
<td>19,966</td>
</tr>
<tr>
<td>Overlay Density (lb/ft&lt;sup&gt;3&lt;/sup&gt;):</td>
<td>145</td>
<td>146</td>
<td>145</td>
</tr>
<tr>
<td>Overlay Quantity (tons):</td>
<td>1,654</td>
<td>2,282</td>
<td>1,448</td>
</tr>
<tr>
<td>Unit Price ($/ton):</td>
<td>$85</td>
<td>$85</td>
<td>$85</td>
</tr>
<tr>
<td>Overlay Cost (by segment):</td>
<td>$140,616</td>
<td>$193,953</td>
<td>$123,039</td>
</tr>
<tr>
<td><strong>Total Cost (all segments)</strong>:</td>
<td><strong>$334,570</strong></td>
<td><strong>$292,748</strong></td>
<td><strong>$334,570</strong></td>
</tr>
</tbody>
</table>

### Shoulder Method

<table>
<thead>
<tr>
<th></th>
<th>152nd Ave</th>
<th>Picadilly Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Traffic Trips (2019-2029):</td>
<td>72,610</td>
<td>72,610</td>
</tr>
<tr>
<td>Production Phase Trips (2019-2029):</td>
<td>19,710</td>
<td>15,134</td>
</tr>
<tr>
<td>Total Vehicle Trips (2019-2029):</td>
<td>92,320</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Trip Proportionality Factor:</td>
<td>21.3%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Shoulder Improvement Costs (6ft added):</td>
<td>$119,720</td>
<td>$119,720</td>
</tr>
<tr>
<td>Extraction's Proportional Shoulder Cost:</td>
<td><strong>$25,560</strong></td>
<td><strong>$20,649</strong></td>
</tr>
</tbody>
</table>

### Independent Study, Combined Impact Cost:

- Cost per Well: $16,370/well
  - **$14,245/well**
Independent Study Fee determination for the proposed Warbler development, assuming both Freshwater and Product Pipelines is $313,397.

If no product pipeline is used, the fee would be $360,129.

Both options result in a calculated fee that is lower than the existing fee structure.
Emergency Action Plan

Warbler Pad

Location: 0.87 mi NE of 144th and Picadilly Rd
Lease Road Entrance: N 39.958061, W 104.721676

Extraction Emergency Hotline: 720-370-5540

Note: This site specific EAP is intended for use only from the drilling to completion phases. Once turned over to production, please refer to Extraction's Master Emergency Response Plan for reference.

Notice: Any printed copy of this Emergency Action Plan is considered an unofficial version at the time of printing. The official version of this document may be found on the Extraction Oil & Gas internal website. For information on how to obtain an official copy, please contact the appropriate Extraction Oil & Gas official.

Version: 0.3
Effective Date: 3/19/2019
1.0 MAPS ....................................................................................................................................................... 3
  1.1 TACTICAL OVERVIEW MAP ................................................................................................................3
  1.2 RECEPTORS MAP .................................................................................................................................. 4
2.0 INCIDENT TACTICS .................................................................................................................................... 5
  2.1 SHELTER IN PLACE ................................................................................................................................ 6
  2.2 SPILLS .................................................................................................................................................... 7
  2.3 FIRES ..................................................................................................................................................... 8
  2.4 NATURAL DISASTERS ........................................................................................................................... 9
    Tornado ..................................................................................................................................................... 9
    Winter Storm .......................................................................................................................................... 9
    Earthquake .......................................................................................................................................... 10
    Flooding ................................................................................................................................................. 10
3.0 PLAN OVERVIEW .................................................................................................................................... 11
  3.1 Emergency Preparedness Plan ................................................................................................................ 11
  3.2 General Information ............................................................................................................................. 11

Plan Approved By

<table>
<thead>
<tr>
<th>Organization</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INCIDENT TACTICS

FIRE
- Notify appropriate on-site and off-site personnel
- Locate and shut off source as soon as possible if safe to do so
- Isolate all potential ignition sources
- Disconnect utilities and equipment if safe to do so
- If fire is spreading, leave area immediately and assemble at muster point
- Perform head count of personnel and determine need for rescue
- Establish perimeter and consider air monitoring needs

SPILLS
- Evaluate personal safety
- Identify product and hazard(s) of released material (refer to SDS)
- Shut off all ignition sources
- Establish site control
- Consider evacuations and facility shut-in
- Environmental manager may implement air monitoring program
- Assess environmental and off-site impact
- Construct additional containment berms
- Conduct recovery operations

NATURAL DISASTERS
- Operations Foreman may decide to initiate facility shut-in
- If outside, move away from process areas, product storage, or other areas where release of hazardous materials may be possible
- Take cover under desk, near load bearing walls, or away from exterior walls and windows
- Avoid areas prone to flooding
- Consider replacing hydrocarbon-containing liquids with clean water

SHELTER IN PLACE
- Take immediate shelter in readily accessible location
- Close all doors, windows and vents
- Shut off ventilation/HVAC systems
- Seal doors and windows with damp towels or duct tape
- Go to interior room without windows
- Keep radio or phone nearby; charge cell phone if possible
- If in vehicle, turn off ventilation system and drive to nearest public building or familiar structure. If vehicle is in a remote location, turn off engine and seal vents with duct tape
2.1 SHELTER IN PLACE

When hazardous materials are released into the atmosphere, a “Shelter in Place” order is issued. This is a short-term safety procedure that reduces potential exposure to airborne chemical hazards during a release or fire.

- Listen for “All-Call” telephone calls, Emergency Alert System (EAS) broadcasts on the radio or television, outdoor warning sirens or horns, news media announcements, or NOAA Weather Radio alerts
- Take immediate shelter in a readily accessible location
- Close all doors, windows, and vents
- Shut off all ventilation/HVAC systems
- Close fireplace damper if present
- Seal doors and windows with damp towels or plastic sheeting and adhesive/duct tape
- Gather emergency supplies such as food, bottled water, first aid supplies, and flashlights
- Go to interior room without windows that is above ground level
- Keep radio or phone nearby to call emergency contact in case of life-threatening condition
- Charge cellphone if possible
- If you are in your vehicle, go to your residence, place of work, or a nearby public building
- If you are in a vehicle in a remote location, stop under a bridge or in a shaded area and turn off the engine
- Seal the heating/air conditioning vents with duct tape
- Listen to radio regularly for updates
- Stay where you are until “Shelter in Place” order is lifted
2.2 SPILLS

Designated Extraction field personnel are to conduct routine inspections of facilities and equipment to ensure proper operation and reduce the potential for a spill incident. In the event of a spill or release at a facility, immediate response and reporting is required. Failure to do so may increase the environmental impact and/or property damage, and subject Extraction to fines and enforcement actions. Depending on the size of the spill, on-site personnel can take certain actions to reduce the potential impact of a spill. The response strategy should be to confine spills to tanks or vessels, locate the leading edge of the spilled material, contain the spill to the ground and to drainage ways, recover spilled materials, and dispose of recovered materials properly.

- Identify the incident level. Refer to the notification flow chart in section 4.1 of the Extraction ERP for notification procedures based on incident level
- Evaluate personal safety
- Identify product and hazard(s) of spilled/released material
- Shut off all ignition sources – no open flames, no smoking, no unapproved hot work
- Establish site control (safe perimeter and security)
- If deemed necessary, foreman/supervisor will ensure safe evacuation of all personnel and will perform accountability check
- Establish transportation restrictions
- Environmental supervisor will implement initial air monitoring program
- The operations foreman must consider a facility shut-in
- Initiate temporary repairs to stop the leak
- Assess environmental and off-site impact
- Contact qualified response contractors
- Construct additional containment berms around the facility
- Take additional measures to protect the community ditch to the northwest and southeast with sorbent berms downstream
- Conduct recovery operations
- Retrieve detailed information regarding spill/release
- Survey spill/release site for dimensions and impacts
- Develop waste disposal plan and provide SDS to appropriate organizations and contractors
2.3 FIRES

Oil well fires can result from human actions, such as accidents or arson, or natural events such as lightning. Good workplace housekeeping practices, regular machinery maintenance, proper chemical storage, and designating smoking areas are effective strategies to reduce the chance of a fire-related incident. Although infrequent, wells have been known to lose pressure balance during drilling operations, which could result in a well control incident and the potential for a fire. Well fires can be extinguished in several ways, though large fires must be approached only by firefighters and designated well control personnel. If deemed safe by managers, on-site personnel may attempt to extinguish small fires to prevent the spread of flames to chemical storage containers, assets, or well structures using appropriate fire-extinguishers or other dry-chemical fire suppression agents such as Purple K.

- Activate the fire alarm
- Foreman/supervisor will notify local fire department if necessary
- Upon arrival of Fire Department, a Foreman/Supervisor will serve as liaison for the duration of the incident
- Locate and shut off/remove the source as soon as possible if safe to do so
- Isolate all potential ignition sources
- If it can be done safely and the source has been shut off, attempt to extinguish the fire
- Fight the fire with wind at your back
- Use appropriate fire extinguisher
- If fire is beyond the site's ability to extinguish or control, leave the area immediately and assemble at the designated muster point (see Tactical Overview Map 1.1)
- Disconnect utilities and equipment if safe to do so
- Perform head count of personnel and determine need for rescue of missing personnel
- Contain any potential runoff resulting from firefighting efforts
- Environmental supervisor may implement initial air monitoring program and establish site control
2.4 NATURAL DISASTERS

Tornado
- Tornado season is generally from March to August
- Be aware of pre-designated shelters
- Operations Foreman will decide whether or not to initiate facility shut-in
- Secure outside equipment that can be blown away
- If indoors, move to the interior away from windows at the lowest level
- Shelter in closet, bathroom, safe room, basement, or storm shelter

Winter Storm
- Prior to a storm, ensure that vehicles are equipped with emergency kits (tire changing tools, fuses, tow chain, sand, flares, booster cables, etc.), store food (energy bars, preserved fruit, etc.) and store blankets/cold weather gear
- During the winter storm season, the manager, with the help of the foremen/supervisors will monitor weather forecasts and notify field personnel via 2-way radio or cell phone of a winter storm watch or warning
- If a winter storm strikes and storm severity warrants field evacuation, all personnel will report to the Field Office for a head count. The Superintendent will ensure that all persons are accounted for prior to closing down operations. Individuals traveling to their residence will telephone and notify the on-duty foreman/supervisor of their safe arrival home
- In the event an individual becomes stranded in the field or on the road, he/she is urged to stay with their vehicle and follow winter survival rules until the storm abates or help arrives
- After the storm abates, facilities will be checked with the aid of four-wheel drive vehicles. All personnel shall maintain 2-way radio or cell phone communication with the office when in the field during or immediately after a storm
NATURAL DISASTERS (CONTINUED)

Earthquake
- Colorado is considered a region of minor earthquake activity. Most seismic activity on record occurred west of the Rocky Mountain Front Range
- Stay in general work area if safe
- If you smell gas or chemical fumes, notify foreman who will consider facility shut-in/down
- Isolate ignition sources
- If outdoors, do not take shelter in a building
- Take cover under desk or other heavy furniture, in doorways (watch for closing doors), or against load-bearing walls
- Move away from exterior walls and windows
- If evacuation order is issued by foreman/supervisor, personnel will assemble at the designated muster point (see Tactical Overview Map 1.1)
- Evacuate only after shaking has stopped
- Do not use elevators
- If in an elevator, use the emergency phone in the elevator to alert someone of your situation
- Move away from buildings, trees, utility wires, and posts
- Go to an open area and stay alert
- If in a vehicle, stop safely as soon as possible and remain in the vehicle
- Avoid stopping near buildings, trees, overpasses, or utility wires
- Avoid bridges, ramps, or roads that may have sustained damage
- Be prepared for aftershocks
- Watch for overhead and falling hazards

Flooding
- Per Federal Emergency Management Agency (FEMA) data, the Facility does not fall in 100 year flood plain
- Operations Foreman will utilize FEMA, United States Geological Survey, National Oceanic and Atmospheric Administration, and National Weather Service to monitor potential flood events
- Be prepared to activate Extraction Flood Response Plan (Rule 603.h requirement)
- Know the difference between a flood advisory, flood watch, flood warning, and flash flood warning
- If Flood Response Plan is activated, facility will be shut-in/down
- Hydrocarbon-containing liquids may be removed from the facility or replaced with clean water
- Consider total storage capacity and proximity to water ways
- Following a flood event, flood waters will be removed, facility will be inspected, damage will be documented, then production will be resumed if deemed safe
3.0 PLAN OVERVIEW

3.1 EMERGENCY PREPAREDNESS PLAN

Extraction creates and maintains an emergency response plan and an emergency preparedness plan, known as an Emergency Action Plan (EAP), for all Adams County locations. The EAP specific to the Warbler Pad location will be provided to and reviewed with the Adams County Emergency Management (EM) and Brighton Fire Protection District. The EAP includes response objectives that span all phases of the operation which details efforts for potential situations for response efforts. The EAP is kept at Extraction’s office and a copy is provided to the local fire department. Extraction lease operators carry a copy of the EAP summary card with them and copies of the summary card is provided to the local fire department to be kept in the responding fire apparatus.

3.2 GENERAL INFORMATION

The Warbler Pad is a production facility that has eight 400 crude oil storage tanks and two 400 water storage tanks located within a lined secondary containment structure. The Warbler Pad Emergency Action Plan (EAP) is designed to provide Extraction employees at the Warbler Pad in Adams County, CO with the information necessary to prepare for and respond to incidents in a safe, rapid, effective, and efficient manner. For purposes of this EAP, incidents are defined as events that occur at or near the facility that create unacceptable impacts on people, the environment, or property, and require emergency response operations. The primary goal of this document is to help the company prevent from incurring, as far as practical, any injury or loss of life, damage to property, or damage to the environment. The health and safety of the public, first responders, Extraction employees, and contractors will always be the primary objective of this plan.

In the event of an incident, site managers will consider implementing emergency shutdown procedures depending on the scope of the incident and the capabilities of the on-site personnel. It is important to limit the scope of a release or a fire by shutting off the source and by isolating all potential ignition sources. The foreman/supervisor is responsible for ensuring the safe evacuation of all personnel and for performing an accountability check at one of the designated muster points and to initiate incident command. The incident command may decide to implement an initial air monitoring program depending on the type of incident; an evacuation of nearby residences and nearby businesses also should be considered. It is important that incident details and actions are documented following company procedures as well as NIMS protocols. These, in addition to the appropriate forms, can be found in the Extraction’s Master Emergency Response Plan.

Changing conditions such as wind direction, road closures, and flooding may require deviations from this plan. It is the responsibility of emergency response personnel to be trained in tactical and emergency response procedures and to be able to make adjustments to the plan as needed.
Warbler Pad
Adams County
Address: 0.87mi NE 144th and Picadilly Rd.
Well heads: N 39.96156, W 104.720403
Lease Road Entrance: N 39.958061,
W 104.721676

NOTIFICATIONS
1. Extraction 24-hour Hotline
   720-370-5540
2. National Response Center
   800-424-8802
3. Colorado Oil and Gas Commission Field
   Supervisors
   719-343-0130, 970-573-1277
4. EPA Region VIII
   303-312-6312
5. Adams County Communications
   303-288-1535
6. Adams County OEM
   720-523-8600
7. Colorado Oil and Gas Conservation
   Commission
   303-894-2100
8. Colorado Dept of Public Health and
   Environment
   877-518-5608

RESPONSE OBJECTIVES
Ensure safety of the public, first responders, Extraction employees, and contractors. Minimize
the impact to the environment and local community. Contain and recover released products to the
extent possible

CRITICAL RECEPTORS
1. Nearby irrigation ditches
2. Surrounding agriculture land

Note: This Emergency Action Card is a reference tool and is intended
to provide guidance during an actual event or exercise only during the
drilling through completion phases, once past turned over to production
refer to Extraction's Master Emergency Response Plan. Placement
of resources may need to be adjusted according to environmental variables.
It is the responsibility of emergency response personnel to be trained in
response and to be able to make adjustments to the
card as needed

Developed by Quandyary Consultants
2/5/2019
TACTICAL RESPONSE

After assessing the incident level and contacting the appropriate parties, the following steps will need to be taken for the tactical response:

1. Implement National Incident Management System (NIMS) Incident Command System (ICS)
2. Assess hazards to site, workers, and public
3. Safety Officer should complete form ICS 208 – Safety Message/Plan
4. Conduct Job Safety Briefing
5. Assess property and environmental impacts
6. Develop ICS 201 Incident Briefing and ICS 202 – Incident Objectives
7. Implement response actions:
   a) Confine spills to tanks/vessels
   b) Locate leading edge of spilled material
   c) Contain spills on ground and any surrounding drainage ways
   d) Recover spilled materials
   e) Dispose of recovered materials properly
8. Document site conditions and activities
9. Document impacts to natural, economic, and cultural resources
10. Document site restoration/remediation activities

See the Extraction’s Master Emergency Response Plan for the full list of NIMS ICS Forms.

PAD STATS

WELL PAD LIQUID STORAGE

<table>
<thead>
<tr>
<th>Oil (BBL)</th>
<th>Water (BBL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

RESPONSE RESOURCE CONTACT INFORMATION

EXTRACTION OIL & GAS CONTACT INFORMATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Main Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-Hour Hotline</td>
<td>720-370-5540</td>
</tr>
</tbody>
</table>

NEAREST LEVEL II TRAUMA CENTERS

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>24-Hour Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Center of Aurora</td>
<td>1501 S Potomac St</td>
<td>303-695-2600</td>
</tr>
<tr>
<td>Good Samaritan Medical Center</td>
<td>200 Exempla Circle</td>
<td>303-689-4000</td>
</tr>
</tbody>
</table>

STATE, FEDERAL, MUNICIPAL EMERGENCY RESPONDERS

<table>
<thead>
<tr>
<th>Name</th>
<th>24-Hour Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams County Communications</td>
<td>303-288-1535</td>
</tr>
<tr>
<td>Adams County OEM</td>
<td>720-523-6600</td>
</tr>
<tr>
<td>Adams County Sheriff’s Office</td>
<td>720-322-1313</td>
</tr>
<tr>
<td>Brighton Fire Protection District</td>
<td>911</td>
</tr>
<tr>
<td>National Response Center</td>
<td>800-424-8802</td>
</tr>
<tr>
<td>Colorado Oil and Gas Conservation Commission Field Supervisors</td>
<td>719-343-0130, 970-573-1277</td>
</tr>
<tr>
<td>EPA Region 8</td>
<td>303-312-6312</td>
</tr>
<tr>
<td>Department of Transportation</td>
<td>855-368-4200</td>
</tr>
</tbody>
</table>

RESPONSE CONTRACTORS

<table>
<thead>
<tr>
<th>Contractor Type</th>
<th>Name</th>
<th>24-Hour Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSRO</td>
<td>Belfor Environmental</td>
<td>800-930-0011, 303-425-7526</td>
</tr>
<tr>
<td>OSRO</td>
<td>Custom Environmental</td>
<td>800-310-7445, 303-423-9949</td>
</tr>
<tr>
<td>Well Control</td>
<td>Boots &amp; Coots</td>
<td>281-931-8884, 800-BLOWOUT</td>
</tr>
<tr>
<td>Well Control</td>
<td>Wild Well</td>
<td>281-784-4700, 281-784-4700</td>
</tr>
<tr>
<td>Environmental</td>
<td>CTEH, LLC</td>
<td>866-869-2834, 307-399-2870</td>
</tr>
<tr>
<td>Environmental</td>
<td>APEX COMPANIES, LLC</td>
<td>720-215-4720, 307-399-2870</td>
</tr>
<tr>
<td>Response Management</td>
<td>CTEH, LLC</td>
<td>866-869-2834, 866-869-2834</td>
</tr>
</tbody>
</table>

RESPONSE OBJECTIVES

Ensure safety of the public, first responders, Extraction employees, and contractors. Minimize the impact to the environment and local community. Contain and recover released product to the extent possible. The following response objective checklist shall be followed:

SAFETY – PROTECT LIFE

- Evaluate and account for all personnel
- Isolate all potential ignition sources
- Initiate emergency services immediately, as needed (911, Fire, LEP)
- Identify hazard(s) of emitted material (obtain SDS)
- Establish site control (safe perimeter and evacuation routes)
- Monitor air in impacted areas
- Develop Site Safety Plan (ICS 208) and Medical Plan
- Continually assess site hazards and risks

RESPONSE – INCIDENT STABILIZATION

- Conduct notifications to external agencies and internal personnel
- Assign on site liaison to Fire Department incident commander
- Identify and implement staging areas to support response operations
- Activate response company for equipment and manpower as needed
- Activate response tactics to contain and recover product/material
- Establish command post and field communications
- Establish flight traffic restriction if required
- Implement waste handling and disposal procedures as required
- Initiate decontamination and demobilization procedures when appropriate

ENVIRONMENTAL – PROTECT THE ENVIRONMENT

- Identify, prioritize, and protect environmentally sensitive areas
- Establish wildlife rescue rehabilitation operations if required
- Verify release if waters are impacted
- Conduct visual assessments (spill tracking and surveillance)
April 2, 2019

Cody Russell
Safety Representative
Extraction Oil and Gas

Subject: Will Serve Letter

Project: Warbler Well Pad
Location: Latitude/Longitude location 39.958061, -104.721676; .87 miles northeast on 144th and Picadilly Road

To Whom It May Concern:

The above named project is within the boundaries of the Brighton Fire Rescue District and will be served by the District. Fire protection and prevention services provided by the District will be according to applicable laws and District rules, regulations, and policies.

Please contact this office if you need further information or have any questions.

Sincerely,

Whitney Even
Fire Marshal
weven@brightonfire.org
Erosion and Sediment Control Plan

for:

Warbler Multi-Well Pad
Parcel # 0156900000161
NE 1/4, Sec 13, T1S, R66W
, Colorado,

Operator(s):

Extraction Oil and Gas, Inc.
Attn: Blake Ford
370 17th Street, Suite 5300
Denver, CO 80202
720-354-4596
bford@extractionog.com

ESC Plan Administrator:

Extraction Oil and Gas, Inc.
Attn: Blake Ford
370 17th Street, Suite 5300
Denver, CO 80202
720-354-4596
bford@extractionog.com

ESC Plan Preparation Date: 02/08/2019
Appendix A-1 of the Stormwater Regulation Guide

Plan Revision:
Docs. #3697430-v3
## Table of Contents

### SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING ................................................................. 5  
1.1 Project/Site Information .............................................................................................................. 5  
1.2 Contact Information/Responsible Parties .................................................................................. 6  
1.3 Nature and Sequence of Construction Activity ........................................................................... 8  
1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns ........................................................... 9  
1.5 Construction Site Estimates ........................................................................................................ 11  
1.6 Receiving Waters ....................................................................................................................... 12  
1.7 Protected Site Features and Sensitive Areas ............................................................................... 13  
1.8 Potential Sources of Pollution .................................................................................................... 14  
1.9 Demolition .................................................................................................................................. 22

### SECTION 2: EROSION AND SEDIMENT CONTROL BMPs ................................................................. 23  
2.1 Minimize Disturbed Area and Protect Natural Features and Soil ............................................... 24  
2.2 Control Stormwater Flowing onto and through the Project ....................................................... 26  
2.3 Stabilize Soils and Protect Slopes .............................................................................................. 30  
2.4 Protect Storm Drain Inlets ......................................................................................................... 38  
2.5 Establish Perimeter Controls and Sediment Barriers .................................................................. 40  
2.6 Retain Sediment On-Site .......................................................................................................... 42  
2.7 Establish Stabilized Construction Exits .................................................................................... 46  
2.8 Additional BMPs ....................................................................................................................... 49

### SECTION 3: CONSTRUCTION SITE PHASING AND SITE MAPS ..................................................... 52  
3.1 Phase BMP Construction Activity ............................................................................................. 53  
3.2 General Notes ........................................................................................................................... 54

### SECTION 4: WASTE MANAGEMENT PLAN ......................................................................................... 56  
4.1 Covering Outdoor Storage and Handling Areas ......................................................................... 57  
4.2 Spill Prevention, Containment and Control ............................................................................... 59  
4.3 Good Housekeeping ............................................................................................................... 64  
4.4 Vehicle Maintenance, Fueling and Storage ............................................................................. 67  
4.5 Street Sweeping and Cleaning .................................................................................................. 70  
4.6 Storm Sewer System Cleaning .................................................................................................. 72

### SECTION 5: STORMWATER INSPECTIONS ......................................................................................... 74  
5.1 Inspections ................................................................................................................................. 74  
5.2 Delegation of Authority ............................................................................................................ 77  
5.3 Recommended Inspection Sequence ......................................................................................... 78  
5.4 Common Compliance Problems During Construction .............................................................. 80

### SECTION 6: RECORDKEEPING ............................................................................................................ 81  
6.1 Recordkeeping .......................................................................................................................... 81

### SECTION 7: FINAL STABILIZATION ................................................................................................. 82  
7.1 Final Construction Site Stabilization ......................................................................................... 82  
7.2 Stormwater Quality Permit Close-out ....................................................................................... 83  
7.3 Permit Closeout Notification ..................................................................................................... 83  
7.4 Removal of Temporary BMPs ................................................................................................... 83  
7.5 Construction Site Stabilization Certification ............................................................................ 83
Appendix A-1 of the Stormwater Regulation Guide

7.6  Stabilization ..........................................................................................................................85

SECTION 8: STORMWATER QUALITY PERMIT VIOLATIONS ..................................................86
8.1  Stormwater Quality Violations ............................................................................................86

SECTION 9: CERTIFICATION AND NOTIFICATION .................................................................87
9.1  Stormwater Quality Regulation Certification .....................................................................87

ESC PLAN APPENDICES .............................................................................................................88
 Appendix 1 – Project Vicinity Map (Section 1.1)
 Appendix 2 – State CDPS Stormwater Construction Permit Certification (Section 1.2)
 Appendix 3 – Pre-disturbance Photos (Section 1.4)
 Appendix 4 – Copy of Demolition Permit and State Asbestos Permit (Section 1.9)
 Appendix 5 – Erosion and Sediment Control BMP Details (Section 1.10)
 Appendix 6 – Erosion and Sediment Control Plan - Site Map (Section 2.10)
 Appendix 7 – Standard Stormwater Quality Inspection Form (Section 5.1)
 Appendix 8 – Delegation of Authority (optional) (Section 5.2)
 Appendix 9 – Completed Stormwater Quality Inspections (Sections 5.3 & 5.5)
 Appendix 10 – Subcontractor Certifications/Agreements (optional) (Section 9.1)

General Instructions:
To fill out the Erosion and Sediment Control Template, select (double right click) the blue text and enter the applicable information.

When a blue box is present, check the applicable selection.

In general, if a section is not applicable to the project, select the blue text and enter not applicable “N/A”.

In section 1.8 always answer “Yes” or “No”; no items shall be left blank!

Note that Appendix 13 – Subcontractor Certifications/Agreement is optional to the permittee.
SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 Project/Site Information

Project/Site Name: Warbler Multi-Well Plan
Project Street/Location: SE/4, Sec 13, T1S, R66W
City: Adams County
State: CO
Subdivision:
County SWQ Permit Number:

*Attach color project vicinity map in Appendix 1 – Project Vicinity Map.*
1.2 Contact Information/Responsible Parties

Instructions:
- List the owners(s) operator(s), project managers, stormwater contact(s), and person or organization that prepared the ESC Plan. Indicate respective responsibilities, where appropriate. To do this, select the blue text by double right clicking then type in the applicable information.
- Place a copy of the State CDPS Stormwater Construction Permit Certification Page in Appendix 2 – State CDPS Stormwater Construction Permit Certification Page.

Owner(s):
Extraction Oil and Gas
370 17th Street, Suite 5300 Denver, CO, 80202
Office #: 720-354-4596
Cell #: 720-354-4596

Site Supervisor(s):
Extraction Oil and Gas
Blake Ford
370 17th Street, Suite 5300
Denver, CO, 80202
Office #: 720-354-4596
Cell #: 970-576-3446 Email Address: bford@extractionog.com

ESC Plan Administrator(s):
Extraction Oil and Gas
Blake Ford
370 17th Street, Suite 5300
Denver, CO, 80202
Office #: 720-354-4596
Cell #: 970-576-3446 Email Address: bford@extractionog.com
Insert ESC Plan Administrator's area of control (if more than one operator at site)
Insert area of control (if more than one operator at site)

This ESC Plan was Prepared by:
Lamp Rynearson
Peter Carlson
4715 Innovation Drive, Ste. 100
Fort Collins, CO 80525
Office #: 970-226-0342 Fax #: 970-226-0879
Appendix A-1 of the Stormwater Regulation Guide

Cell #: 970-305-0426  Email Address: Pete.Carlson@lamprynearson.com

Emergency 24-Hour Contact:
   Extraction Oil and Gas
   Blake Ford
   Office #: 720-354-4596  Cell #: 970-576-3446

State CDPS Stormwater Construction Permit #: COR-03M-013

*Attach a copy of the State CDPS Stormwater Construction Permit Certification Page in Appendix 2 – State CDPS Stormwater Construction Permit Certification.*
1.3 Nature and Sequence of Construction Activity

Instructions:
- Describe the scope of the construction activity at the project site.
- Identify the purpose of the construction activity and include estimated dates construction will begin and commence.
- Describe the sequence for major construction activities at each phase of the construction project.

Describe the project scope of work:
The project includes construction of a well pad and installation of linear infrastructure typical to oil and gas exploration and production.

What is the function of the construction activity (select check box)?
- Residential
- Commercial
- Industrial
- Road Construction
- Linear Utility
- Other (please specify): Oil and gas development

Estimated Project Start Date: 10/01/2020
Estimated Project Completion Date: 05/01/2023
Estimated Project Final Stabilization: 05/01/2023

Describe the major phases of Construction:
Pre-construction Phase including: surveying, locate and mark utilities, mark construction disturbance allowance and access, stormwater control measure identification.
Construction Phase including: access road installation, stormwater control measure installation, top soil striping, stockpiling and land grading, drilling, well completions, production equipment construction, sales/transfer lines installation.
Interim Reclamation Phase including: backfilling and grading, topsoil replacement, re-seeding, monitoring.
1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns

Instructions:
- Describe the existing soil conditions at the construction site including soil type(s), drainage patterns, and other topographic features that might affect erosion and sediment control.
- Describe the pre-disturbance vegetation and include color pre-disturbance photos in Appendix 3 – Pre-Disturbance Photos.
- Note any soil or groundwater contamination evident from existing site features and known past usage of the site.

Soil type(s):
Ascalon sandy loam, 0 to 3 percent runoff, hydrologic soil group B (moderate runoff potential)
Ascalon sandy loam, 3 to 5 percent runoff, hydrologic soil group B (moderate runoff potential)
Vona sandy loam, 3 to 5 percent runoff, hydrologic soil group A (low runoff potential)

Slope(s) - describe current slope and its ratio i.e. 3:1, and note any changes to any of the slopes due to grading or fill activities:
The property is currently undeveloped and consists of moderately dense weeds and grasses. In general, the site has a drainage divide near the middle of the site, sloping westerly and northerly at slopes of approximately 1.0% to 3.0%. The south and southeast corner of the proposed pad will be in a cut utilizing 3:1 slopes from existing grade to the proposed pad grade. The westerly and northerly portion of the proposed pad will be in a fill area utilizing 3:1 slopes from the proposed pad grade to existing grade. Following interim grading (post-development) the site will continue to utilize 3:1 slopes in the cut and fill areas. The pad working grade will be at approximately 0.5%, draining to the north.

Drainage Pattern(s) - describe current drainage patterns and note any changes due to the proposed grading or fill activities:
All the existing drainage on the site sheet flows northerly and westerly, discharging into Neres Canal. The offsite runoff from neighboring properties enter the project site along the southerly and southeasterly boundary of the project site and sheet flows to Neres Canal. Post-development, runoff from the project site flows to the proposed sediment basin/extended detention basin in the northerly portion of the production and drilling pad, before discharging offsite into historical flow patterns.

Vegetation - describe pre-disturbance vegetation and estimate of percent vegetative cover:
The property is currently undeveloped and consists of moderately dense weeds and grasses but is historically irrigated cropland. NA - cropland. When vegetation is used to achieve final stabilization, a uniform vegetative cover will be established with an individual plant density of at least 70 percent the surrounding landscape. Areas developed as stabilized unpaved surfaces, as shown in the interim grading plan, will not be revegetated.
*Attach color pre-disturbance photo in Appendix 3 – Pre-Disturbance Photos.
1.5 Construction Site Estimates

Instructions:
- Estimate the area to be disturbed by excavation, grading, or other construction activities, including dedicated off-site borrow and fill areas, equipment and material storage areas, and staging areas.
- Calculate the percentage of impervious surface area before construction.

The following are estimates of the construction site.

Total project area: 15.4+/- acres
Construction site area to be disturbed: 12.0+/- acres
Area of site that is impervious: 0%
1.6 Receiving Waters

Instructions:
- List the waterbody(s) that would receive stormwater from your site, including streams, rivers, lakes and wetlands. Describe each as clearly as possible, such as: *Clear Creek, a tributary to the South Platte River*, and so on.
- List the jurisdictional storm sewer system or drainage system that stormwater from your site discharges to, such as *Storm sewer system at inlets, culverts and pipes – Adams County MS4*.

Description and name of receiving waters:
*Neres Canal, approximately 7,500 ft. downstream of Barr Lake*

Description and owner’s name of storm sewer system:
*N/A*

Other:
1.7 Protected Site Features and Sensitive Areas

Instructions:
- Describe unique site features including streams, stream buffers, wetlands, specimen trees, natural vegetation, steep slopes, or highly erodible soils that are to be preserved. Describe the measures that will be used to protect these features. Include unique features and sensitive areas on your ESC Plan site drawings.
- Identify and describe any historic structures and the methods to be used for demolition or protection.
- Describe any known soil or groundwater contamination; note that additional permitting will be required from the State Water Quality Control Division.

Historic Site Contamination (describe any known site contamination i.e. soil, ground water). Refer to http://www.cdphe.state.co.us/hm/HMSiteCover.htm and access the Hazardous Materials and Waste Management Division Site Locator Mapping Application:

All sensitive areas are shown on the site-specific drawings, as well as the stormwater control measures to protect / preserve these areas.
1.8 Potential Sources of Pollution

Instructions:
- Below is a comprehensive source list of potential sediment and pollutants associated with construction, which may reasonably be expected to affect the quality of stormwater discharges from the construction site. Add rows if additional potential sources of pollution are not included.
- Identify and list all potential sources of pollution, other than sediment, which may reasonably be expected to affect the quality of stormwater discharges from the construction site.
- Below, identify if a potential pollutant source that is applicable to the construction site by selecting the blue Yes/No then type “yes” or “no” in the applicable information.

<table>
<thead>
<tr>
<th>Potential Pollution Source</th>
<th>Potential on This Site?</th>
<th>Control Measures</th>
<th>BMP Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Disturbed and Stored Soils - grading - spoils - stockpiles</td>
<td>Yes</td>
<td>1. Sediment and Erosion Control Measures (IP1, IP2, SF, SSA, TRM, RECP, TOP, SCL, SBB, RS, SB, ST) 2. Preservation of Existing Vegetation (PV, VB, CF, CP) 3. Materials Management 4. Solid Waste Management (SP, GH) 5. Stockpile Management (SP) 6. Vehicle Tracking Controls (VTC)</td>
<td>1. Install BMPs prior to major construction. 2. Delineate protected areas prior to major construction. 3. Material management effective once material arrives on site. 4. Place trash receptacles on site prior to major construction. 5. Implement spill response procedures as needed. 6. Implement stockpile management controls as needed. 7. Delineate vehicle travel areas prior to major construction, adjust as needed.</td>
</tr>
<tr>
<td>Vehicle Tracking of Sediments - all permitted area vehicle traffic</td>
<td>Yes</td>
<td>1. Sediment and Erosion Control Measures (IP1, IP2, SF, SSA, TRM, RECP, TOP, SCL, SBB, RS, SB, ST) 2. Vehicle Traffic Controls 3. Vehicle Tracking Controls (VTC) 4. Street Sweeping (SS)</td>
<td>1. Install BMPs prior to major construction. 2. Delineate vehicle travel areas prior to major construction, adjust as needed. 3. Install VTC BMP prior to construction. 4. Implement street sweeping in conjunction with start of major construction and as needed.</td>
</tr>
</tbody>
</table>

* See the Stormwater Regulation Guide for acronyms used to identify BMP details.
<table>
<thead>
<tr>
<th>Potential Pollution Source</th>
<th>Potential on This Site?</th>
<th>Control Measures</th>
<th>BMP Implementation</th>
</tr>
</thead>
</table>
| **Loading and Unloading Activities**  
- construction materials | Yes | 1. Material Management (GH)  
2. Vehicle Traffic Controls (VTC) | 1. Materials management effective once materials arrive on site and effective throughout the project.  
2. Delineate vehicle travel areas prior to major construction, adjust as needed. |
| **Outdoor storage activities**  
- building materials  
- fertilizers  
- chemicals | Yes | 1. Material Storage Procedures (GH) | 1. Designate materials storage areas prior to the delivery of materials.  
2. Materials left outdoors must be covered if they can become a pollutant when mixed with water.  
3. Secondary containment must be used for hazardous materials. |
| **Vehicle equipment maintenance and fueling**  
- gas  
- diesel  
- oil  
- lubricants  
- hydraulic fluids | Yes | 1. Spill prevention controls (GH)  
2. Designated Fuel Storage Area (GH)  
3. Spill Response and Notification (GH) | 1. Implement spill prevention controls as needed.  
2. Designate fuel storage area as needed.  
3. Implement spill response and notification procedures as needed. |
| **Dust Control**  
- Wind Transport  
- Saw Cutting Activities | Yes | 1. Dust Control (DC)  
2. Temporary Soil Stabilization (SF, SD, GB, SSA, TRM, RECP, TOP)  
3. Street Sweeping (SS)  
4. Preservation of Existing (PV, VB, CF) Vegetation (VB, CF) | 1. Implement dust control in conjunction with soil disturbing activities and as needed.  
2. Implement temporary soil stabilization measures as soon as practical.  
3. Implement street sweeping at the start of major construction and maintain as needed.  
4. Delineate protected areas prior to major construction. |
| **Routine maintenance activities**  
- fertilizers  
- pesticides  
- detergents  
- fuels  
- solvents  
- oils, etc. | Yes | 1. Material Storage (GH)  
2. Hazardous Waste Management (GH, CT)  
3. Erosion and Sediment Controls (IP1, IP2, SF, SSA, TRM, RECP, TOP, SCL, SBB, RS, SB, ST) | 1. Designate materials storage areas prior to their arrival on site.  
2. Practice hazardous waste management procedures during the storage of such materials.  
3. Install sediment and erosion control BMPs prior to conducting landscape activities. |

* See the Stormwater Regulation Guide for acronyms used to identify BMP details.
### Potential Pollution Source

<table>
<thead>
<tr>
<th>Potential Pollution Source</th>
<th>Potential on This Site?</th>
<th>Control Measures</th>
<th>BMP Implementation</th>
</tr>
</thead>
</table>
| On-site waste management practices | Yes                     | 1. Waste Management (GH)  
2. Liquid Waste Management (GH)  
3. Hazardous Waste Management (GH, CT) | 1. Place trash receptacles on site prior to major construction.  
2. Place designated watertight receptacles or washout area(s) prior to proceeding with an activity that is known to produce liquid waste.  
3. Implement hazardous waste management procedures as needed. |
| Concrete truck/equipment washing | Yes                     | 1. Concrete Washout area (CWA)                                                   | 1. Install designated concrete washout(s) prior to commencement of concrete activities. |
| Dedicated asphalt and concrete batch plants | No                      | 1. Secondary Containment  
2. Concrete Washout Area (CWA)  
3. Solid Waste Management (GH)  
4. Materials Management (GH) | 1. Install secondary containment BMPs prior to using dedicated batch plants.  
2. Dedicated washout area must be established before construction begins.  
3. Trash receptacles on site prior to major construction activities.  
4. Material management effective once material arrives on site. |
| Non-industrial waste sources – worker trash and portable toilets | Yes                     | 1. Sanitary Waste (GH)  
2. Solid Waste Management (GH) | 1. Place temporary sanitary facilities on site as needed and protect from off-site discharge.  
2. Trash receptacles on site prior to major construction activities. |
| Waste from geo-technical testing, potholing, saw cutting, and utility borings for locates | No                      | 1. Dust Control (DC)  
2. Material Storage (GH)  
3. Solid Waste Management (GH) | 1. Implement dust control in conjunction with soil disturbing activities and as needed.  
2. Designate materials storage areas prior to their arrival on site.  
3. Trash receptacles on site prior to major construction activities. |
| Fly Ash - concrete - flow fill | No                      | 1. Concrete Washout area (CWA)  
2. Hazardous Waste Management (GH) | 1. Install designated concrete washout(s) prior to commencement of concrete activities.  
2. Implement hazardous waste management procedures as needed. |

* See the Stormwater Regulation Guide for acronyms used to identify BMP details.
<table>
<thead>
<tr>
<th>Potential Pollution Source</th>
<th>Potential on This Site?</th>
<th>Control Measures</th>
<th>BMP Implementation</th>
</tr>
</thead>
</table>
| Demolition of infrastructure, i.e. - concrete curb - asphalt road - steel/rebar            | No                      | 1. Dust Control (DC)  
2. Solid Waste Management (GH)                                                 | 1. Implement dust control in conjunction with soil disturbing activities and as needed.  
2. Trash receptacles on site prior to major construction activities.                     |
| Drywall Mud and Paint                                                                      | No                      | 1. Liquid Waste Management (GH)                                                   | 1. Place designated watertight receptacles or washout area(s) prior to proceeding with an activity that is known to produce liquid waste. |
| Electric Generator, i.e. pump                                                              | Yes                     | 1. Secondary Containment  
2. Spill Response and Notification (GH)  
3. Hazardous Waste Management (GH, CT)                                              | 1. Install secondary containment BMPs prior to using generators.  
2. Implement hazardous waste management procedures as needed.                           |
| Other areas or procedures where potential spills can occur                                 | No                      | 1. Hazardous Waste Management (GH)  
2. Spill Response and Notification (GH)                                             | 1. Implement hazardous waste management as needed.  
2. Implement spill response and notification procedures as necessary.                    |
| Flushing New Waterlines                                                                    | No                      | 1. Sediment and Erosion Control Measures  
2. Low Risk Guidance for Potable Water**                                            | 1. Install sediment and erosion control measures prior to discharge.  
2. Follow BMPs required by this low risk guidance.                                        |
| Dewatering and Ponded Water Management                                                      | Yes                     | 1. Pumping out inundated area to areas that are utilizing BMPs                    | N/A                                                                                 |
| Utility Excavations, Hydro-Vac Operations                                                   | No                      |                                                                                  |                                                                                      |

* See the Stormwater Regulation Guide for acronyms used to identify BMP details.
**Potential hazardous material/chemical pollutants, to stormwater runoff:**

<table>
<thead>
<tr>
<th>Potential On This Site</th>
<th>Material/Chemical</th>
<th>Physical Description</th>
<th>Stormwater Pollutants</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Fertilizer</td>
<td>Liquid or solid grains</td>
<td>Nitrogen, phosphorous</td>
<td>Newly seeded areas</td>
</tr>
<tr>
<td>No</td>
<td>Cleaning solvents</td>
<td>Colorless, blue, or yellow-green liquid</td>
<td>Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates</td>
<td>Staging areas</td>
</tr>
<tr>
<td>No</td>
<td>Asphalt</td>
<td>Black solid</td>
<td>Oil, petroleum distillates</td>
<td>Streets</td>
</tr>
<tr>
<td>Yes</td>
<td>Concrete and Grout</td>
<td>White solid/grey liquid</td>
<td>Limestone, sand, pH, chromium</td>
<td>Curb and gutter, sidewalk, building construction</td>
</tr>
<tr>
<td>No</td>
<td>Curing compounds</td>
<td>Creamy white liquid</td>
<td>Naphtha</td>
<td>Curb and gutter, sidewalk, driveways, concrete slabs</td>
</tr>
<tr>
<td>Yes</td>
<td>Hydraulic oil/fluids</td>
<td>Brown, oily petroleum hydrocarbon</td>
<td>Mineral oil</td>
<td>Leaks or broken hoses from equipment</td>
</tr>
<tr>
<td>Yes</td>
<td>Gasoline</td>
<td>Colorless, pale brown or pink petroleum hydrocarbon</td>
<td>Benzene, ethyl benzene, toluene, xylene, MTBE</td>
<td>Secondary containment/staging area</td>
</tr>
<tr>
<td>Yes</td>
<td>Antifreeze/coolant</td>
<td>Clear green/yellow liquid</td>
<td>Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)</td>
<td>Leaks or broken hoses from equipment or vehicles</td>
</tr>
<tr>
<td>Yes</td>
<td>Sanitary toilets</td>
<td>Various colored liquid</td>
<td>Bacteria, parasites, and viruses</td>
<td>Staging areas</td>
</tr>
</tbody>
</table>

Insert any additional hazardous material/chemical pollutants that are not listed above here. 
*Sediment, slurry, fuel, lubricants, grease, oils, debris, litter, trash, oil and gas exploration and production fluids, well completion fluids, produced water, produced crude oil / condensate, paint, primers, stains, glue, fire retardant, acid wash, graffiti prevention liquid, processed water, chemical additives, and ground water and ponded water containing various other pollutants.*
**If “Flushing New Waterlines” is applicable to this construction project, the following information is applicable to this project.**

**LOW RISK DISCHARGE GUIDANCE: DISCHARGES OF POTABLE WATER**  
Revised August 2009

This discharge guidance has been developed in accordance with WQP-27, Low Risk Discharges. The Division has previously had coverage for some discharges of potable water under the Treated Water Distribution Permit (COG380000), however, this permit is only available to entities that produce, store and distribute potable water supplies. The Division does not intend to renew the Treated Water Distribution Permit as all authorized discharges under this permit are potable water related. Other discharges of potable water have been covered under the Minimum Industrial Discharge Permit (COG600000); however, this permit is in process of being dismantled as it has evolved into covering numerous facility and discharge types.

When the provisions of this guidance are met, the Division will not actively pursue permitting or enforcement for the discharge of potable water, unless on a case-by-case basis the Division finds that a discharge has resulted in an adverse impact to the quality of any state waters receiving the discharge.

Discharges of potable water are a type of industrial activity with short term infrequent discharges that with proper management are not expected to contain pollutants in concentrations that are toxic or in concentrations that would cause or contribute to a violation of a water quality standard. The typical pollutant of concern is total residual chlorine, however, depending on how the discharge occurs, total suspended solids and oil and grease may become pollutants of concern. These pollutants can be handled using dechlorination techniques, filters, oil booms, and other best management practices (BMPs).

There are a large number of discharges of potable water, some of which are covered under the previously mentioned General Permits. Numerous discharges occur without permit coverage. These types of discharges may occur at all times of the year, and require a resource intensive effort to permit, without resulting in a clear general benefit to environmental quality.

The following conditions must be followed by anyone discharging potable water:

The discharge of cleaning materials or chemicals, including dyes, is strictly prohibited, and shall be sent to the sanitary sewer, with permission of the local wastewater treatment facility, or otherwise collected and disposed of.

The potable water shall **not** be used in any additional process. Processes include, but are not limited to, any type of washing, heat exchange, manufacturing, and hydrostatic testing of pipelines not associated with treated water distribution systems.

The discharge shall be from a potable water distribution system, tank or storage that has been maintained for potable water distribution use. Discharges from a distribution system, tank or storage that is used for conveyance or storage of materials other than potable water is not authorized under this policy.

The discharge shall not cause erosion of a land surface.

The discharge shall not contain solid materials in concentrations that can settle to form bottom deposits detrimental to the beneficial uses of the state waters or form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses.
Appendix A-1 of the Stormwater Regulation Guide

All discharges must comply with the lawful requirements of federal agencies, municipalities, counties, drainage districts, ditch owners, and other local agencies regarding any discharges to storm drain systems, conveyances, ditches or other water courses under their jurisdiction.

The guidance included in this document in no way reduces the existing authority of the owner of a storm sewer, ditch owner, or other local agency, from prohibiting or placing additional conditions on the discharge.

If the discharge is directly to a State surface water (any stream, creek, Gulch, whether dry or flowing), it must not contain any residual chlorine. The operator is responsible for determining what is necessary for removing chlorine from the discharge. If the discharge is to a ditch, chlorine content may be limited by the owner of the ditch. However, if the ditch returns flow to classified state waters, it must not contain any residual chlorine at the point where it discharges to the classified state water.

BMPs shall be implemented as necessary to meet the conditions above, by anyone discharging potable water. These BMPs have been developed by the Division to help ensure that the discharge will not negatively affect water quality.

For discharge to the ground, the water shall not cause any toxicity to vegetation. When discharging, allow the water to drain slowly so that it soaks into the ground as much as possible.

If discharge is to the sanitary sewer, contact the local wastewater treatment facility prior to discharge. System owners may grant blanket authorization to discharge to their systems. This must be done to ensure that the facility is able to accept the discharge. Not all facilities are able to accept such discharges. Note that additional restrictions or local guidelines may apply.

Removal of any residual chlorine must be done for any direct discharge to state surface waters or for any discharge to a storm sewer or conveyance where the chlorine will not dissipate prior to reaching state surface water. Dechlorination, if necessary, may be achieved by allowing water to stand uncovered until no chlorine is detected, or by dechlorination using a portable dechlorinator. Pay particular attention when handling super-chlorinated waters. A longer time is needed to dissipate chlorine from super-chlorinated waters.

The discharge shall be conducted to minimize the potential to pick up additional suspended solids. When possible, a best management practice, or combination of practices, for filtering or settling suspended solids and other debris, or a combination of practices, shall be used to remove suspended solids or other debris. Examples of suspended solid removal practices include, but are not limited to check dams, filter bags, and inlet protection. These devices shall be used and maintained in accordance with the manufacturers specifications.

The discharge shall be conducted to minimize the potential that it will not pick up any oil and grease. When possible, an absorbent oil pad, boom or similar device shall be used to eliminate oil from the discharge.

Contact Information:
Questions regarding this action shall be forwarded to Nicole Rolfe at: nicole.rolfe@state.co.us
1.9 Demolition

Instructions:
- Before demolition of a structure begins, a copy of the asbestos certification from the State certifying the structure is free of asbestos and other pollutants must be obtained. Attach a copy of the County Demolition Permit including the state issued asbestos abatement permit in Appendix 4 – Copy of Demolition Permit and State Asbestos Permit Certification.

Are there any structures to be demolished as part of construction related to this site?

☐ Yes ☑ No

If yes, describe or refer to documentation that determines the likelihood of an impact for erosion and the steps taken to address that impact. Place a copy of the state asbestos certification in Appendix 4, as applicable.
SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

Instructions:
- Multiple structural and non-structural BMPs are used during each phase of construction to minimize erosion and the transport of sediment. Included is the Expected Level of BMP Information for structural and non-structural BMPs that are expected to minimize sediment transport and erosion control.
- Describe the BMPs that will be implemented to control pollutants in stormwater discharges. For each major activity identified below, complete the following:
  - Clearly select and describe appropriate control measures.
  - Describe the maintenance and inspection procedures that will be used for that specific BMP.
  - Include protocols, thresholds, and schedules for cleaning, repairing or replacing damaged or failing BMPs.
- If a construction project uses a BMP that is not included below, add BMPs in the place provided after each listed BMP and ensure that the Expected Level of BMP Information is included.
- Below are the listed BMP descriptions Expected Level of BMP Information items that address the following:
  - What BMPs will be installed?
  - When will the BMPs be implemented and removed?
  - Where will the BMPs be implemented?
  - How will the BMPs be maintained?
- Place all BMP details and associated procedures in Appendix 5 – Erosion and Sediment Control BMP Details.
- Categorize and describe each BMP under one of the following 8 activities:
  2.1 Minimize Disturbed Area and Protect Natural Features and Soil
  2.2 Control Stormwater Flowing onto and through the Project
  2.3 Stabilize Soils and Protect Slopes
  2.4 Protect Storm Drain Inlets
  2.5 Establish Perimeter Controls and Sediment Barriers
  2.6 Retain Sediment On-Site and Control Dewatering Practices
  2.7 Establish Stabilized Construction Exits
  2.8 Any Additional BMPs

Below are standard structural and non-structural practices that are often used for erosion and sediment control throughout a construction project. BMPs include but are not limited to the following list. Following each BMP is a placeholder for additional site specific comments or information the designer may want to include. If a BMP is not included, space has been provided at the end of each BMP table. Any additional BMPs shall include all four “Expected Level of BMP Information” (i.e. What, When, Where, How). All BMPs shall be installed as a phased operation when construction progresses.

*Expected Level of BMP Information = What, When, Where and How*
2.1 Minimize Disturbed Area and Protect Natural Features and Soil

Instructions:
- Describe the areas that will be disturbed with each phase of construction and the methods (e.g., signs, construction fence) that you will use to protect those areas that shall not be disturbed. Describe natural features identified earlier and how each will be protected during construction activity. Include these areas and associated BMPs on your site map(s) also. (Information can be found in the Stormwater Regulation Guide Detail SM-2 Protection of Existing Vegetation.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type "yes" or "no" AND identify the phase of construction the BMP is associated with, i.e. Phase1, 2, 3 or N/A.

<table>
<thead>
<tr>
<th>Permitted Limits of Disturbance</th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, and 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Permanent</td>
<td>☒ Temporary</td>
<td></td>
</tr>
</tbody>
</table>

**What – BMP Description**
Used to designate the area of land that will be disturbed by construction activities.

**When – Installation**
The permitted limits of disturbance shall be designated prior to land disturbing activities. If, at any time during construction, land is disturbed outside of the permitted area, the CDPS Stormwater Construction Permit and ESC Plan must be amended.

**Where – Location**
The permitted limits of disturbance shall be identified on the ESC Plan.

**How – BMP Maintenance and Inspection**
Typically, the permitted limits of disturbance are delineated by silt fence or construction fence. The Permittee shall continuously inspect and maintain the permitted limits of disturbance in an effort to not disturb land outside of the limits.

<table>
<thead>
<tr>
<th>Protection of Existing Vegetation (PV) SM-2</th>
<th>Used: No</th>
<th>Phase(s): 1, 2, 3, N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Permanent</td>
<td>☒ Temporary</td>
<td></td>
</tr>
</tbody>
</table>

**What – BMP Description**
A construction fence shall be installed around native areas that requires protection. It may also be necessary to install perimeter controls to prevent sediment loading to sensitive areas.

**When – Installation**
BMPs installed for protection of existing vegetation shall be installed prior to land disturbing activities or as part of the phasing of the construction project.
### Where – Location
Protection of existing vegetation BMPs shall be installed at locations identified on the ESC Plan. These locations will be any area that has been designated as a preservation area.

### How – BMP Maintenance and Inspection
Protection of existing vegetation BMPs shall be installed per the protection of existing vegetation detail (Appendix 5 – Erosion and Sediment Control BMP Details and Procedural Plans).

- Clearly mark the area on the site plan to be preserved. No stockpiles, equipment, trailers or parking shall be allowed within the area. Repair or replace damaged or displaced protective barriers around the vegetated area. The Permittee shall continuously inspect and maintain all areas that are designated to be protected. If damage to the vegetation occurs in a protected area, reseed the area with the same or similar species.

- Construction equipment must not enter a wetland area, except as permitted by the U.S. Army Corps of Engineers (USACE). Inadvertent placement of fill in a wetland is a 404 permit violation and will require notification of the USACE.
2.2 **Control Stormwater Flowing onto and through the Project**

Instructions:
- Describe structural practices (e.g., swales, diversions, berms, ditches, storage basins) used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. (Information can be found in the Stormwater Regulation Guide Details EC-7 Temporary Slope Drains, EC-10 Earth Dikes and Drainage Swales & SC-8 Sediment Trap.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue **Yes/No** then type “yes” or “no” **AND** identify the phase of construction the BMP is associated with, i.e. Phase 1, 2, 3 or N/A.

<table>
<thead>
<tr>
<th>Temporary Slope Drains (TSD) BMP Detail EC-7</th>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Permanent</td>
<td>☐ Temporary</td>
<td></td>
</tr>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>A pipe or culvert used to convey water down a slope where there is high potential for erosion. A collection system at the top of the slope directs runoff to the conveyance. The pipe outlet must be equipped with outlet protection.</td>
<td></td>
</tr>
<tr>
<td><strong>When - Installation</strong></td>
<td>Temporary slope drains shall be installed prior to up gradient land disturbing activities and are to remain in place until no longer needed, but shall be removed prior to the end of construction.</td>
<td></td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Temporary slope drains shall be installed at the locations identified on the ESC Plan. They are for use on long, steep slopes where there is a high potential for flow concentration.</td>
<td></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>Temporary slope drains shall be installed and maintained per the temporary slope drain detail EC-7 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all temporary slope drains throughout construction. Inspect the entrance for sediment accumulation and remove, as needed. Inspect the downstream outlet for signs of erosion and stabilize, as needed. Remove accumulated sediment at the entrance and outfall, and inspect pipe anchors to ensure they are secure.</td>
<td></td>
</tr>
</tbody>
</table>
### Earth Dikes/Drainage Swales (ED/DS) BMP Detail EC-10

**Used:** Yes  
**Phase(s):** 1, 2, 3

<table>
<thead>
<tr>
<th><strong>Permanent</strong></th>
<th><strong>Temporary</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>Temporary storm conveyance channels used to divert runoff around slopes or to convey runoff to additional sediment control BMPs prior to discharge from the site.</td>
</tr>
<tr>
<td><strong>When – Installation/Removal</strong></td>
<td>Earth dikes and drainage swales will be installed immediately upon completion of channel grading and will remain in place until the end of construction.</td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Earth dikes and drainage swales shall be installed at the locations identified on the ESC Plan. They are typically installed around steep slopes or as a temporary conveyance feature leading to a sediment basin or trap.</td>
</tr>
</tbody>
</table>
| **How – BMP Maintenance and Inspection** | Earth dikes and drainage swales shall be installed per the earth dikes and drainage swales detail EC-10 (Appendix 5 – Erosion and Sediment Control BMP Details and Procedural Plans).  
The Permittee shall continuously inspect and maintain all earth dikes and drainage swales for stability, compaction and signs of erosion and repair. Inspect side slopes for erosion and damage to erosion control fabric. Stabilize slopes and repair fabric as necessary. Accumulated sediment shall be removed when the sediment has accumulated to one-half of the depth of the earth dike or drainage swales. |

### Sediment Trap (ST) BMP Detail SC-8

**Used:** Yes  
**Phase(s):** 1, 2

<table>
<thead>
<tr>
<th><strong>Permanent</strong></th>
<th><strong>Temporary</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>An excavated or bermed area designed to capture drainage, allowing settling of sediment from a disturbed area less than one acre.</td>
</tr>
<tr>
<td><strong>When – Installation/Removal</strong></td>
<td>A sediment trap shall be installed prior to land disturbing activities; the sediment trap shall not be removed until the upstream area is sufficiently stabilized.</td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Sediment traps shall be installed at the locations identified on the ESC Plan. It shall be installed across a low area or drainage swale.</td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>Sediment trap shall be installed per the sediment trap detail SC-8 (Appendix 5 – Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain the sediment trap embankments for stability and seepage.</td>
</tr>
</tbody>
</table>
Inspect the sediment trap embankments for stability and seepage, and the outlet for debris and damage. Repair damage to the outlet, and remove all obstructions. Accumulated sediment shall be removed when it reaches ½ the height of the outflow embankment.

<table>
<thead>
<tr>
<th>Temporary Diversion Channel (TDC) SM-8</th>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What – BMP Description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diverts water from a stream to allow for construction activities to take place underneath or in the stream.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>When – Installation/Removal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All BMPs associated with a temporary diversion channel shall be installed prior to the start of any construction activities within a stream; removed when the work at the down gradient or natural channel is no longer required, the diversion channel shall be backfilled and stabilized.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary diversion channels shall be installed at the location identified on the ESC Plan. Temporary diversion channel BMPs can be used in the following locations: construction of detention ponds, dams, in-stream grade control structures, utility installations or any activity that requires work in a waterway.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary diversion channel shall be installed per the temporary diversion channel detail SM-8 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall frequently and continuously inspect and maintain all temporary diversion channel BMPs throughout construction. Flow barriers shall be inspected at the start and end of each workday. The diversion channel shall be inspected for signs of erosion and the lining repaired or replaced if necessary.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dewatering Operations (DW) SM-9</th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What – BMP Description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumping water from an inundated area to a BMP, then downstream to a receiving waterway, sediment basin or well-vegetated area. When pumping water outside of the permitted boundary a separate State Dewatering Permit is required.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Dewatering Operations

**When – Installation/Removal**

Dewatering operations are used when an area of the construction site that is inundated with water which needs to be dewatered as a result of a large storm event, groundwater or existing ponding conditions; and be removed once the work in the down gradient area or natural channel is no longer required.

**Where – Location**

Dewatering BMPs shall be installed at the locations identified on the ESC Plan. Dewatering operations may occur in any area of the construction site where accumulated water needs to be removed.

**How – BMP Maintenance and Inspection**

Dewatering operations shall be conducted per dewatering operations detail SM-9 (Appendix 5 – Erosion and Sediment Control BMP Details).

All dewatering discharges must be treated to remove sediment (and other pollutants as needed) before discharging from the construction site. The Permittee shall continuously inspect and maintain all dewatering operations throughout construction.

---

### Temporary Stream Crossing (TSC) SM-10

**Used:** No  
**Phase(s):**

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**

A temporary crossing where an actively flowing watercourse must be crossed. Three methods are available: culvert crossing, stream ford and temporary bridge. A permit is required for placement of fill in a waterway under Section 404 of the Clean Water Act. Contact the local office of the U.S. Army Corps of Engineers regarding the requirements for obtaining a 404 permit.

**When – Installation/Removal**

A temporary stream crossing shall be installed only when it is necessary to cross a stream; and removed when the crossing is no longer needed for construction.

**Where – Location**

Temporary stream crossings shall be installed at the locations identified on the ESC Plan.

**How – BMP Maintenance and Inspection**

Temporary stream crossings shall be installed per the temporary stream crossing detail SM-10 (Appendix 5 - Erosion and Sediment Control BMP Details).

The Permittee shall continuously inspect and maintain the temporary stream crossing throughout construction. Specifically, inspect for bank erosion and in-stream degradation.
2.3 Stabilize Soils and Protect Slopes

Instructions:
- **Stabilize Soils** - Describe controls (e.g., interim temporary mulching, seeding with native vegetation, hydro-seeding and soil binders) to stabilize exposed soils where construction activities have temporarily or permanently ceased. Also describe measures to control dust generation. (Information can be found in the Stormwater Regulation Guide Details EC-1 through EC-14 Erosion Control BMPs minus EC-5 & EC-9.)

- **Protect Slopes** - Describe controls (e.g., erosion control blankets, soil binders) including design specifications and details that will be implemented to protect all slopes from eroding. (Information can be found in the Stormwater Regulation Guide Details EC-1 through EC-14 Erosion Control BMPs minus EC-5 & EC-9.)

- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no” AND identify the phase of construction the BMP is associated with, i.e. Phase1, 2, 3 or N/A.

---

### Surface Roughening (SR) BMP Detail EC-1

<table>
<thead>
<tr>
<th></th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent</strong></td>
<td>✗</td>
<td></td>
</tr>
<tr>
<td><strong>Temporary</strong></td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>

**What – BMP Description**
Tracking, scarifying, imprinting or tilling a disturbed area to provide temporary stabilization. Variations in the soil are created to help minimize wind and water erosion.

**When – Installation**
Surface roughening shall be performed either after final grading or to temporarily stabilize an area during active construction.

**Where – Location**
Surface roughening shall be used in the locations identified on the ESC Plan. It can be used on mild and steep slopes.

**How – BMP Maintenance and Inspection**
Surface roughening shall be installed per the surface roughening detail EC-1 (Appendix 5 – Erosion and Sediment Control BMP Details).

Surface roughening shall always be perpendicular to the slope. The Permittee shall continuously inspect and maintain all surfaces that are roughened throughout construction. Surface roughening shall be inspected for erosion as it is only a temporary control.

Vehicles and equipment shall not be driven over areas that have been surface roughening. Additional activities may be needed to maintain the roughening on the soil surface.
### Temporary and Permanent Seeding (P) EC-2

| Used: Yes | Phase(s): 2, 3, 5 |

| Permanent | Temporary |

#### What – BMP Description

Amendment and Seed Specifications Must be Provided by ESC Plan Designer.

Seed is applied to disturbed areas in an effort to establish vegetation. Temporary seeding is used to stabilize disturbed areas that will be inactive for an extended period.

Permanent seeding is used to stabilize areas at final grade that will not be otherwise stabilized. Effective seeding includes preparation of a seedbed, selection of an appropriate seed mixture, proper planting techniques, and protection of the seeded area with mulch, geotextile, or other appropriate measures.

Mulching helps to protect the bare soil and must be secured by crimping, tackifiers, netting or other measures.

#### When – Installation

Temporary and permanent seeding shall be performed on temporary inactive surfaces and following the completion of final grading.

#### Where – Location

Temporary and permanent seeding shall be completed in the locations identified on the ESC Plan. They are used to stabilize areas at final grade that will not otherwise be stabilized.

#### How – BMP Maintenance and Inspection

Permanent seeding and secured mulching shall be installed per the temporary and permanent seeding specifications and detail. The Permittee shall continuously inspect and maintain all temporary and permanent seeding and secured mulch throughout construction. Prepare the seedbed, select an appropriate seed mixture, use proper planting techniques and protect the seeded area with secured mulch.

---

### Soil Binders (SB) EC-3

| Used: No | Phase(s): |

| Permanent | Temporary |

#### What – BMP Description

A broad range of treatments that can be applied to exposed soils for temporary stabilization to reduce wind and water erosion.

#### When – Installation

Use soil binders for short term temporary stabilization. Soil binders can break down fast due to natural weathering.

#### Where – Location

Soil binders can be used on mild and steep slopes including stockpiles. They are often used in areas where work has
temporarily stopped, but is expected to resume before revegetation can is established.

**How – BMP Maintenance and Inspection**

Soil binders shall be used per the soil binder detail/specifications. The Permittee shall continuously inspect and maintain all areas where soil binders have been applied throughout construction. Soil binders can fail after heavy rainfall events and may require reapplication. In particular, soil binders will general experience spot failures during heavy rainfall events.

### Mulching (MU) EC-4

<table>
<thead>
<tr>
<th>Used: Yes</th>
<th>Phase(s): 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Permanent</td>
<td>☐ Temporary</td>
</tr>
</tbody>
</table>

**What – BMP Description**

Mulching consists of evenly applying straw, hay, shredded wood mulch, bark or compost to disturbed soils and securing the mulch be crimping, tackifiers or netting.

**When – Installation**

Mulching is used in conjunction with seeding to help protect the seed bed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed area where there are growing season constraints.

After mulching, the bare ground surface shall not be exposed. Reapply mulch, as needed, to cover bare areas.

**Where – Location**

Temporary and permanent mulching shall be completed in the locations identified on the ESC Plan.

**How – BMP Maintenance and Inspection**

Mulching shall be installed per the mulching detail EC-4 (Appendix 5 – Erosion and Sediment Control BMP Details).

After mulching, the bare ground surface shall not be more than 10% exposed. Reapply mulch, as needed, to cover bare areas.

### Rolled Erosion Control Product (RECP) EC-6

<table>
<thead>
<tr>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3, N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Permanent</td>
<td>☐ Temporary</td>
</tr>
</tbody>
</table>

**What – BMP Description**

A variety of temporary or permanently installed manufactured products designed to control erosion and enhance vegetation establishment and survivability, especially on slopes and in channels. There are four categories of products; mulch control netting, open weave textile, erosion control blanket and turf reinforcement mat.
<table>
<thead>
<tr>
<th><strong>When – Installation</strong></th>
<th>Rolled erosion control products shall be installed upon completion of slope grading and when revegetation measures are completed; rolled erosion control products are biodegradable typically and do not need to be removed after construction.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where – Location</strong></td>
<td>Rolled erosion control products shall be installed at the locations identified on the ESC Plan. They shall be installed according to manufacturer’s specifications and guidelines.</td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>Rolled erosion control products shall be installed per the rolled erosion control products detail EC-6 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all rolled erosion control products throughout construction. Check for signs of erosion, including voids under the mat. Also check for damaged or loose stakes and secure loose sections of the blanket.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Temporary Slope Drain (TSD) EC-7</strong></th>
<th><strong>Used:</strong> No</th>
<th><strong>Phase(s):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent</strong></td>
<td><strong>Temporary</strong></td>
<td></td>
</tr>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>A temporary slope drain is a pipe or culvert used to convey water down a slope where there is a high potential for erosion. A drainage channel or swale at the top of the slope typically directs up gradient runoff to the pipe entrance for conveyance down the slope. The pipe outlet must be equipped with outlet protection.</td>
<td></td>
</tr>
<tr>
<td><strong>When – Installation/Removal</strong></td>
<td>A temporary slope drain shall be installed when it is necessary to convey water on long, steep slopes where there is a high potential of flow concentration or rill development. Temporary slope drains shall be removed when no longer needed or just prior to installation of permanent slope stabilization measures that cannot be installed with the slope drain in place.</td>
<td></td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Temporary slope drain shall be installed at the locations identified on the ESC Plan. It shall be installed where it is necessary to convey water down an erodible surface.</td>
<td></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>Temporary slope drain shall be installed per the temporary slope drain detail EC-7 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all temporary slope drains as the conveyance system may be dislodged or displaced. Accumulated sediment shall be removed before the outlet protection becomes buried and ineffective.</td>
<td></td>
</tr>
</tbody>
</table>
### Temporary Outlet Protection (TOP) EC-8

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**
Riprap rock placed at the outlet to help reduce erosion immediately downstream of a pipe, culvert, slope drain rundown or other conveyance with concentrated flow. Temporary outlet protection is intended to be used for less than two years.

**When – Installation/Removal**
Temporary outlet protection shall be installed immediately upon the completion of grading; temporary outlet protection shall be removed once the pipe is no longer draining and upstream area or once the downstream area has been sufficiently stabilized.

**Where – Location**
Temporary outlet protection shall be installed at the locations identified on the ESC Plan. It shall be installed where a conveyance discharges onto a disturbed area where there is a potential for accelerated erosion due to concentrated flow.

**How – BMP Maintenance and Inspection**
Temporary outlet protection shall be installed per the temporary outlet protection detail with topside protection\(^1\) EC-8 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all temporary outlet protection as the rocks may be damaged or displaced. Accumulated sediment shall be removed before the outlet protection becomes buried and ineffective.

\(^1\) 8/5/11 LR Comment

### Earth Dikes/Drainage Swales (ED/DS) BMP Detail EC-10

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**
Temporary storm conveyance channels are used to divert runoff around slopes or to convey runoff to additional sediment control BMPs prior to discharge from the site.

**When – Installation/Removal**
Earth dikes and drainage swales will be installed immediately upon completion of channel grading and will remain in place until the end of construction.

**Where – Location**
Earth dikes and drainage swales shall be installed at the locations identified on the ESC Plan. They are typically installed around steep slopes or as a temporary conveyance feature leading to a sediment basin or trap.

**How – BMP Maintenance and Inspection**
Earth dikes and drainage swales shall be installed per the earth dikes and drainage swales detail EC-10 (Appendix 5 - Erosion and Sediment Control BMP Details).
The Permittee shall continuously inspect and maintain all earth dikes and drainage swales for stability, compaction and signs of erosion and repair. Inspect side slopes for erosion and damage to erosion control fabric. Stabilize slopes and repair fabric as necessary. Accumulated sediment shall be removed when the sediment has accumulated to one-half of the depth of the earth dike or drainage swales.

### Terracing (TER) EC-11

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
</table>

**What – BMP Description**

Grading steep slopes into a series of relatively flat sections separated at intervals by steep slope segments. They shorten the uninterrupted flow lengths on steep slopes, reducing the development of rills and gullies.

**When – Installation/Removal**

Terracing shall be completed during grading activities; when slope is at final grade vegetation shall be established as soon as possible.

**Where – Location**

Terracing shall be installed at the locations identified on the ESC Plan. It is usually used to control erosion on slopes that are steeper than 4:1.

**How – BMP Maintenance and Inspection**

Terracing shall be installed per the terracing detail EC-11 (Appendix 5 - Erosion and Sediment Control BMP Details). Terracing shall be used in combination with other stabilization measures that provide cover for exposed soils. The Permittee shall continuously inspect and maintain all terracing throughout construction. Remove accumulated sediment and repair rill erosion as necessary.
### Check Dams (CD) EC-12

<table>
<thead>
<tr>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Permanent</td>
<td>□ Temporary</td>
</tr>
</tbody>
</table>

#### What – BMP Description
Temporary grade control structures are used in drainage channels to reduce the velocity of runoff and concentrated flows. They can be constructed from rock, gravel bags, sand bags or proprietary devices.

#### When – Installation/Removal
Check dams shall be installed prior to earth disturbing activities or immediately upon completion of channel grading.

Temporary check dams shall be removed and stabilized. Permanent check dams shall be cleaned and remain in place.

#### Where – Location
Check dams shall be installed at the locations identified on the ESC Plan. Typically they are placed in drainage channels, swales or on mild to moderately steep slopes.

#### How – BMP Maintenance and Inspection
Check dams shall be installed per the check dam detail EC-12 (Appendix 5 - Erosion and Sediment Control BMP Details). They shall be placed at regularly spaced intervals along the drainage swale or ditch. The height of the dams shall allow for pooling of the runoff.

The Permittee shall continuously inspect and maintain check dams as rocks can be displaced and gravel bags or sandbags can be torn. Accumulated sediment shall be removed before it reaches one-half the height of the check dam.

---

### Streambank Stabilization (SS) EC-13

<table>
<thead>
<tr>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Permanent</td>
<td>□ Temporary</td>
</tr>
</tbody>
</table>

#### What – BMP Description
A combination of erosion and sediment control BMPs are used to protect streams, banks, and in-stream habitat from accelerated erosion. Some of the BMPs that may be used include protection of existing vegetation, check dams, temporary and permanent seeding and rolled erosion control products.

#### When – Installation/Removal
BMPs used for streambank stabilization shall be installed prior to earth disturbing activities to protect existing vegetation or to preserve an exposed streambank to mitigate erosion rates from the disturbed area; for BMPs that are not to remain in place as a part of final stabilization, such as silt fence and other temporary measures, BMPs shall be removed when all land disturbing activities have ceased and area have been permanently stabilized.
BMPs used for stream bank stabilization shall be installed at the locations identified on the ESC Plan. They shall be installed along the banks of streams or waterways.

See individual details and notes for the various BMPs used in streambank stabilization EC-13 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain BMPs used in streambank stabilization.

<table>
<thead>
<tr>
<th>Wind Erosion/Dust Control (DC) EC-14</th>
<th>Used: Yes</th>
<th>Phase(s): 1,2,3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>Wind erosion and dust control BMPs help sediment from disturbed soils and soil stockpiles from entering the air as a result of land disturbing construction activities. A variety of practices that focus on either graded disturbed areas or construction roadways may be used.</td>
<td></td>
</tr>
<tr>
<td><strong>When – Installation</strong></td>
<td>During conditions which result in the formation of dust from either construction activities or from naturally occurring winds. Do not overwater.</td>
<td></td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Dust abatement shall be completed throughout the project area where any material exists that has the potential to become airborne.</td>
<td></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>Wind erosion/dust control measures shall be performed per the wind erosion/dust control detail EC-14 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee may apply water or magnesium chloride, seed and mulch or use spray-on soil binders on disturbed areas. Water and magnesium chloride shall be applied such that concentrated flows do not form.</td>
<td></td>
</tr>
</tbody>
</table>
2.4 Protect Storm Drain Inlets

Instructions:
- Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design specifications and details that will be implemented to protect all inlets receiving stormwater from the project during the entire project. (Information can be found in the Stormwater Regulation Guide Details SC-5 Rock Sock and SC-6 Inlet Protection.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type "yes" or "no" AND identify the phase of construction the BMP is associated with, i.e. Phase 1, 2, 3 or N/A.

### Rock Sock (RS) SC-5

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**Used:** No  **Phase(s):** 1, 2, 3, N/A

**What – BMP Description**
An elongated cylindrical filter constructed of gravel wrapped by wire mesh or woven geotextile. Also called curb socks when placed at angles in the curb line.

**When – Installation/Removal**
Rock socks shall be installed prior to land disturbing activities; once upstream stabilization is complete, rock socks and accumulated sediment shall be removed and properly disposed.

**Where – Location**
Rock socks shall be installed at the locations identified on the ECS Plan. They are typically used for perimeter control of a disturbed area, part of inlet protection.

**How – BMP Maintenance and Inspection**
Rock socks shall be installed per the rock sock detail SC-5 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all rock socks as they are susceptible to displacement and breakage due to vehicle traffic. Accumulated sediment shall be removed by sweeping, as needed, to maintain functionality.

### Inlet Protection (IP) SC-6

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**Used:** No  **Phase(s):**

**What – BMP Description**
A permeable barrier that is installed around an inlet to filter runoff and remove sediment before it enters the storm drain inlet. Inlet protection can be constructed of the following: rocks socks, sediment control logs, silt fence, blocks and rock socks, or other materials.

**When – Installation/Removal**
Inlet protection for existing inlets shall be installed prior to land disturbing activities upslope from the inlet. Inlet protection for proposed inlets shall be installed immediately after the inlet is
### Where – Location

Inlet protection shall be installed at the locations identified on the ESC Plan. Inlet protection shall not be a stand-alone BMP. It shall be used in conjunction with other up gradient BMPs.

### How – BMP Maintenance and Inspection

Inlet protection shall be installed per the inlet protection detail SC-6 (Appendix 5 - Erosion and Sediment Control BMP Details). Inlet protection shall enable the inlet to function without completely blocking the flow. The Permittee shall continuously inspect and maintain all inlet protection BMPs throughout construction as it is the final BMP before runoff enters the storm drain.

Accumulated sediment shall be removed when it has reached one-half the height of the inlet protection or looses functionality, whichever comes first.

Inlet protection shall not be used as standalone BMP and shall be part of redundant BMPs.\(^1\)

\(^1\) (8/5/11 LR Comment)
## 2.5 Establish Perimeter Controls and Sediment Barriers

**Instructions:**
- Describe structural practices (e.g., silt fences or fiber rolls) including design specifications and details to filter and trap sediment before it leaves the construction site. (Information can be found in the Stormwater Regulation Guide Details SM-3 Construction Fence, SM-4 Vehicle Tracking Control and SC-9 Vegetated Buffer.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no” AND identify the phase of construction the BMP is associated with, i.e. Phase 1, 2, 3 or N/A.

### Construction Fence (CF) BMP Detail SM-3

<table>
<thead>
<tr>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**
Restricts site access to designated entrances and exits, delineates construction site boundaries, and keeps construction out of sensitive locations such as natural areas to be preserved as open space, wetlands and riparian areas.

**When – Installation/Removal**
Construction fence shall be installed prior to earth disturbing activities; and removed once construction is complete.

**Where – Location**
Along the site perimeter or any area within the site where access shall be restricted.

**How – BMP Maintenance and Inspection**
Construction fencing shall be installed, maintained and removed per the construction fence detail SM-3 (Appendix 5 – Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect fences for damages and slumping. The fence shall be tight and any areas with slumping or fallen posts shall be reinstalled and/or replace the fencing.

### Vehicle Tracking Control (VTC) SM-4

<table>
<thead>
<tr>
<th>Yes</th>
<th>Phase(s): 1, 2, 3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**
A stabilized site access point that helps remove sediment from vehicle tires and reduces tracking of the sediment onto paved surfaces.

**When – Installation/Removal**
Vehicle tracking control shall be installed prior to any land disturbing activities; and removed when there is no longer the potential for vehicle tracking to occur.
### Where – Location

Vehicle tracking control shall be installed at the location identified on the ESC Plan. Locate your vehicle tracking control where frequent vehicle traffic will exit the construction site onto a paved roadway.

### How – BMP Maintenance and Inspection

Vehicle tracking control shall be installed per the vehicle tracking control detail SM-4 (Appendix 5 - Erosion and Sediment Control BMP Details).

All vehicle tracking control BMPs must have non-woven geotextile fabric between soil and rock. Recycled concrete aggregate is not allowed.

The Permittee shall continuously inspect and maintain all vehicle tracking control BMPs throughout construction. If the area becomes clogged with sediment, remove and dispose of excess sediment or replace material with a fresh layer of aggregate. Any sediment that is tracked onto adjacent roadways shall be cleaned with brooms, shovels (no water washing), or mechanically cleaned with a pick-up broom.

---

### Vegetated Buffer (VB) SC-9

**Used:** No  
**Phase(s):**

- [ ] Permanent  
- [x] Temporary

#### What – BMP Description

Preserved natural vegetation used to protect waterways and wetlands. A vegetated buffer may be required as a type of setback from a natural waterway. It shall be used in conjunction with other perimeter BMPs.

#### When – Installation

Vegetated buffers shall be pre-existing of land disturbing activities.

#### Where – Location

Vegetated buffers shall be installed at the locations identified on the ESC Plan. Vegetated buffers shall be use for separating land disturbing activities with additional BMPs.

#### How – BMP Maintenance and Inspection

Vegetated buffer shall be installed per the vegetated buffer detail SC-9 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain the vegetated buffer for signs of erosion.

Inlet protection shall not be used as standalone BMP and shall be part of redundant BMPs.¹

¹(8/5/11 LR Comment)
2.6 Retain Sediment On-Site

Instructions:
- Describe sediment control practices (e.g., sediment trap or sediment basin), including design specifications and details (volume, dimensions, outlet structure) that will be implemented at the construction site to retain sediments on-site. (Information can be found in the Stormwater Regulation Guide Details SC-1 through SC-3 Straw Bale Barrier and SC-7 Sediment Basin and SC-8 Sediment Trap.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no” AND identify the phase of construction the BMP is associated with, i.e. Phase1, 2, 3 or N/A.

---

**Silt Fence (SF) SC-1**  
Used: Yes  
Phase(s): 1, 2

- **Permanent**  
- **Temporary**

**What – BMP Description**  
A woven geotextile fabric attached to wooden posts and trenched into the ground. It is used to intercept sheet flow runoff from disturbed areas.

**When – Installation/Removal**  
Silt fence shall be installed prior to all land disturbing activities. Silt fence shall be removed when the upstream area is stabilized.

**Where – Location**  
Silt fence shall be installed at the locations identified on the ESC Plan. It is typically installed along the contour of slopes, which is down slope of a disturbed area to accept sheet flow, and placed along the perimeter of a construction site.

_Silt fence is not designed to receive concentrated flow or to be used a filter fabric._

**How – BMP Maintenance and Inspection**  
Silt fence shall be installed per the silt fence detail SC-1 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all silt fence throughout construction.

Any section of silt fence that has a tear, hole, slumping, undercutting or has been bypassed shall be replaced with a new section. Accumulated sediment shall be removed before it reaches a depth of 6 inches.

---

**Sediment Control Log (SCL) SC-2**  
Used: No  
Phase(s):

- **Permanent**  
- **Temporary**

**What – BMP Description**  
Aka “Straw Wattle” - a linear roll made of natural materials such as straw, coconut fiber or other fibrous material that is trenched.
### Sediment Control Logs

**When - Installation/Removal**

Sediment control logs shall be installed during land disturbing activities and after formation of a stockpile; once the upstream area is stabilized, remove and properly dispose of the logs. If disturbed areas exist after removal, the area shall be covered with topsoil, seeded and mulched.

**Where – Location**

Sediment control logs work well in combination with other layers of erosion and sediment controls.

Stockpiles stored on impervious surfaces shall not be placed in a flowline and shall have weighted sediment control logs; stockpiles stored on pervious surfaces may be protected by pervious sediment control logs, silt fence or adequate vegetative cover as allowed.

**How – BMP Maintenance and Inspection**

Sediment control log shall be installed per the sediment control log detail SC-2 (Appendix 5 - Erosion and Sediment Control BMP Details). Sediment control logs shall be installed along (parallel) the slope contour to avoid concentrating flows.

The Permittee shall continuously inspect and maintain all sediment control logs throughout construction as they will eventually degrade. Accumulated sediment shall be removed before the depth is one-half the height of the sediment control log.

---

### Straw Bale Barrier (SBB) SC-3

**Used:** No  
**Phase(s):**

<table>
<thead>
<tr>
<th></th>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**

A linear barrier of straw bales used to intercept and capture sheet flow and to trap sediment before runoff exits a disturbed area. It is typically used for perimeter control of a site or stockpile management, at the toe of a slope, along the edge of a drainage pathway, or as part of inlet protection.

**When – Installation/Removal**

Straw bale barriers shall be installed prior to land disturbing activities and after formation of a stockpile; remove and properly
<table>
<thead>
<tr>
<th><strong>Appendix A-1 of the Stormwater Regulation Guide</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>dispose of the straw bale once the upstream area has been stabilized. Areas of disturbance beneath the ball shall be seeded and mulched when the bale is removed.</td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sediment Basin (SB) SC-7</strong></th>
<th><strong>Used:</strong> Yes</th>
<th><strong>Phase(s):</strong> 1,2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>☐ Permanent</strong></td>
<td><strong>☒ Temporary</strong></td>
<td></td>
</tr>
<tr>
<td><strong>What – BMP Description</strong></td>
<td>A temporary basin built on a construction site to capture sediment transported in runoff prior to discharge from the site. A sediment basin is designed to capture runoff and slowly release it to allow time for settling of the sediment prior to discharge.</td>
<td></td>
</tr>
<tr>
<td><strong>When – Installation/Removal</strong></td>
<td>A sediment basin shall be installed prior to land disturbing activities; for a basin being converted to permanent detention basins. For basins to be converted to a detention facility, remove accumulated sediment and reconfigure the basin and outlet to meet the requirements of the final design for the detention facility. For basins that are temporary and not to be used as a permanent detention facility, fill the excavated area with soil and stabilize accordingly.</td>
<td></td>
</tr>
<tr>
<td><strong>Where – Location</strong></td>
<td>Sediment basins shall be installed at the locations identified on the ESC Plan. Where feasible, the sediment basin shall be installed in the same location where a permanent post-construction detention pond will be located.</td>
<td></td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>The sediment basin shall be installed per the sediment basin detail SC-7 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain the sediment basin to ensure its effectiveness. Accumulated sediment shall be dredged from the basin when it reaches no more than one-third of the design storage volume.</td>
<td></td>
</tr>
</tbody>
</table>

Modified EPA SWPPP Template, Version 1.1, September 17, 2007
Created 3/17/11; Rev 2/14/12; Rev 3/12/12

44
## Sediment Trap (ST) BMP Detail SC-8

<table>
<thead>
<tr>
<th>Used: No</th>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

### What – BMP Description
An excavated or bermed area designed to capture drainage, allowing settling of sediment from a disturbed area less than one acre.

### When – Installation/Removal
A sediment trap shall be installed prior to land disturbing activities; the sediment trap shall not be removed until the upstream area is sufficiently stabilized.

### Where – Location
Sediment traps shall be installed at the locations identified on the ESC Plan. It shall be installed across a low area or drainage swale.

### How – BMP Maintenance and Inspection
Sediment traps shall be installed per the sediment trap detail SC-8 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain the sediment trap embankments for stability and seepage.

Inspect the sediment trap embankments for stability and seepage, and the outlet for sediment, debris and damage. Repair damage to the outlet, and remove all obstructions. Accumulated sediment shall be removed when it reaches \( \frac{1}{2} \) the height of the outflow embankment.
## 2.7 Establish Stabilized Construction Exits

### Instructions:
- Describe location(s) of vehicle entrance(s) and exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediments and discharges to stormwater. (Information can be found in the Stormwater Regulation Guide Detail SM-4 Vehicle Tracking Control and SM-6 Stabilized Staging Area.)
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no” in the applicable information AND identify the phase of construction the BMP is associated with, i.e. Phase 1, 2, 3 or N/A.

### Vehicle Tracking Control (VTC) SM-4

<table>
<thead>
<tr>
<th></th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3, 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

#### What – BMP Description
A stabilized site access point that helps remove sediment from vehicle tires and reduces tracking of the sediment onto paved surfaces.

#### When – Installation/Removal
Vehicle tracking control shall be installed prior to any land disturbing activities; and removed when there is no longer the potential for vehicle tracking to occur. This is typically after the site has been stabilized.

#### Where – Location
Vehicle tracking control shall be installed at the location identified on the ESC Plan. Locate your vehicle tracking control where frequent vehicle traffic will exit the construction site onto a paved roadway.

#### How – BMP Maintenance and Inspection
Vehicle tracking control shall be installed per the vehicle tracking control detail SM-4 (Appendix 5 - Erosion and Sediment Control BMP Details).

All vehicle tracking control BMPs must have non-woven geotextile fabric between soil and rock. Recycled concrete aggregate is not allowed.

The Permittee shall continuously inspect and maintain all vehicles tracking control BMPs throughout construction. If the area becomes clogged with sediment, remove and dispose of excess sediment or replace material with a fresh layer of aggregate. Any sediment that is tracked onto adjacent roadways shall be cleaned with brooms, shovels (no water washing), or mechanically cleaned with a pick-up broom.
### Stabilized Construction Roadway (SCR) SM-5

**Used:** No  
**Phase(s):**

<table>
<thead>
<tr>
<th><strong>Permanent</strong></th>
<th><strong>Temporary</strong></th>
</tr>
</thead>
</table>

**What – BMP Description**
A temporary method to control sediment runoff, vehicle tracking, and dust from roads during construction activities consisting of aggregate base course of 3-inch diameter granular material (no recycled concrete allowed).

**When – Installation/Removal**
Use on high traffic construction roads to minimize dust and erosion, and use in place of rough cut street controls on roadways with frequent construction and vehicle traffic; gravel shall be removed once the road is ready to be paved. Prior to paving, the road should be inspected for grade changes and damage. Regrade and repair as necessary.

**Where – Location**
Stabilized construction roadways shall be installed at the locations identified on the ESC Plan. Apply gravel to disturbed areas that are used as a route for vehicles.

**How – BMP Maintenance and Inspection**
A stable surface cover of rigid gravel shall be maintained as well as repairing any perimeter controls. Inspect drainage ditches along the roadway for erosion and stabilize, as needed, through the use of check dams or rolled erosion control products.

### Stabilized Staging Area (SSA) SM-6

**Used:** Yes  
**Phase(s):** 1

<table>
<thead>
<tr>
<th><strong>Permanent</strong></th>
<th><strong>Temporary</strong></th>
</tr>
</thead>
</table>

**What – BMP Description**
A stabilized staging area is a clearly designated area where construction equipment and vehicles, stockpiles, waste bins and other construction-related materials are stored. If the construction site is big, more than one staging area may be necessary.

**When – Installation/Removal**
Stabilized staging areas shall be installed prior to any land disturbing activities.

**Where – Location**
Stabilized staging areas shall be installed at the location identified on the ESC Plan.

**How – BMP Maintenance and Inspection**
Stabilized staging areas shall be installed per the stabilized staging area detail SM-6 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all stabilized staging areas throughout construction.
A stable surface cover of rigid gravel shall be maintained as well as repairing any perimeter controls and following good housekeeping practices.

### Street Sweeping and Vacuuming (SS) SM-7

<table>
<thead>
<tr>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent</strong></td>
<td><strong>Temporary</strong></td>
</tr>
</tbody>
</table>

#### What – BMP Description

Used where vehicles track sediment onto paved roadways to reduce the transport of it into storm drain systems or surface waterways.

#### When – Applicable

Street sweeping or vacuuming shall be conducted when there is noticeable sediment accumulation on roadways adjacent to the construction site. Street sweeping and vacuuming shall be completed prior to any precipitation events, at the end of the workday as needed, and at the end of construction.

#### Where – Location

Street sweeping and vacuuming shall be utilized throughout and adjacent to construction.

#### How – BMP Maintenance and Inspection

Street sweeping and vacuuming shall be performed per the street sweeping and vacuuming detail SM-7 (Appendix 5 - Erosion and Sediment Control BMP Details).

Use standard street sweeping and vacuuming equipment to adequately remove sediment from roadways adjacent to the construction site.
## 2.8 Additional BMPs

**Instructions:**
- Describe additional BMPs that are not listed in Sections 2.1 – 2.7.
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type "yes" or “no” AND identify the phase of construction the BMP is associated with, i.e. Phase 1, 2, 3 or N/A.

### Concrete Washout Areas (CWA) MM-1

<table>
<thead>
<tr>
<th>Used: Yes</th>
<th>Phase(s): 1, 2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**

A specific area of the construction site must be designated and managed as a concrete washout area. Three basic options are available: excavation of a pit in the ground, use of an above ground storage area or use of prefabricated haul-away concrete washout containers.

**When – Installation/Removal**

Concrete washout areas shall be installed prior to any concrete delivery to the construction site; upon termination of use of the washout, accumulated solid waste, including concrete waste and any contamination soils, must be removed from the site to a designated disposal location.

**Where – Location**

Concrete washout areas shall be installed at the locations identified on the ESC Plan. Washout areas within 400 feet of any natural drainage pathway or waterbody or within 1,000 feet of any wells or drinking water sources must be lined.

**How – BMP Maintenance and Inspection**

Concrete washout areas shall be installed per the concrete washout area detail MM-1 (Appendix 5 - Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all concrete washout area BMPs throughout construction.

Ensure adequate signage is in place identifying the location of the washout area. Remove concrete waste in the washout area when filled to about two-thirds of its capacity to maintain functionality.

### Stockpile Management (SP) MM-2

<table>
<thead>
<tr>
<th>Used: Yes</th>
<th>Phase(s): 1, 2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**

Includes measures to minimize erosion and sediment transport from stockpiles. Stockpile management shall be used when soils or other erodible materials are stored at a construction site.
### Stockpile Management

| **When – Installation/Removal** | Stockpile locations shall be determined during construction; and when temporary removal of a BMP is necessary to access the stockpile, ensure BMPs are reinstalled in accordance with their respective design detail section. When the stockpile is no longer needed, properly dispose of excess materials and re-vegetate or otherwise stabilize the ground surface where the stockpile was located. |
| **Where – Location** | Stockpile locations shall be placed away from areas where concentrated stormwater flow is anticipated, major drainageways, gutters, and storm sewer inlets. Stockpile locations shall be noted on the ESC Plan. |
| **How – BMP Maintenance and Inspection** | Stockpile management shall be performed per the stockpile management detail MM-2 (Appendix 5 – Erosion and Sediment Control BMP Details). The Permittee shall continuously inspect and maintain all stockpiles throughout construction.  

**Pervious Surface** - It is recommended that stockpiles are stored on a pervious surface and are protected from any sediment transport. BMPs that can be used on pervious surfaces include, but are not limited to sediment control logs, vegetated buffer and silt fence.  

**Impervious Surface** - Stockpile locations are only allowed on impervious surfaces if no other practical alternative exists. Temporary sediment control shall be placed around the perimeter of the stockpile, such as but not limited to rock socks, straw bales and sand bags. |

---

**Paving and Grinding Operations (PGO) SM-12**  
Used: No  
Phase(s): 

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

**What – BMP Description**  
Runoff management practices shall be used during all paving and grinding operations. A variety of management practices can be used including, but not limited to: inlet protection, perimeter controls, store materials away from the storm sewer system, drainages and waterways and keep a spill kit onsite.
<table>
<thead>
<tr>
<th><strong>When – Installation/Removal</strong></th>
<th>Paving and grinding operations shall be scheduled when dry weather is forecasted; recycle asphalt and pavement material when feasible. Material that cannot be recycled must be disposed of in accordance with applicable regulations.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where – Location</strong></td>
<td>Use runoff management practices during all paving and grinding operations such as surfacing, resurfacing, and saw cuts.</td>
</tr>
<tr>
<td><strong>How – BMP Maintenance and Inspection</strong></td>
<td>The Permittee shall continuously inspect and maintain BMPs associated with paving and grinding operations throughout construction. Perform maintenance on associated BMPs in accordance with their applicable detail maintenance notes.</td>
</tr>
</tbody>
</table>

---

Modified EPA SWPPP Template, Version 1.1, September 17, 2007
Created 3/17/11; Rev 2/14/12; Rev 3/12/12
SECTION 3: CONSTRUCTION SITE PHASING AND SITE MAPS

Instructions:

- **Phased BMP Implementation** – The ESC Plan Site Maps shall clearly delineate the construction sequencing between the separate phases of construction, and the BMP implementation and maintenance of both structural and non-structural BMPs with each phase of construction.

- The ESC Plan **must** identify the BMPs to be implemented during the following three project phases. **Develop a separate phased detailed site maps (i.e. one page representing one phase; not combined) by delineating each BMP for each phase of construction AND provide BMP details with Installation and Maintenance Notes.**

- **Phases of Construction** – Using Section 1.3 Nature and Sequence of Construction Activity section, delineate which BMPs will be used for each of the following phases of construction:

  **Initial Construction**
  - **Phase I – Locations of all initial BMPs**
    Examples of activities include: protect specified vegetation, construction staging/parking/storage, clearing, grubbing, tree and scrub removal, top soil stripping and stock piling temporary roads, and site access points.

  **Interim Construction**
  - **Phase II – Locations of all interim BMPs**
    Examples of activities include: removal of existing pipe, earthwork (excavation/embankment), dewatering, construction of utilities & structures, rip rap, and placement of top soil.

  **Final Construction**
  - **Phase III – Locations of all final BMPs**
    Examples of activities include: final topsoil placement, sod, seeding, mulching, permanent landscaping, pavement, sod, seed and mulching.

- Place the site map pages for each phase in Appendix 6 – Erosion and Sediment Control Plan – Site Map.

  Note the location of each BMP on your site map(s). All BMP details (with installation, maintenance and removal notes) shall be placed in Appendix 5 – Erosion and Sediment Control BMP Details.
3.1 Phase BMP Construction Activity

Instructions:
- Using the information provided in Section 1.3 Nature and Sequence of Construction Activity, specifically the major phases of construction describe the construction phase.
- Describe the BMPs associated with each phase, and the temporary & permanent stabilization methods to be used for each phase.

- **Pre-Construction - Phase I**
  - Describe construction phase: 10/1/20 to 11/1/20
  - List BMPs associated with this phase: Berm, Earth Dikes and Drainage Swales, Silt Fence, Vehicle Tracking Controls
  - Describe stabilization methods for this phase: N/A

- **Construction - Phase II**
  - Describe construction phase: 10/15/20 to 11/1/20
  - List BMPs associated with this phase: Berm, Diversion Ditch and Berm, Drainage Swales, Good Housekeeping, Mulching, Sediment Basin, Silt Fence, Surface Roughening, Temporary Seeding, Vehicle Tracking Controls, Land grading, tackifiers, Erosion Control Blankets.
  - Describe stabilization methods for this phase: N/A

- **Interim Reclamation - Phase III**
  - Describe construction phase: 5/1/22 to 5/1/23
  - List BMPs associated with this phase: Drainage Swales, Good Housekeeping, Mulching, Surface Roughening, Temporary and Permanent Seeding, Vehicle Tracking Controls
  - Describe stabilization methods for this phase: Vegetation establishment and monitoring

- **Well Plugging & Abandonment - Phase IV**
  - Describe construction phase: 5/18/50 to 5/1/51
  - List BMPs associated with this phase: Secondary Containment, Surface Roughening, Vehicle Tracking Controls
  - Describe stabilization methods for this phase: N/A

- **Final Reclamation - Phase V**
  - Describe construction phase: 5/18/50 to 5/1/51
  - List BMPs associated with this phase: Mulching, Surface Roughening, Temporary and Permanent Seeding
  - Describe stabilization methods for this phase: Vegetation establishment and revegetation monitoring
3.2 General Notes

Instructions:
Below are the required general notes applicable to this Erosion and Sediment Control Plan.

1. Owner/Contractor is responsible for obtaining a State of Colorado, Colorado Department of Public Health and Environment (CDPHE) General Permit for Stormwater Discharges Associated with Construction Activity COR-030000 prior to construction (CDPS Stormwater Construction Permit).

2. The Owner/Contractor shall provide Adams County with a copy of the CDPS Stormwater Construction Permit Inactivation Notice Application. There will be no fee charged to Adams County for the Inactivation Notice or if the Contractor neglects to file this Notice.

3. It is anticipated that the BMPs implemented at the site will have to be maintained and modified to adapt to changing conditions or to ensure that potential pollutants are being properly managed at the site. Responsive ESC Plan changes addressing BMP installation, maintenance and/or implementation or when BMPs are determined to be ineffective; shall be made prior to changes in site conditions. Prior to BMP modification, a notation shall be made in the ESC Plan that includes date and time of changes in the field, an identification of the BMPs removed or added, and the locations of those BMPs.

4. Construction Safety Barrier Fencing (orange construction fence) shall be used to protect wetlands and other sensitive areas, to prevent access, and to delineate the Limits of Construction. The Construction Safety Barrier Fencing shall be installed prior to any work or earth disturbing activities. It shall be specified in the ESC Plan and the locations shown on the site map.

5. The Owner/Contractor is responsible for implementing and maintaining erosion and sediment control measures at all times during construction. The ESC Plan shall be modified in compliance to the Adams County Stormwater Regulations.

6. Stormwater Inspections – always use the Stormwater construction Inspection Report form provided in Appendix 7 - Inspection Report Instructions and Form.

7. Minimum Stormwater Inspection Schedule - A thorough inspection of the Best Management Practices (BMPs) shall be performed every fourteen (14) calendar days and within twenty-four (24) hours after any precipitation or snowmelt event that causes surface erosion.

   a. Post-Storm Event Stormwater Inspections at Temporarily Idle Sites – If no construction activities will occur following a storm event, post-storm event inspections shall be conducted prior to re-commencing construction activities, but no later than seventy
Appendix A-1 of the Stormwater Regulation Guide

two (72) hours following the storm event. The occurrence of any such delayed inspections must be documented in the inspection record. Routine inspections still must be conducted at least every fourteen (14) calendar days.

b. Stormwater Inspections at Completed Sites/Areas – For sites or portions of sites that meeting the following criteria, the permittee shall make a thorough inspection of their construction site BMPs at least once every month, and post-storm event stormwater inspection are not required.
   i. all construction activities that will result in surface ground disturbed are completed;
   ii. all activities required for final stabilization, in accordance with the ESC Plan, have been completed;
   iii. the ESC Plan has been amended to indicate those areas that will be inspected in accordance with the reduced schedule allowed.

8. Always use biodegradable erosion control blankets on slopes 3:1 or steeper and in swales, long channels and roadside ditches.

9. All soil imported to or exported from the site shall be properly covered to prevent the loss of material during transport. Haul routes must be permitted by the County. No material shall be transported to another site without first obtaining a Hauling Permit from Adams County Planning.

10. Sediment caused by accelerated soil erosion shall be removed from runoff water before it leaves the site of the earth disturbance.

11. Any construction areas, not graded to final grade, require temporary BMPs for site stabilization.

12. Construction debris shall be stockpiled within the designated staging area and properly disposed of.

13. Excavated material shall not be stockpiled within the roadway section unless it is temporary and has appropriate sediment control measures in place.

14. Permanent erosion and sediment control measures for all slopes, channels, ditches, or any disturbed land area shall be stabilized immediately after final grading.

15. All spills shall be cleaned up immediately after discovery, or contained until appropriate cleanup methods can be employed. Section 4.2 Spill Prevention, Containment and Control shall be followed along with proper disposal methods.
SECTION 4: WASTE MANAGEMENT PLAN

Instructions:
- The construction site wastes identified in Section 1.8 Potential Sources of Pollutants include the following categories of waste:
  - Solid Waste (e.g. sediment, gravel, compost, building materials, vehicle tracking, construction spoils, trash, etc.)
  - Liquid Waste (e.g. oil, gas, tar, hydraulic fluid, etc.)
  - Concrete and Paint Washout (e.g. truck chute and associated fixtures and equipment, paint, etc.)
  - Sanitary Waste (e.g. worker trash, portable toilets, waste piles and dumpsters, etc.)
  - Chemical Waste (e.g. fertilizers, pesticides, detergents, fuels, solvents, oils, etc.)
  - Contaminated Groundwater Management, if applicable
  - Permitted Construction Dewatering, if applicable

- Use the Stormwater Regulation Guide to write a waste management plan by describing structural and non-structural pollution prevention BMPs that will be implemented to control pollutants in stormwater from construction site waste from leaving the construction site permitted area.

- The following BMP categories shall be addressed to control construction site waste, as applicable. Use the Stormwater Regulation Guide for information on the following BMPs:
  - Covering Outdoor Storage and Handling Areas
  - Spill Prevention, Containment and Control
  - Good Housekeeping
  - Vehicle Maintenance, Fueling and Storage
  - Street Sweeping and Cleaning
  - Storm Sewer System Cleaning
4.1 Covering Outdoor Storage and Handling Areas

Instructions:
- Below, identify BMP procedures that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no”.
- The following procedures shall be implemented for covering outdoor storage and handling areas.

<table>
<thead>
<tr>
<th>Covering Outdoor Storage and Handling Areas</th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent</strong></td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td><strong>Temporary Procedure</strong></td>
<td>☑</td>
<td></td>
</tr>
</tbody>
</table>

Description

When raw materials, byproducts, finished products, storage tanks, and other materials are stored or handled outdoors, stormwater runoff that comes in contact with the materials can become contaminated. Proactively covering storage and handling areas can be an effective source control for such areas. Coverings can be permanent or temporary and consist of tarp, plastic sheeting, roofing, enclosed structures, or other approaches that reduce exposure of materials to precipitation and wind.

Appropriate Uses

Covering is appropriate for areas where solids (e.g., gravel, compost, building materials) or liquids (e.g., oil, gas, tar) are stored, prepared, or transferred. Cover the follow areas that are applicable to this construction site:

- **Loading and Unloading**: Loading and unloading operations usually take place at outside storage or staging area on the construction site. Materials may be spilled during transfer between storage facilities and trucks during pumping of liquids, pneumatic transfer of dry chemicals, and mechanical transfer of bags, boxes, drums, or other containers by material handling equipment.

- **Aboveground Tanks/Liquid Storage**: Accidental releases of chemicals from above-ground liquid storage can contaminate stormwater with a variety of pollutants. Several common causes of accidental releases from above-ground storage include: external corrosion and structural failure, problems due to improper installation, spills and overfills due to operator error, failure of piping systems, and leads or spills during pumping of liquids or gases between trucks to a storage facility.

- **Outside Manufacturing**: Common outside manufacturing activities may include parts assembly, rock grinding or crushing, metals paining or coating, grinding or sanding, degreasing, concrete manufacturing, parts cleaning or operations that use hazardous materials. These activities can result in dry deposition of dust, metal and wood shavings and liquid discharges of dripping or leaking fluids from equipment or process and other residuals being washed away in storm runoff. In addition to the manufacturing process,
outside storage of materials and waste products may occur in conjunction with outside manufacturing.

- **Waste Management:** Wastes spilled, leached, or lost from outdoor waste management areas or outside manufacturing activities may accumulate in soils or on other surfaces and be carried away by storm runoff. There is also the potential for liquid wastes from surface impoundments to overflow to surface waters or soak the soil where they can be picked up by runoff. Possible stormwater contaminants include toxic compounds, oil and grease, oxygen-demanding organics, paints and solvents, heavy metals and high levels of suspended solids. Lack of coverage of waste receptacles can result in precipitation seeping through the material and collecting contaminants or the material being blown around the site and into the storm sewer system. Typical containment sources include waste piles, wastewater and solid waste treatment and disposal, land application sites, dumpsters, or unlabeled drums.

- **Outside Storage of Materials:** Raw materials, intermediate products, byproducts, process residuals, finished products, containers, and materials storage areas can be sources of pollutants such as metals, oils and grease, sediment and other contaminants. Pollutant transport can occur when solid materials wash off or dissolve into water, or when spills or leaks occur.

### Practice Procedures

- Where practical, conduct operations indoors. Where impractical, select an appropriate temporary or permanent covering to reduce exposure of materials to precipitation and runoff.

- The type of covering selected depends on a variety of factors such as the type and size of activity being conducted and materials involved. Types of cover range from relatively inexpensive tarps and plastic sheeting to overhead structures or fully enclosed buildings equipped with ventilation, lighting, etc.

- Covering practices should be combined with Good Housekeeping BMPs to be most effective.

- Measures such as tarps and plastic sheets typical require more frequent inspection and maintenance than construction facilitates.

*During construction Adams County Inspects for Construction Site Waste.*

Place additional information here:
4.2 Spill Prevention, Containment and Control

Instructions:
- Below, identify BMP procedures that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no”.
- The following procedures shall be implemented for spill prevention, containment and control.

<table>
<thead>
<tr>
<th>Spill Prevention, Containment and Control</th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Permanent</td>
<td>☑ Temporary Procedure</td>
<td></td>
</tr>
</tbody>
</table>

Description
Spills and leaks of solid and liquid materials processed, handled or stored outdoors can be significant source of stormwater pollutants. Spilled substances can reach receiving waters when runoff washes these materials from impervious surfaces or when spills directly enter the storm sewer system during dry weather conditions.

Effective spill control includes both spill prevent and spill response measures and depends on proper training for spill response measures and may also include structural spill containment. Structural spill containment measures typically include temporary or permanent curbs or berms that surround a potential spill site. Berms may be construction of concrete, earthen material, metal, synthetic liners, or other material that will safely contain the spill. Spill control devises may also include valves, slide gates, or other devices that can control and contain spilled material before it reaches the storm sewer system or receiving waters.

Appropriate Uses
Implement spill prevention, containment and control measures at construction sites in areas where materials may be spilled in quantities that can adversely impact receiving waters when discharged directly or through the storm sewer system.

Practice Procedures – Spill Prevention Measures
- Train employees on potential sources of pollution on-site and provide clear, common-sense spill prevention practices be strictly followed.
- Identify equipment that is exposed to precipitation, pollutants that may be generated and possible sources of leaks or discharges.
- Perform regular inspection and preventative maintenance of equipment to ensure proper operation and to check for leaks or evidence of discharge (stains). Provide clear procedures to ensure that needed repairs are completed and provide temporary leak containment until such repairs can be made.
Appendix A-1 of the Stormwater Regulation Guide

- Drain or replace motor oil and other automotive fluids in a designated area away from storm sewer inlets. Collect spent fluids and recycle or dispose of properly. Never dispose of these fluids in the storm sewer or sanitary sewer.
- In fueling areas, clean up spills with dry methods (absorbents) and use damp cloths on gas pumps and damp mops on paved surfaces. **Never use a hose to “wash down” a fuel spill.**
- Where practical, reduce stormwater contact with equipment and materials by implementing covered storage, reduce stormwater run-on and follow good housekeeping practices.

**Identification of Spill Areas**

Identify potential spill areas, potential spill volumes, material types, frequency of material used, and drainage paths from spill areas with relation to storm sewer inlets, adjacent water bodies, structural BMPs, and containment structures. Use this information to determine the types of spill prevention and control measures needed specific to the site conditions. Examples of potential spill locations include:

- Loading and unloading areas
- Outdoor storage areas
- Outdoor manufacturing or processing activities
- Waste disposal
- Areas that generate significant dust or particulates (that may be subsequently deposited on the ground)
- Areas prone to spills based on past experience at the site
- Locations where other routine maintenance activities occur such as equipment maintenance and cleaning, pesticide/fertilizer application, etc.

Additionally, areas where smaller leaks may occur such as parking should also have basic spill cleanup procedures.

**Material Handling Procedures**

From a water quality perspective, the primary principle behind effective material handling practices is to minimize exposure to precipitation. This can be accomplished by storing the material indoors under weather-resistant covering, elevating the material off the ground by using pallets, and diverting stormwater around materials storage areas. Representative outdoor materials handling procedures include:
Appendix A-1 of the Stormwater Regulation Guide

- Keep bulk solid materials such as raw materials, sand, gravel, topsoil, compost, concrete, packing materials, metal products and other materials covered and protected from stormwater.
- When practical, store materials on impermeable surfaces.
- Store hazardous materials according to federal, state, and local hazardous materials requirements.
- Adopt procedures that reduce the chance of spills or leaks during filling or transfer of materials.
- Substitute less toxic or nontoxic materials for toxic materials.
- Store containers that are easily punctured or damaged away from high traffic areas.
- Add waste-capture containers such as collection pans for lubricating fluids.
- Store drums and containers with liquid materials on impermeable surfaces and provide secondary containment where appropriate. Drums stored outdoors should be located on pallets to minimize contact with runoff.

Spill Response Procedures and Equipment

Spill response procedures should be tailored to site-specific conditions and industry-specific regulatory requirements. General spill response procedures include:

- Containment and cleanup of spills should begin promptly after the spill is observed.
- Sweep up small quantities of dry chemical or solids to reduce exposure to runoff. Shoveling may be used for larger quantities of materials.
- Absorbents should be readily accessible in fueling areas or other areas susceptible to spills.
- Wipe up small spills with a shop rag, store shop rags in appropriate containers, dispose of rags properly or use a professional industrial cleaning service.
- Contain medium-sized spills with absorbents (e.g., kitty litter, sawdust) and use inflatable berms or absorbent "snakes" as temporary booms for the spill. Store and dispose of absorbents properly. Wet/dry vacuums may also be used, but not for volatile fluids.
- Develop procedures and locations for containing and storing leaking containers.
- Install drip pans below minor equipment leaks and properly dispose of collected material until a repair can be made.
- For large spills, first contain the spill and plug storm sewer inlets where the liquid may migrate off-site, then clean up the spill.
- Excavation of spill areas to removed-contaminated material may be required where large liquid spills occur on unpaved surfaces.
An inventory of cleanup materials should be maintained onsite and strategically located based on the types and quantities of chemicals present.

**Structural Spill Containment Measures**

Two general approaches are often used when implementing spill containment measures. The first approach is designed to contain the entire spill. The second approach uses curbing to route spilled material to a collection basin. Both containment berming and curbing should be sized to safely contain or convey to a collection basin a spill from the largest storage tank, tanker truck, or other containment device in the possible spill area. The spill containment area must have an impermeable surface (e.g., impermeable liner, asphalt or concrete) to prevent groundwater contamination. The containment system must be designed to enable collection and removal of spilled material through a pump or vacuum trucks, use of sorbent or gelling material, or other measures. Material removed from the spill area must be disposed of or recycled according to local, state, and federal standards.

If the capacity of the containment berming or the collection basin is exceeded, supplemental spill control measures should be available such as a portable containment device, sorbent materials, or gelling agents that eventually solidify the material. Water that collects within containment areas due to rainfall or snowmelt must be appropriately treated before release from the spill area.

**Spill Plan Development**

Many industries are required by federal law to have a Spill Prevention, Control and countermeasures Plan (SPCC) that meets specific regulatory criteria when certain types and quantities of materials are used or processed at a site. These plans can be instrumental in developing a spill control plan for stormwater management purposes. Even if an SPCC plan is not legally required at a site, a spill control plan for stormwater management purposes may be necessary. Representative information appropriate for a spill control plan, building on concepts previously introduced in this Fact Sheet, includes:

- Site plan showing where materials are stored and handled, and where associated activities occur.
- Notification procedures to be used in the event of an accident.
- Instructions for clean-up procedures.
- A designated person with spill response and clean-up authority.
- Training of key personnel in plan and clean-up procedures.
- Signs posted at critical locations providing a summary of SPCC plan information, phone numbers, contacts, equipment locations, etc.
Appendix A-1 of the Stormwater Regulation Guide

- Provisions requiring spills to be cleaned up, corrective actions taken, or countermeasures implemented immediately.
- Provisions for absorbents to be made available for use in fuel areas, and for containers to be available for used absorbents.
- Prohibition on washing absorbents into the storm sewer system or into the sanitary sewer system via floor drains.
- Provision for emergency spill containment and clean-up kits in accessible and convenient locations. Kits should contain the appropriate clean-up materials applicable to the materials stored at the site.

*During construction Adams County Inspects for Construction Site Waste.*

Place additional information here:
4.3 Good Housekeeping

Instructions:
- Below, identify BMP procedures that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no”.
- The following procedures shall be implemented for good housekeeping.

Good Housekeeping Practices

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
</thead>
</table>

Used: Yes  Phase(s): 1, 2, 3

Description
Good housekeeping practices are designed to maintain a clean and orderly work environment. The most effective first steps towards preventing pollution in stormwater from construction sites simply involve using common sense to improve the facility's basic housekeeping methods. Poor housekeeping practices result in increased waste and potential for stormwater contamination.

A clean and orderly work site reduces the possibility of accidental spills caused by mishandling of chemicals and equipment and should reduce safety hazards to personnel. A well-maintained material and chemical storage area will reduce the possibility of stormwater mixing with pollutants.

Some simple procedures a facility can use to promote good housekeeping include improved operation and maintenance of machinery and processes, material storage practices, material inventory controls, routine and regular clean-up schedules, maintaining well organized work areas, signage, and educational programs for employees and the general public about all of these practices.

Practice Procedures
Good housekeeping practices include these general areas:

- Operation and Maintenance
- Material Storage
- Material Inventory
- Training and Participation.

Operation and Maintenance
Consider implementing the following practices:

- Maintain dry and clean floors and ground surfaces by using brooms, shovels, vacuums or cleaning machines, rather than wet clean-up methods.
- Regularly collect and dispose of garbage and waste material.
Appendix A-1 of the Stormwater Regulation Guide

- Routinely inspect equipment to ensure that it is functioning properly without leaking and conduct preventative maintenance and needed repairs.
- Train employees on proper clean up and spill response procedures.
- Designate separate areas of the site for auto parking, vehicle refueling and routine maintenance.
- Promptly clean up leaks, drips and other spills.
- Cover and maintain dumpsters and waste receptacles. Add additional dumpsters or increase frequency of waste collection if overflowing conditions reoccur.
- Where outdoor painting and sanding occur, implement these practices:
  - Conduct these activities in designated areas that provide adequate protection to prevent overspray and uncontrolled emissions. All operations should be conducted on paved surfaces to facilitate cleanup.
  - Use portable containment as necessary for outside operations.
  - Clean up and properly dispose of excess paint, paint chips, protective coatings, grit waste, etc.
- Maintain vegetation on facility grounds in a manner that minimizes erosion. Follow the Landscape Maintenance and Pesticide, Herbicide and Fertilizer Usage BMPs to ensure that minimum amounts of chemicals needed for healthy vegetation are applied in a manner that minimizes transport of these materials in runoff.

Material Storage Practices

Proper storage techniques include the following:

- Provide adequate aisle space to facilitate material transfer and ease of access for inspection.
- Store containers, drums, and bags away from direct traffic routes to reduce container damage resulting in accidental spills.
- Stack containers according to manufacturer’s instructions to avoid damaging the containers from improper weight distribution. Also store materials in accordance with directions in Material Safety Data Sheets (MSDSs).
- Store containers on pallets or similar devices to prevent corrosion of containers that results from containers coming in contact with moisture on the ground.
- Store toxic or hazardous liquids within curbed areas or secondary containers.

Material Inventory Practices

An up-to-date materials inventory can keep material costs down by preventing overstocking, track how materials are stored and handled onsite, and identify which materials and activities pose the most risk to the environment. Assign responsibility of hazardous material inventory to individuals trained to handle such materials. A material inventory should include these steps:
Identify all chemical substances present at work site. Perform a walk-through of the site, review purchase orders, list all chemical substances used and obtain Material Safety Data Sheets (MSDS) for all chemicals.

Label all containers. Labels should provide name and type of substance, stock number, expiration date, health hazards, handling suggestions, and first aid information. Much of this information can be found on an MSDS.

Clearly identify special handling, storage, use and disposal considerations for hazardous materials on the material inventory.

Institute a shelf-life program to improve material tracking and inventory that can reduce the amount of materials that are overstocked and ensure proper disposal of expired materials. Careful tracking of materials ordered can result in more efficient materials use. Decisions on the amounts of hazardous materials that are stored on site should include an evaluation of any emergency control systems that are in place. All storage areas for hazardous materials should be designed to contain spills.

Training and Participation
It is recommended that frequent and proper training in good housekeeping techniques reduces the likelihood that chemicals or equipment will be mishandled. To promote good housekeeping, consider implementing these practices:

- Discuss good housekeeping practices in training programs and meetings.
- Publicize pollution prevention concepts through posters or signs.
- Post bulletin boards with updated good housekeeping procedures, tips and reminders.

*During construction Adams County Inspects for Construction Site Waste.*

Place additional information here:
4.4 Vehicle Maintenance, Fueling and Storage

Instructions:
- Below, identify BMP procedures that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no”.
- The following procedures shall be implemented for vehicle maintenance, fueling and storage.

<table>
<thead>
<tr>
<th>Vehicle Maintenance, Fueling and Storage</th>
<th>Used: Yes</th>
<th>Phase(s): 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Permanent</td>
<td>☒ Temporary</td>
<td></td>
</tr>
</tbody>
</table>

Description

Areas where vehicles are fueled, maintained, and stored/parked can be pollutant "hot spots" that can result in hydrocarbons, trace metals, and other pollutants being transported in precipitation runoff. Proper fueling operations, storage of automotive fluids and effective spill cleanup procedures can help reduce contamination of stormwater runoff from vehicle maintenance and fueling facilities.

Fuel-related spills can occur due to inattention during fueling or "topping off" fuel tanks. Common activities at construction sites include vehicle fluid replacement and equipment replacement and repair. Some of the wastes generated maintaining automobiles include solvents (degreasers, paint thinners, etc.), antifreeze, brake fluid and brake pad dust, battery acid, motor oil, fuel, and lubricating grease.

Appropriate Uses

These BMP procedures are applicable to vehicle maintenance and fueling. Be aware that vehicle wash water is considered process wastewater that will not be discharged to the storm sewer system.

Practice Procedures

Vehicle Maintenance

The most effective way to minimize wastes generated by automotive maintenance activities is to prevent their production in the first place. Consider adopting these practices:

- Perform maintenance activities inside or under cover. When repairs cannot be performed indoors, be sure to use drip pans or absorbents.
- Keep equipment clean and free of excessive oil and grease buildup.
- Promptly cleanup spills using dry methods and properly dispose of waste. When water is required, use as little as possible to clean spills, leaks, and drips.
Use a solvent collection service to collect spent solvent used for parts cleaning.

When using liquids for cleaning, use a centralized station to ensure that solvents and residues stay in one area. Locate drip pans and draining boards to direct solvents back into a solvent sink or holding tank for reuse.

Store used oil for recycling in labeled tanks. Locate used oil tanks and drums away from storm sewer, flowing streams, and preferably indoors.

Use non-hazardous or less hazardous alternatives when practical. For example, replace chlorinated organic solvents with non-chlorinated ones like kerosene or mineral spirits.

Properly recycle or dispose of grease, oil, antifreeze, brake fluid, cleaning solutions, hydraulic fluid, batteries, transmission fluid, worn parts, filters, and rags.

Drain and crush oil filters before recycling or disposal.

Drain all fluids and remove batteries from salvage vehicles and equipment.

Closely monitor parked vehicles for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling.

Install berms or other measures to contain spills and prevent work surface runoff from entering storm sewer system.

Develop and follow a spill prevention plan. This includes a variety of measures such as spill kits and knowing where storm sewers are located and how to protect them (e.g., drain mat, berm) when larger spills occur. (See the Spill Prevention, Containment and Control BMP Procedure for more information.)

Conduct periodic employee training to reinforce proper disposal practices.

Promptly transfer used fluids to recycling drums or hazardous waste containers.

Store cracked batteries in leak-proof secondary containers.

Inspect outdoor storage areas regularly for drips, spills and improperly stored materials (unlabeled containers, auto parts that might contain grease or fluids, etc.). This is particularly important for parking areas for vehicles awaiting repair.

Structural stormwater BMPs in vehicle hotspot areas require routine cleanout of oil and grease, sometimes monthly or more frequently. During periods of heavy rainfall, cleanout is required more often to ensure that pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the BMP working efficiently.

Vehicle Fueling

Designated fueling areas should be designed to prevent stormwater runoff and spills. For example, fuel-dispensing areas should be paved with concrete or an equivalent impervious surface, with an adequate slope to prevent ponding, and separated from the rest of the site by a grade break or berm that prevents run-on of precipitation.
For facilities where equipment is being fueled with a mobile fuel truck, establish a designated fueling area. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs, it is prevented from entering the storm sewer system. A form of secondary containment should be used when transferring fuel from the tank truck to the fuel tank. Storm drains in the vicinity should also be covered. Install vapor recovery nozzles to help control drips, as well as reduce air pollution.

- Keep spill response information and spill cleanup materials onsite and readily available.
- Dry cleanup methods should be employed when cleaning up fuel spills. Such methods include sweeping to remove litter and debris and using rags and absorbents for leaks and spills.
- Water should not be used to wash these areas. During routine cleaning, use a damp cloth on the pumps and a damp mop on the pavement, rather than spraying with a hose. Fuel dispensing nozzles should be fitted with "hold-open latches" (automatic shutoff) except where prohibited by local fire departments. Signs can be posted at the fuel dispenser or island warning vehicle owners/operators against "topping off" vehicle fuel tanks.
- Written procedures that describe these BMPs should be provided to employees who will be using fueling systems.

*During construction Adams County Inspects for Construction Site Waste.*

Place additional information here:
4.5 Street Sweeping and Cleaning

Instructions:
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type "yes" or "no".
- The following procedures shall be implemented for street sweeping and cleaning.

<table>
<thead>
<tr>
<th>Street Sweeping and Cleaning</th>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Permanent</td>
<td>☐ Temporary</td>
<td></td>
</tr>
</tbody>
</table>

Description
Street sweeping uses mechanical pavement cleaning practices to reduce sediment, litter and other debris washed into storm sewers by runoff. This can reduce pollutant loading to receiving waters and in some cases reduce clogging of storm sewers and prolong the life of infiltration oriented BMPs and reduce clogging of outlet structures in detention BMPs. Different designs are available with typical sweepers categorized as a broom and conveyor belt sweeper, wet or dry vacuum-assisted sweepers, and regenerative-air sweepers. The effectiveness of street sweeping is dependent upon particle loadings in the area being swept, street texture, moisture conditions, parked car management, equipment operating conditions and frequency of cleaning (Pitt et al. 2004).

Appropriate Uses
Street sweeping is an appropriate technique in urban areas where sediment and litter accumulation on streets is of concern for aesthetic, sanitary, water quality, and air quality reasons. From a pollutant loading perspective, street cleaning equipment can be most effective in areas where the surface to be cleaned is the major source of contaminants. In areas where construction activity is occurring, street sweeping shall occur as part of construction site erosion and sediment control plans.

Practice Procedures
1. Street sweeping shall be completed when there is sediment or tracking from the construction site exits present that has come from the construction site into the public right-of-way.
2. The frequency of street sweeping is dependent on presence of sediment or tracking that has occurred. If tracking is occurring, either a VTC shall be installed, the VTC needs maintenance or the VTC present is inadequate; all require that the Erosion and Sediment Control Plan be updated.
3. All instances of off-site (outside permitted area) sediment or tracking from the construction site shall be swept immediately.

4. Conduct street sweeping prior to precipitation events.

5. Operate sweepers at manufacturer recommended optimal speed levels to increase effectiveness.

6. Regularly inspect vehicles and equipment for leaks and repair promptly.

7. Keep accurate logs of the number of curb-miles swept and the amount of waste collected.

8. Dispose of street sweeping debris and dirt at a landfill.

9. Do not store swept material along the side of the street or near a storm drain inlet.
4.6 Storm Sewer System Cleaning

Instructions:
- Describe structural and non-structural BMPs that are used to remove accumulated sediment, trash, and other pollutants of the storm sewer system including inlets, pipes and stormwater BMPs for the applicable construction site wastes identified in Section 1.8 Potential Sources of Pollution to maintain a clean and orderly construction site.
- Below, identify BMPs that are applicable to the construction site by selecting the blue Yes/No then type “yes” or “no”.

<table>
<thead>
<tr>
<th>Storm Sewer System Cleaning</th>
<th>Used: No</th>
<th>Phase(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Permanent</td>
<td>□ Temporary</td>
<td></td>
</tr>
</tbody>
</table>

Description

Periodic storm sewer system cleaning can help to remove accumulated sediment, trash, and other substances from various components of the storm sewer system including inlets, pipes and stormwater BMPs.

Routine cleaning reduces the amount of pollutants, trash, and debris both in the storm drain system and in receiving waters. Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion (Livingston et al. 1997). Cleaning increases dissolved oxygen, reduces levels of bacteria, and supports in-stream habitat. Areas with relatively flat grades or low flows should be given special attention because they rarely achieve high enough flows to flush themselves (Ferguson et al. 1997).

Water used in storm drain cleaning must be collected and properly disposed of, typically at a sanitary wastewater treatment facility. Simpler methods in localized areas can also include manual trash collection and shoveling sediment and debris from inlets and outlets.

Frequency and prioritization of storm sewer cleaning is affected by multiple factors such as the activity and intensity of construction and the proper installation and maintenance for construction BMPs.

Appropriate Uses

The contractor is responsible for properly cleaning out the storm sewer system. It is recommended that prior to construction, the contractor inspect existing storm sewer inlets to document if they are clean or need maintenance.

The storm sewer system shall be cleaned, at minimum, following completion of construction but prior to stabilization.

Practice Guidelines

Modified EPA SWPPP Template, Version 1.1, September 17, 2007
Created 3/17/11; Rev 2/14/12; Rev 3/12/12
To be most effective, the storm sewer system shall be inspected as part of the mandated 14 day stormwater quality inspections.

- **Technology**: A variety of methods of cleaning catch basins are available, including manual cleaning (shovel), vacuum cleaning and vacuum combination jet cleaning. Choose the approach that is most effective for site conditions.

- **Staff training**: Operators should be properly trained in catch basin maintenance including waste collection and disposal methods.

- **Material disposal**: Most catch basin waste is of acceptable quality for landfills. If it is suspected that catch basin waste contains hazardous material, it should be tested and disposed of accordingly.

Place additional information here:
SECTION 5: STORMWATER INSPECTIONS

5.1 Inspections

Instructions:
- Identify the individual(s) responsible for conducting 14 day and stormwater quality inspections and describe their qualifications. It is recommended that the individual responsible for conducting stormwater quality inspection is Certified Inspector of Sediment and Erosion Control (CISEC) certification is preferred.
- Describe the frequency of inspections and procedures to inspect BMPs that will occur at your site.
- Identify procedures that will be taken to document the repairs and maintenance of BMPs that you undertake as a result of your inspections.
- For standard required stormwater quality inspections, use the Standard Stormwater Quality Inspection Form in Appendix 7 – Standard Stormwater Quality Inspection Form. Place completed stormwater quality inspections in Appendix 9 – Completed Stormwater Quality Inspections.

1. Inspection Personnel:

Identify the person(s) who will be responsible for conducting inspections and describe their qualifications:

Blake Ford – Certified SWMP Administrator and has completed CETC 145 and 150 continuing education classes

2. Inspection Frequency:

Stormwater Quality Regulations Section 9-05-05-02

“…shall perform and document complete inspections, at minimum, once every fourteen (14) days during active construction in addition to post-precipitation events that may cause surface erosion.” And “The Permittee shall make a thorough inspection of their construction site at least once every month once all construction activities have been completed.”

Stormwater Inspections – always use the Stormwater construction Inspection Report form provided in Appendix 7 - Inspection Report Instructions and Form.

- Minimum Stormwater Inspection Schedule - A thorough inspection of the Best Management Practices (BMPs) shall be performed every fourteen (14) calendar days and within twenty-four (24) hours after any precipitation or snowmelt event that causes surface erosion.
- Post-Storm Event Stormwater Inspections at Temporarily Idle Sites – If no construction activities will occur following a storm event, post-storm event inspections shall be conducted prior to re-commencing construction activities, but no later than seventy two (72) hours following the storm event. The occurrence of any such delayed inspections must be documented in the inspection record.
Routine inspections still must be conducted at least every fourteen (14) calendar days.

c. Stormwater Inspections at Completed Sites/Areas – For sites or portions of sites that meeting the following criteria, the permittee shall make a thorough inspection of their construction site BMPs at least once every month, and post-storm event stormwater inspection are not required.

   i. all construction activities that will result in surface ground disturbed are completed;

   ii. all activities required for final stabilization, in accordance with the ESC Plan, have been completed;

   iii. the ESC Plan has been amended to indicate those areas that will be inspected in accordance with the reduced schedule allowed.

Minimum Stormwater Quality Inspection Schedule

The permittee will inspect at least once every 14 calendar days. Also, post-storm event inspections must be conducted within 24 hours after the end of any precipitation event that causes surface erosion.

Stormwater Quality Inspections at Completed Sites

The permittee is allowed to make a thorough stormwater quality inspection of their project site at least once every month contingent upon:

   a. All construction activities that will result in surface ground disturbance are completed but final stabilization has not been achieved due to the vegetative cover that has not become established;

   b. All activities required for final stabilization, in accordance with the ESC Plan, have been completed;

   c. The ESC Plan has been amended to indicate those areas that will be inspected in accordance with the reduced inspection schedule.

3. Inspection Procedures:

At minimum, inspect the construction site perimeter, all disturbed area, material and/or waste storage areas that are exposed to precipitation, discharge location, and locations where vehicles access the site shall be inspected for evidence of, or the potential for, pollutants leaving the Permitted boundaries, entering the storm sewer system, or discharging...
Appendix A-1 of the Stormwater Regulation Guide

to the County’s MS4 Permitted Area. Refer to Section 5.5 Recommended inspection sequence.

4. **Correcting Problems:**

Describe the general procedures for correcting problems when they are identified and the responsible staff that is responsible for making corrections. Inspection forms will be completed by the designated contractor after each inspection frequency and included in the Project records. Inspectors shall be knowledgeable in erosion, sediment, and stormwater control principles as well as the installation, function, and maintenance of such practices. All non-functioning control measures shall be documented upon discovery in a corrective action maintenance log, then scheduled for completion, review, and/or repaired immediately (during the inspection). Each inspection report shall be signed, and a copy of all inspection records will be maintained by Extraction Oil and Gas, Inc.

Where earthwork and construction activities have been completed, but final stabilization is not achieved due to vegetative cover, the frequency of inspections may be reduced to once every 30 days. Inspections will continue until all reclaimed areas have achieved a plant cover of 70% of the pre-construction reference vegetation (i.e. final stabilization).

5. **Inspection Form:**

Always use the inspection form provided under Appendix 7 – Standard Stormwater Inspection Form and place all completed inspections under Appendix 9 – Completed Stormwater Quality Inspections.
5.2 Delegation of Authority

Instructions:
- Delegation of Authority is optional.
- Identify the individual(s) or specifically describe the position where the construction site operator has delegated authority for the purposes of signing inspection reports, certifications, or other information.

Duly Authorized Representative(s) or Position(s):

Extraction Oil and Gas, Inc.
Blake Ford
Site Supervisor
370 17th Street, Suite 5300
Denver, CO 80202
970-576-3446
bford@extractionog.com

Optional - Attach a copy of the signed delegation of authority form in Appendix 8.
5.3 **Recommended Inspection Sequence**

**Instructions:**
- When conducting stormwater inspections of your construction site it is recommended that one always follows this recommended inspection sequence to ensure that all procedures and measures are being followed. Place all completed inspections in Appendix 9 – Completed Stormwater Quality Inspections.

1. **Plan your stormwater inspection**
   - Always use the inspection form provided in Appendix 7 – Stormwater Quality Inspection Form.
   - Obtain a copy of the site drawings with BMP locations marked.
   - Plan to walk the entire site, including discharge points from the site and any off-site support activities.
   - Follow a consistent pattern each time to ensure you inspect all areas.

2. **Inspection frequency**
   - Site inspections must be conducted at least once every 14 calendar day.
   - Post-storm inspections must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion.
   - Stabilization inspections are inspections conducted at upon completion of construction, but final stabilization has not been achieved due to a vegetative cover that has not become established. Stabilization inspections are conducted at least once every month.

3. **Inspect discharge points and downstream, off-site areas**
   - Inspect discharge locations to determine whether erosion and sediment control measures are effective.
   - Inspect nearby downstream locations, if feasible.
   - Walk down the street to inspect off-site areas for signs of discharges. This is important in areas with existing curbs and gutters.
   - Inspect down slope existing catch basin inlets to ensure they are free of sediment and other pollutants and to ensure that they are adequately protected.

4. **Inspect perimeter controls and slopes**
   - Inspect perimeter controls such as silt fences to determine if sediment shall be removed.
   - Check the structural integrity of the BMP to determine if portions of the BMP need to be replaced.
   - Inspect slopes and temporary stockpiles to determine if erosion controls are effective.

5. **Compare BMPs in the site plan with the construction site conditions.**
Appendix A-1 of the Stormwater Regulation Guide

- Determine whether BMPs are in place as required by the site plan.
- Evaluate whether BMPs have been adequately installed and maintained.
- Look for areas where BMPs are needed but are missing and are not in the Erosion and Sediment Control Plan.

6. **Inspect construction site entrances**
   - Inspect the construction exits to determine if there is tracking of sediment from the site onto the street.
   - Refresh or replace the rock in designated entrances and concrete washout areas.
   - Look for evidence of additional construction exits being used that are not in the ESC Plan or are not stabilized.
   - Sweep or vacuum the street if there is evidence of sediment accumulation.

7. **Inspect sediment controls**
   - Inspect any sediment basins for sediment accumulation.
   - Remove sediment when it reduces the capacity of the basin by the specified amount for maintenance.

8. **Inspect pollution prevention and good housekeeping practices**
   - Inspect trash areas to ensure that waste is properly contained.
   - Inspect material storage and staging areas to verify that potential pollutant sources are not exposed to stormwater runoff.
   - Verify that concrete, paint, and stucco washouts are being used properly and are correctly sized for the volume of wash water.
   - Inspect vehicle/equipment fueling and maintenance areas for signs of stormwater pollutant exposure.

9. **Inspect for final stabilization**
   - Inspect all temporary and permanent BMPs for correct application and installation with the BMP details.
   - Remove sediment that is in the private storm sewer system pipes – do not jet pollutants into the County’s storm sewer system.
5.4 Common Compliance Problems During Construction

The following reasons are problems commonly found at construction sites.

Problem #1 – Not using phased grading or providing temporary or permanent soil stabilization

Problem #2 – No sediment controls on-site

Problem #3 – No sediment control for temporary stockpiles

Problem #4 – No inlet protection

Problem #5 – No BMPs or inadequate BMPs to minimize vehicle tracking onto the road

Problem #6 – Inadequate or improper solid waste or hazardous waste management

Problem #7 – Unpermitted dewatering and other pollutant discharge at the construction site

Problem #8 – Poorly managed washouts (concrete, paint, stucco)

Problem #9 – Inadequate BMP maintenance

Problem #10 – Inadequate documentation
SECTION 6: RECORDKEEPING

6.1 Recordkeeping

Instructions:
- The following is a list of records you shall keep available at your construction site for County Stormwater Program Inspectors to review:
  - An updated ESC Plan showing all changes to site conditions and BMPs on site.
  - Inspection reports, these shall be placed in Appendix 9 – Completed Stormwater Quality Inspections.

Records will be retained for a minimum period of at least 3 years after the permit is terminated.

This ESC Plan narrative, the design drawings, and the Permittee’s inspection and maintenance records are all components of required record keeping and shall be kept on site at all times and updated as required. These and any other pertinent records shall be provided to the county when requested.
SECTION 7: FINAL STABILIZATION

7.1 Final Construction Site Stabilization

Instructions:
- The final stabilization of construction sites occurs when there is 70% uniform vegetated cover. The vegetation MUST be uniform so that there are no open patches of soil. Vegetated cover for final stabilization is not what the vegetation was just prior to construction; it is from a fully vegetated site.

In accordance with Adams County Stormwater Quality Regulations 9-07-04:

“Final Construction Site Stabilization means that all ground disturbing activities are complete, and all disturbed areas have either been built on, paved over or are awaiting uniform vegetative cover per County accepted plans.

Prior to closing out the Adams County Stormwater Quality Permit, all the items listed below must be completed in order for the construction site to be considered to have final stabilization.

1. The site has a uniform vegetative cover with a density of at least seventy percent (70%) compared to the original undisturbed site. Such cover is capable of adequately controlling soil erosion, as determined by the Stormwater Regulatory Compliance Unit.

2. Proper installation of all approved, permanent, post-construction stormwater quality BMPs.

3. Removal of all stockpiles of soil, construction material/debris, construction equipment, etc. from the construction site.

4. Streets, parking lots and other surrounding paved surfaces are clean and free of any sediment or debris.

5. Removal of sediment and debris within the County’s MS4 and surrounding property, caused by the construction activity; this includes all pollutants. The Permittee shall restore any damaged public infrastructure caused by the Permittee’s construction activities.

6. Provide documentation as required by Section 9-05-08 Permit Closeout and Section 9-05-09 Permit Closeout Notification.”
7.2 Stormwater Quality Permit Close-out

In accordance with Adams County Stormwater Quality Regulations 9-05-08:

“In order to close out an Adams County Stormwater Quality permit, all of the following measures must be met:

a. Notify the Stormwater Regulatory Compliance Unit as required in Section 9-05-09 Permit Closeout Notification.

b. When a construction site is considered to be final stabilized, but prior to BMP removal; submit an electronic (.pdf) color copy of the ESC Plan final marked up copy to Adams County Public Works – SRC Unit with all revisions and markups that update the plan during construction for stabilization.

c. Provide Construction Site Stabilization Certification and color photo documentation in compliance with Section 9-05-10-02 Construction Site Stabilization Certification.

d. BMPs will be removed only after a Release of Financial Surety Request has been approved by the SRC Unit.”

7.3 Permit Closeout Notification

In accordance with Adams County Stormwater Quality Regulations 9-05-09:

“Permittee must contact Adams County Public Works - SRC Unit to set up a Closeout Stormwater Quality Inspection. This notification shall be sent to the Public Works - SRC Unit via e-mail as indicated on the County SWQ Permit. The Public Works – SRC Unit must be contacted by the Permittee at least three (3) business days prior to scheduling the final inspection.

The purpose of the Closeout Inspection is to verify the site is adequately stabilized and/or covered with pavement or structures, per the County accepted plans.

If the Adams County Public Works - SRC Unit needs to conduct more than one Closeout Inspection, an inspection fee will be assessed for each additional closeout inspection, as approved by resolution, by the Board of County Commissioners.”

7.4 Removal of Temporary BMPs

In accordance with Adams County Stormwater Quality Regulations 9-05-09-01:

Once the site has met the final stabilization conditions, as specified in Section 9-07-04 Final Construction Site Stabilization, the remaining temporary BMPs such as perimeter controls, inlet protection, silt fence, etc. shall be removed and disposed of properly.

7.5 Construction Site Stabilization Certification

In accordance with Adams County Stormwater Quality Regulations 09-05-10-02:
“The responsible Adams County Stormwater Quality Permit holder (permittee) shall provide formal notarized certification in accordance with the stabilization certification page found in the supplemental stormwater guide.

The signed, sealed and notarized Stabilization Certification shall be submitted, in electronic form, to Adams County Public Works - SRC Unit along with documented proof in the form of electronic color photographs, depicting the stabilized site. The photographs must show the materials used for stabilization and that growth of the vegetation is adequate. It must be proved that the vegetation is 70% of pre-disturbance levels and no sediment will erode outside the permitted area. Refer to the supplemental stormwater guide for a copy of the Stabilization Certification Form.

Remove all temporary BMPs in compliance with Section 9-05-09-01 Removal of Temporary BMPs.”
7.6 Stabilization

**Instructions:**
Describe procedures for final stabilization. Following construction remember to update your site plans to indicate areas that have achieved final stabilization.

<table>
<thead>
<tr>
<th>Mulching and Seeding</th>
<th>Used: Yes</th>
<th>Phase(s): 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent</strong></td>
<td><strong>Temporary</strong></td>
<td></td>
</tr>
</tbody>
</table>

**What – BMP Description**
Stabilize disturbed soils and achieve 70% vegetation

**When - Installation**
Final Reclamation Phase

**Where - Location**
Mulching and seeding areas shall be installed at the locations identified on the ESC Plan.

**How – BMP Maintenance and Inspection**
Mulching shall be installed per the mulching detail EC-4 (Appendix 5 – Erosion and Sediment Control BMP Details). After mulching, the bare ground surface shall not be more than 10% exposed. Reapply mulch, as needed, to cover bare areas.

Permanent seeding and secured mulching shall be installed per the temporary and permanent seeding specifications and detail. The Permittee shall continuously inspect and maintain all temporary and permanent seeding and secured mulch throughout construction. Prepare the seedbed, select an appropriate seed mixture, use proper planting techniques and protect the seeded area with secured mulch.
SECTION 8: STORMWATER QUALITY PERMIT VIOLATIONS

8.1 Stormwater Quality Violations

_In accordance with Adams County Stormwater Quality Regulations:_

“Adams County complies with Colorado Revised Statute, Title 30 Government – County to enforce the Stormwater Quality Regulations specifically, 30-15-401.11, CRS et. seq. These regulations allow the County to enforce upon a Permittee or violator of these regulations to compel the abatement of any condition that caused or contributes to a violation of the Adams County Stormwater Quality Regulations.

**ALL VIOLATIONS ARE SUBJECT TO ENFORCEMENT FROM THE TIME EVIDENCE IS DOCUMENTED OF VIOLATIONS.**

The following items are considered a violation of the Adams County Regulations or Adams County Ordinance No. 11 Concerning Illicit Discharges to the Waters of the State within Unincorporated Adams County.

A. Conducting Permit Covered Activity without a County SWQ Permit.

B. Failure to prepare an Erosion and Sediment Control Plan.

C. Deficient Erosion and Sediment Control Plan.

D. Failure to install, maintain or properly select Best Management Practices.

E. Failure to perform required inspections of the permitted construction site.

F. Failure to submit requested documentation.

G. Failure to adequately respond to the SRC Unit’s findings as designated by a Compliance Inspection Notification.

H. Failure to maintain the Erosion and Sediment Control Plan to reflect current site conditions.

I. Pollution, contamination or degradation of stormwater quality caused by work outside of the Adams County Stormwater Quality Permit boundary.

J. An illicit discharge into the County’s Municipal Separate Storm Sewer System.”
SECTION 9: CERTIFICATION AND NOTIFICATION

9.1 Stormwater Quality Regulation Certification

Instructions:
The Permittee shall certify the ESC Plan by signing the ESC Plan Certification and Notification statement below. It is recommended that all subcontractors sign the Subcontractor Certifications/Agreements in Appendix 10 – Subcontractor Certifications/Agreements.

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, 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.

Name: ________________________________  Title: ________________________________

Signature: ________________________________  Date: ________________
ESC PLAN APPENDICES

Attach the following documentation to the ESC PLAN:

Appendix 1 – Project Vicinity Map (Section 1.1)

Appendix 2 – State CDPS Stormwater Construction Permit Certification Page (Section 1.2)

Appendix 3 – Pre-disturbance Photos (Section 1.4)

Appendix 4 – Copy of Demolition Permit and State Asbestos Permit (Section 1.9)

Appendix 5 – Erosion and Sediment Control BMP Details (Section 1.10)

Appendix 6 – Erosion and Sediment Control Plan - Site Map (Section 2.10)

Appendix 7 – Standard Stormwater Quality Inspection Form (Section 5.1)

Appendix 8 – Delegation of Authority (optional) (Section 5.2)

Appendix 9 – Completed Stormwater Quality Inspections (Sections 5.3 & 5.5)

Appendix 10 – Subcontractor Certifications/Agreements (optional) (Section 9.1)

*The format is “Appendices #– Name (Section Number)”. 
Appendix A-1 of the Stormwater Regulation Guide

Appendix 1 – Project Vicinity Map
Appendix 2 – State CDPS Stormwater Construction Permit Certification Page
Appendix 3 – Pre-Disturbance Photos
Appendix 4 – Copy of Demolition Permit and State Asbestos Permit
Appendix 5 – Erosion and Sediment Control BMP Details
**CHECK DAM ELEVATION VIEW**

- **FLOW**
- **D50 = 12" RIPRAP, TYPE M OR TYPE L D50 = 9" (SEE TABLE MD-7, MAJOR DRAINAGE, VOL. 1 FOR GRADATION)**
- **EXCAVATION TO NEAT LINE, AVOID OVER-EXCAVATION, (TYP.)**

**SECTION A**

- **FLOW**
- **D50 = 12" RIPRAP, TYPE M OR TYPE L D50 = 9" (SEE TABLE MD-7, MAJOR DRAINAGE, VOL. 1 FOR GRADATION)**
- **EXCAVATION TO NEAT LINE, AVOID OVER-EXCAVATION (TYP.)**

**SECTION B**

- **SPACING BETWEEN CHECK DAMS SUCH THAT A AND B ARE EQUAL ELEVATION**
- **CHANNEL GRADE**

**PROFILE**

**CD-1. CHECK DAM**
CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CHECK DAMS.
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   - LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON INITIAL SWMP SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBING ACTIVITIES.

3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9").

4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1’.

5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1’ 6” HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN ½ OF THE HEIGHT OF THE CREST.

5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEADED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(Details adapted from Douglas County, Colorado, not available in AutoCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
Concrete Washout Area (CWA)

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (15 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULDN'T BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.
CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFOC STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
ED-1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM

DS-1. COMPACTED UNLINED EXCAVATED SWALE

DS-2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL

GEOTEXTILE OR MAT (SEE ECB)

INTERMEDIATE ANCHOR TRENCH AT ONE-HALF ROLL LENGTH (SEE ECB)

W (5' MIN.)

D (10' MIN.)

STAKES (SEE ECB)

ANCHOR TRENCH AT PERIMETER OF BLANKET AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF BLANKET (SEE ECB)

TRANSVERSE ANCHOR TRENCHES AT PERIMETER OF BLANKET AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF BLANKET (SEE ECB)

DS-3. ECB LINED SWALE (CUT AND FILL OR BERM)
DS—4. SYNTHETIC LINED SWALE

THICKNESS = 2 x D50

DS—5. RPRAP LINED SWALE

LINE WITH AASHTO #3 ROCK (CDOT SECT. 703, #3) OR RPRAP CALLED FOR IN THE PLANS

EARTH DIKE AND DRAINAGE SWALE INSTALLATION NOTES

1. SEE SITE PLAN FOR:
   - LOCATION OF DIVERSION SWALE
   - TYPE OF SWALE (UNLINED, COMPACTED AND/OR LINED)
   - LENGTH OF EACH SWALE
   - DEPTH, D, AND WIDTH, W DIMENSIONS
   - FOR ECB/TRM LINED DITCH, SEE ECB DETAIL
   - FOR RPRAP LINED DITCH, SIZE OF RPRAP, D50

2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES AND/OR DIVERSION SWALES EXCEEDING 2-YEAR FLOW RATE OR 10 CFS

3. EARTH DIKES AND SWALES INDICATED ON SWMP PLAN SHALL BE INSTALLED PRIOR TO LAND-DISTURBING ACTIVITIES IN PROXIMITY.

4. EMBANKMENT IS TO BE COMPACTED TO 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D698

5. SWALES ARE TO DRAIN TO A SEDIMENT CONTROL BMP

6. FOR LINED DITCHES, INSTALLATION OF ECB/TRM SHALL CONFORM TO THE REQUIREMENTS OF THE ECB DETAIL

7. WHEN CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION SWALE, INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12 INCHES.
EARTH DIKE AND DRAINAGE SWALE MAINTENANCE NOTES

1. Inspect BMPs each workday, and maintain them in effective operating condition. Maintenance of BMPs should be proactive, not reactive. Inspect BMPs as soon as possible (and always within 24 hours) following a storm that causes surface erosion, and perform necessary maintenance.

2. Frequent observations and maintenance are necessary to maintain BMPs in effective operating condition. Inspections and corrective measures should be documented thoroughly.

3. Where BMPs have failed, repair or replacement should be initiated upon discovery of the failure.

4. Swales shall remain in place until the end of construction; if approved by local jurisdiction, swales may be left in place.

5. When a swale is removed, the disturbed area shall be covered with topsoil, seeded and mulched or otherwise stabilized in a manner approved by local jurisdiction.

(Adapted from Douglas County, Colorado and the City of Colorado Springs, Colorado, not available in Autodesk)

Note: Many jurisdictions have BMP details that vary from UDFCD standard details. Consult with local jurisdictions as to which detail should be used when differences are noted.
SEDIMENT TRAP PLAN

SECTION A

SECTION B
ST-1. SEDIMENT TRAP
SEDIMENT TRAP INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION, LENGTH AND WIDTH OF SEDIMENT TRAP.

2. USE FOR SEDIMENT TRAP LESS THAN 3" DEEP.

3. SEDIMENT TRAPS SHALL BE INSTALLED PRIOR TO ANY UPGRADE LAND-DISTURBING ACTIVITIES.

4. SEDIMENT TRAP BERM SHALL BE CONSTRUCTED FROM MATERIAL FROM EXCAVATION. THE BERM SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.

5. SEDIMENT TRAP OUTLET TO BE CONSTRUCTED OF RIPRAPH, TYPE M (D50=12") TYP. SMALLER ROCK SIZE MAY BE ALLOWABLE FOR SMALLER TRAPS IF APPROVED BY LOCAL JURISDICTION.


7. THE ENDS OF THE RIPRAPH OUTLET STRUCTURE SHALL BE A MINIMUM OF 6" HIGHER THAN THE CENTER OF THE OUTLET STRUCTURE.

SEDIMENT TRAP MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. REMOVE SEDIMENT ACCUMULATED IN TRAP AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN THE SEDIMENT DEPTH REACHES ½ THE HEIGHT OF THE RIPRAPH OUTLET.

5. SEDIMENT TRAPS SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTurbed AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

6. WHEN SEDIMENT TRAPS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
SILT FENCE

POSTS SHALL OVERLAP AT JOINTS SO THAT NO GAPS EXIST IN SILT FENCE

THICKNESS OF GEOTEXTILE HAS BEEN EXAGGERATED, TYP

SECTION A

SF-1. SILT FENCE
SILT FENCE INSTALLATION NOTES

1. Silt fence must be placed away from the toe of the slope to allow for water ponding. Silt fence at the toe of a slope should be installed in a flat location at least several feet (2-5 ft) from the toe of the slope to allow room for ponding and deposition.

2. A uniform 6” x 4” anchor trench shall be excavated using trencher or silt fence installation device. No road graders, backhoes, or similar equipment shall be used.

3. Compact anchor trench by hand with a "jumping jack" or by wheel rolling. Compaction shall be such that silt fence resists being pulled out of anchor trench by hand.

4. Silt fence shall be pulled tight as it is anchored to the stakes. There should be no noticeable sag between stakes after it has been anchored to the stakes.

5. Silt fence fabric shall be anchored to the stakes using 1” heavy duty staples or nails with 1” heads. Staples and nails should be placed 3” along the fabric down the stake.

6. At the end of a run of silt fence along a contour, the silt fence should be turned perpendicular to the contour to create a "J-hook." The "J-hook" extending perpendicular to the contour should be of sufficient length to keep runoff from flowing around the end of the silt fence (typically 10’ - 20’).

7. Silt fence shall be installed prior to any land disturbing activities.

SILT FENCE MAINTENANCE NOTES

1. Inspect BMPs each workday, and maintain them in effective operating condition. Maintenance of BMPs should be proactive, not reactive. Inspect BMPs as soon as possible (and always within 24 hours) following a storm that causes surface erosion, and perform necessary maintenance.

2. Frequent observations and maintenance are necessary to maintain BMPs in effective operating condition. Inspections and corrective measures should be documented thoroughly.

3. Where BMPs have failed, repair or replacement should be initiated upon discovery of the failure.

4. Sediment accumulated upstream of the silt fence shall be removed as needed to maintain the functionality of the BMP, typically when depth of accumulated sediments is approximately 6”.

5. Repair or replace silt fence when there are signs of wear, such as sagging, tearing, or collapse.

6. Silt fence is to remain in place until the upstream disturbed area is stabilized and approved by the local jurisdiction, or is replaced by an equivalent perimeter sediment control BMP.

7. When silt fence is removed, all disturbed areas shall be covered with topsoil, seeded and mulched or otherwise stabilized as approved by local jurisdiction.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

NOTE: Many jurisdictions have BMP details that vary from UDSCD Standard Details. Consult with local jurisdictions as to which detail should be used when differences are noted.
SP-1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF STOCKPILES.
   - TYPE OF STOCKPILE PROTECTION.

2. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.

3. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30-60 DAYS).

4. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.
STOCKPILE PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

STOCKPILE PROTECTION MAINTENANCE NOTES

4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.

5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

(DETAILS ADAPTED FROM PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFOOD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF STAGING AREA(S).
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL
     FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE.
   OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3” THICK GRANULAR
   MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT
   SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6” (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT
   FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION.
   MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS
   POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE
   EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN
   EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE
   DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON
   DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR
   UNDERLYING SUBGRADE BECOMES EXPOSED.
STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TOContain PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)
VTC—1. AGGREGATE VEHICLE TRACKING CONTROL
STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF CONSTRUCTION ENTRANCE(S)/EXIT(S).
   - TYPE OF CONSTRUCTION ENTRANCE(S)/EXIT(S) (WITH/WITHOUT WHEEL WASH,
     CONSTRUCTION MAT OR TRM).

2. CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE
   USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH)
   WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.

3. A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS
   WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED RIGHT--OF--WAYS.

4. STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND
   DISTURBING ACTIVITIES.

5. A NON--WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED
   CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.

6. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT
   SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK. Recycled concrete is not
   allowed.

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION.
   MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS
   POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE
   EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN
   EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE
   DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON
   DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADING AS NECESSARY TO THE STABILIZED
   ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.

5. SEDIMENT TRACED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND
   AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED
   DOWN STORM SEWER DRAINS.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS.
CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN
DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM CITY OF BROOKFIELD, COLORADO, NOT AVAILABLE IN AUTOCAD)
Temporary and Permanent Seeding (TS/PS) EC-2

Description

Temporary seeding can be used to stabilize disturbed areas that will be inactive for an extended period. Permanent seeding should be used to stabilize areas at final grade that will not be otherwise stabilized. Effective seeding includes preparation of a seedbed, selection of an appropriate seed mixture, proper planting techniques, and protection of the seeded area with mulch, geotextiles, or other appropriate measures.

Appropriate Uses

When the soil surface is disturbed and will remain inactive for an extended period (typically 30 days or longer), proactive stabilization measures should be implemented. If the inactive period is short-lived (on the order of two weeks), techniques such as surface roughening may be appropriate. For longer periods of inactivity, temporary seeding and mulching can provide effective erosion control. Permanent seeding should be used on finished areas that have not been otherwise stabilized.

Typically, local governments have their own seed mixes and timelines for seeding. Check jurisdictional requirements for seeding and temporary stabilization.

Design and Installation

Effective seeding requires proper seedbed preparation, selection of an appropriate seed mixture, use of appropriate seeding equipment to ensure proper coverage and density, and protection with mulch or fabric until plants are established.

The USDCM Volume 2 Revegetation Chapter contains detailed seed mix, soil preparations, and seeding and mulching recommendations that may be referenced to supplement this Fact Sheet.

Drill seeding is the preferred seeding method. Hydroseeding is not recommended except in areas where steep slopes prevent use of drill seeding equipment, and even in these instances it is preferable to hand seed and mulch. Some jurisdictions do not allow hydroseeding or hydromulching.

Seedbed Preparation

Prior to seeding, ensure that areas to be revegetated have soil conditions capable of supporting vegetation. Overlot grading can result in loss of topsoil, resulting in poor quality subsoils at the ground surface that have low nutrient value, little organic matter content, few soil microorganisms, rooting restrictions, and conditions less conducive to infiltration of precipitation. As a result, it is typically necessary to provide stockpiled topsoil, compost, or other

### Temporary and Permanent Seeding

<table>
<thead>
<tr>
<th>Functions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion Control</td>
<td>Yes</td>
</tr>
<tr>
<td>Sediment Control</td>
<td>No</td>
</tr>
<tr>
<td>Site/Material Management</td>
<td>No</td>
</tr>
</tbody>
</table>
soil amendments and rototill them into the soil to a depth of 6 inches or more.

Topsoil should be salvaged during grading operations for use and spread on areas to be revegetated later. Topsoil should be viewed as an important resource to be utilized for vegetation establishment, due to its water-holding capacity, structure, texture, organic matter content, biological activity, and nutrient content. The rooting depth of most native grasses in the semi-arid Denver metropolitan area is 6 to 18 inches. At a minimum, the upper 6 inches of topsoil should be stripped, stockpiled, and ultimately respread across areas that will be revegetated.

Where topsoil is not available, subsoils should be amended to provide an appropriate plant-growth medium. Organic matter, such as well digested compost, can be added to improve soil characteristics conducive to plant growth. Other treatments can be used to adjust soil pH conditions when needed. Soil testing, which is typically inexpensive, should be completed to determine and optimize the types and amounts of amendments that are required.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rototilling is necessary. Surface roughening will assist in placement of a stable topsoil layer on steeper slopes, and allow infiltration and root penetration to greater depth.

Prior to seeding, the soil surface should be rough and the seedbed should be firm, but neither too loose nor compacted. The upper layer of soil should be in a condition suitable for seeding at the proper depth and conducive to plant growth. Seed-to-soil contact is the key to good germination.

Seed Mix for Temporary Vegetation

To provide temporary vegetative cover on disturbed areas which will not be paved, built upon, or fully landscaped or worked for an extended period (typically 30 days or more), plant an annual grass appropriate for the time of planting and mulch the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1. These are to be considered only as general recommendations when specific design guidance for a particular site is not available. Local governments typically specify seed mixes appropriate for their jurisdiction.

Seed Mix for Permanent Revegetation

To provide vegetative cover on disturbed areas that have reached final grade, a perennial grass mix should be established. Permanent seeding should be performed promptly (typically within 14 days) after reaching final grade. Each site will have different characteristics and a landscape professional or the local jurisdiction should be contacted to determine the most suitable seed mix for a specific site. In lieu of a specific recommendation, one of the perennial grass mixes appropriate for site conditions and growth season listed in Table TS/PS-2 can be used. The pure live seed (PLS) rates of application recommended in these tables are considered to be absolute minimum rates for seed applied using proper drill-seeding equipment.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (Chrysothamnus nauseosus), fourwing saltbush (Atriplex canescens) and skunkbrush sumac (Rhus trilobata) could be added to the upland seedmixes at 0.25, 0.5 and 1 pound PLS/acre, respectively. In riparian zones, planting root stock of such species as American plum (Prunus americana), woods rose (Rosa woodsii), plains cottonwood (Populus sargentii), and willow (Populus spp.) may be considered. On non-topsoiled upland sites, a legume such as Ladak alfalfa at 1 pound PLS/acre can be included as a source of nitrogen for perennial grasses.
Seeding dates for the highest success probability of perennial species along the Front Range are generally in the spring from April through early May and in the fall after the first of September until the ground freezes. If the area is irrigated, seeding may occur in summer months, as well. See Table TS/PS-3 for appropriate seeding dates.

Table TS/PS-1. Minimum Drill Seeding Rates for Various Temporary Annual Grasses

<table>
<thead>
<tr>
<th>Species(^a) (Common name)</th>
<th>Growth Season (^b)</th>
<th>Pounds of Pure Live Seed (PLS)/acre (^c)</th>
<th>Planting Depth (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oats</td>
<td>Cool</td>
<td>35 - 50</td>
<td>1 - 2</td>
</tr>
<tr>
<td>2. Spring wheat</td>
<td>Cool</td>
<td>25 - 35</td>
<td>1 - 2</td>
</tr>
<tr>
<td>4. Annual ryegrass</td>
<td>Cool</td>
<td>10 - 15</td>
<td>½</td>
</tr>
<tr>
<td>5. Millet</td>
<td>Warm</td>
<td>3 - 15</td>
<td>½ - ¾</td>
</tr>
<tr>
<td>6. Sudangrass</td>
<td>Warm</td>
<td>5–10</td>
<td>½ - ¾</td>
</tr>
<tr>
<td>7. Sorghum</td>
<td>Warm</td>
<td>5–10</td>
<td>½ - ¾</td>
</tr>
<tr>
<td>8. Winter wheat</td>
<td>Cool</td>
<td>20–35</td>
<td>1 - 2</td>
</tr>
<tr>
<td>10. Winter rye</td>
<td>Cool</td>
<td>20–35</td>
<td>1 - 2</td>
</tr>
</tbody>
</table>

\(^a\) Successful seeding of annual grass resulting in adequate plant growth will usually produce enough dead-plant residue to provide protection from wind and water erosion for an additional year. This assumes that the cover is not disturbed or mowed closer than 8 inches.

Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1 or where access limitations exist. When hydraulic seeding is used, hydraulic mulching should be applied as a separate operation, when practical, to prevent the seeds from being encapsulated in the mulch.

\(^b\) See Table TS/PS-3 for seeding dates. Irrigation, if consistently applied, may extend the use of cool season species during the summer months.

\(^c\) Seeding rates should be doubled if seed is broadcast, or increased by 50 percent if done using a Brillion Drill or by hydraulic seeding.
Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Growth Season</th>
<th>Growth Form</th>
<th>Seeds/Pound</th>
<th>Pounds of PLS/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alakali Soil Seed Mix</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkali sacaton</td>
<td><em>Sporobolus airoides</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>1,750,000</td>
<td>0.25</td>
</tr>
<tr>
<td>Basin wildrye</td>
<td><em>Elymus cinereus</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>165,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Sodar streambank wheatgrass</td>
<td><em>Agropyron riparium 'Sodar'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>170,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Jose tall wheatgrass</td>
<td><em>Agropyron elongatum 'Jose'</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>79,000</td>
<td>7.0</td>
</tr>
<tr>
<td>Arriba western wheatgrass</td>
<td><em>Agropyron smithii 'Arriba'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>110,000</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>17.75</strong></td>
</tr>
<tr>
<td><strong>Fertile Loamy Soil Seed Mix</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephriam crested wheatgrass</td>
<td><em>Agropyron cristatum 'Ephriam'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>175,000</td>
<td>2.0</td>
</tr>
<tr>
<td>Dural hard fescue</td>
<td><em>Festuca ovina 'duriuscula'</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>565,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Lincoln smooth brome</td>
<td><em>Bromus inermis leyss 'Lincoln'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>130,000</td>
<td>3.0</td>
</tr>
<tr>
<td>Sodar streambank wheatgrass</td>
<td><em>Agropyron riparium 'Sodar'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>170,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Arriba western wheatgrass</td>
<td><em>Agropyron smithii 'Arriba'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>110,000</td>
<td>7.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>15.5</strong></td>
</tr>
<tr>
<td><strong>High Water Table Soil Seed Mix</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meadow foxtail</td>
<td><em>Alopecurus pratensis</em></td>
<td>Cool</td>
<td>Sod</td>
<td>900,000</td>
<td>0.5</td>
</tr>
<tr>
<td>Redtop</td>
<td><em>Agrostis alba</em></td>
<td>Warm</td>
<td>Open sod</td>
<td>5,000,000</td>
<td>0.25</td>
</tr>
<tr>
<td>Reed canarygrass</td>
<td><em>Phalaris arundinacea</em></td>
<td>Cool</td>
<td>Sod</td>
<td>68,000</td>
<td>0.5</td>
</tr>
<tr>
<td>Lincoln smooth brome</td>
<td><em>Bromus inermis leyss 'Lincoln'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>130,000</td>
<td>3.0</td>
</tr>
<tr>
<td>Pathfinder switchgrass</td>
<td><em>Panicum virgatum 'Pathfinder'</em></td>
<td>Warm</td>
<td>Sod</td>
<td>389,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Alkar tall wheatgrass</td>
<td><em>Agropyron elongatum 'Alkar'</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>79,000</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>10.75</strong></td>
</tr>
<tr>
<td><strong>Transition Turf Seed Mix</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruebens Canadian bluegrass</td>
<td><em>Poa compressa 'Ruebens'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>2,500,000</td>
<td>0.5</td>
</tr>
<tr>
<td>Dural hard fescue</td>
<td><em>Festuca ovina 'duriuscula'</em></td>
<td>Cool</td>
<td>Bunch</td>
<td>565,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Citation perennial ryegrass</td>
<td><em>Lolium perenne 'Citation'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>247,000</td>
<td>3.0</td>
</tr>
<tr>
<td>Lincoln smooth brome</td>
<td><em>Bromus inermis leyss 'Lincoln'</em></td>
<td>Cool</td>
<td>Sod</td>
<td>130,000</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>7.5</strong></td>
</tr>
<tr>
<td>Common Name</td>
<td>Botanical Name</td>
<td>Growth Season&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Growth Form</td>
<td>Seeds/ Pound</td>
<td>Pounds of PLS/acre</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Sandy Soil Seed Mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue grama</td>
<td>Bouteloua gracilis</td>
<td>Warm</td>
<td>Sod-forming bunchgrass</td>
<td>825,000</td>
<td>0.5</td>
</tr>
<tr>
<td>Camper little bluestem</td>
<td>Schizachyrium scoparium 'Camper'</td>
<td>Warm</td>
<td>Bunch</td>
<td>240,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Prairie sandreed</td>
<td>Calamovilfa longifolia</td>
<td>Warm</td>
<td>Open sod</td>
<td>274,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Sand dropseed</td>
<td>Sporobolus cryptandrus</td>
<td>Cool</td>
<td>Bunch</td>
<td>5,298,000</td>
<td>0.25</td>
</tr>
<tr>
<td>Vaughn sideoats grama</td>
<td>Bouteloua curtipendula 'Vaughn'</td>
<td>Warm</td>
<td>Sod</td>
<td>191,000</td>
<td>2.0</td>
</tr>
<tr>
<td>Arriba western wheatgrass</td>
<td>Agropyron smithii 'Arriba'</td>
<td>Cool</td>
<td>Sod</td>
<td>110,000</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>10.25</strong></td>
</tr>
<tr>
<td>Heavy Clay, Rocky Foothill Seed Mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephriam crested wheatgrass&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Agropyron cristatum 'Ephriam'</td>
<td>Cool</td>
<td>Sod</td>
<td>175,000</td>
<td>1.5</td>
</tr>
<tr>
<td>Oahé Intermediate wheatgrass</td>
<td>Agropyron intermedium 'Oahé'</td>
<td>Cool</td>
<td>Sod</td>
<td>115,000</td>
<td>5.5</td>
</tr>
<tr>
<td>Vaughn sideoats grama&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Bouteloua curtipendula 'Vaughn'</td>
<td>Warm</td>
<td>Sod</td>
<td>191,000</td>
<td>2.0</td>
</tr>
<tr>
<td>Lincoln smooth brome</td>
<td>Bromus inermis leyss 'Lincoln'</td>
<td>Cool</td>
<td>Sod</td>
<td>130,000</td>
<td>3.0</td>
</tr>
<tr>
<td>Arriba western wheatgrass</td>
<td>Agropyron smithii 'Arriba'</td>
<td>Cool</td>
<td>Sod</td>
<td>110,000</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup> All of the above seeding mixes and rates are based on drill seeding followed by crimped straw mulch. These rates should be doubled if seed is broadcast and should be increased by 50 percent if the seeding is done using a Brillion Drill or is applied through hydraulic seeding. Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1. If hydraulic seeding is used, hydraulic mulching should be done as a separate operation.

<sup>b</sup> See Table TS/PS-3 for seeding dates.

<sup>c</sup> If site is to be irrigated, the transition turf seed rates should be doubled.

<sup>d</sup> Crested wheatgrass should not be used on slopes steeper than 6H to 1V.

<sup>e</sup> Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sideoats grama.
Table TS/PS-3. Seeding Dates for Annual and Perennial Grasses

<table>
<thead>
<tr>
<th>Seeding Dates</th>
<th>Annual Grasses (Numbers in table reference species in Table TS/PS-1)</th>
<th>Perennial Grasses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warm</td>
<td>Cool</td>
</tr>
<tr>
<td>January 1–March 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 16–April 30</td>
<td>4</td>
<td>1,2,3</td>
</tr>
<tr>
<td>May 1–May 15</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>May 16–June 30</td>
<td>4,5,6,7</td>
<td></td>
</tr>
<tr>
<td>July 1–July 15</td>
<td>5,6,7</td>
<td></td>
</tr>
<tr>
<td>July 16–August 31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>September 1–September 30</td>
<td>8,9,10,11</td>
<td></td>
</tr>
<tr>
<td>October 1–December 31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mulch**

Cover seeded areas with mulch or an appropriate rolled erosion control product to promote establishment of vegetation. Anchor mulch by crimping, netting or use of a non-toxic tackifier. See the Mulching BMP Fact Sheet for additional guidance.

**Maintenance and Removal**

Monitor and observe seeded areas to identify areas of poor growth or areas that fail to germinate. Reseed and mulch these areas, as needed.

An area that has been permanently seeded should have a good stand of vegetation within one growing season if irrigated and within three growing seasons without irrigation in Colorado. Reseed portions of the site that fail to germinate or remain bare after the first growing season.

Seeded areas may require irrigation, particularly during extended dry periods. Targeted weed control may also be necessary.

Protect seeded areas from construction equipment and vehicle access.
Description

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

<table>
<thead>
<tr>
<th>Functions</th>
<th>Mulch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion Control</td>
<td>Yes</td>
</tr>
<tr>
<td>Sediment Control</td>
<td>Moderate</td>
</tr>
<tr>
<td>Site/Material Management</td>
<td>No</td>
</tr>
</tbody>
</table>
Mulching (MU)

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tucking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.

- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).

- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.

- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydroseeding. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.

- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-coconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)

- Some tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)

- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

**Maintenance and Removal**

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.
Appendix 6 – Erosion and Sediment Control Plan - Site Map
Appendix 7 – Inspection Report Instructions and Form

Instructions
This inspection report has been developed for you use in completing your 14 day and storm event site inspections and inspections at completed sites. This inspection report was created consistent with County’s Stormwater Quality Regulations.


Using the Inspection Report
You can complete the items in the upper section that will remain constant, such as the date, project name, contractor, and inspector (if you only use one inspector). You will either need to print out multiple copies of this inspection report or save an electronic version as a master form to use during your inspections.

Ensure that all items in the “Weather/Off-Site Discharge Assessment” AND the “Overall Site Assessment” are completed by checking “Yes” or “No” and document any “Corrective Action Needed/Notes”. Under “Site Specific BMP Assessment”, document the BMPs that are required and/or used, if maintenance is needed and document any “Corrective Action Needed/Notes” as necessary.

When “findings” are present at a construction site due to a 14 day inspection, storm event site inspections and inspections at completed sites, ensure that when the “finding” has been addressed, on the same inspection form. Always document when the “finding” was addressed by filling in the “Date Action Complete”.
## Erosion and Sediment Control Plan

### Contractor Stormwater Quality Inspection Form

<table>
<thead>
<tr>
<th>Date of Inspection:</th>
<th>Project Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADOC SWQ Permit #:</th>
<th>Inspected By:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor Name:</th>
<th>Type of Inspection:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14-Day Inspection</td>
</tr>
<tr>
<td></td>
<td>Storm Event Inspection</td>
</tr>
<tr>
<td></td>
<td>Completed Site Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor Address:</th>
<th>Present Phase of Construction (circle):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor Phone Number(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

| ESC Plan Administrator: | |
|-------------------------| |

### Weather/Off-Site Discharge Assessment

- Has a storm event occurred since last inspection? □ Yes □ No
  - If yes, estimate storm Start Date/Time: 
  - Duration: ________ hours
  - Amount: ________ inches

- Have any off-site discharges occurred since the last inspection? □ Yes □ No
  - If yes, describe:

- Are there any off-site discharges at the time of this inspection? □ Yes □ No
  - If yes, describe:

### Overall Site Assessment

<table>
<thead>
<tr>
<th>BMP/Activity</th>
<th>Implemented</th>
<th>Maintenance Req’d</th>
<th>Corrective Action Needed/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are disturbed areas not actively being worked or stabilized?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are natural resource areas (i.e. streams, wetlands and trees) protected with BMPs?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Is the construction perimeter contained?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are all discharge points free of any pollutants (i.e. sediment, trash)</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are storm inlets properly protected?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Is the VTC preventing sediment from being tracked into the street?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Is all trash/construction site waste collected and in a covered dumpster?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are washout facilities clearly identified and maintained?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are potential stormwater contaminants stored properly?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are equipment maintenance areas free of spills or leaks?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Are non-stormwater discharges properly controlled?</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>□ Yes □ No</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
</tbody>
</table>
### Site Specific BMP Assessment

<table>
<thead>
<tr>
<th>BMP Description</th>
<th>Code</th>
<th>Practice Req</th>
<th>Practice Used</th>
<th>Maintenance Yes</th>
<th>Maintenance No</th>
<th>Corrective Action Needed/Notes</th>
<th>Date Action Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sediment Control BMPs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt Fence</td>
<td>SF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment Control Log</td>
<td>SCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straw Bale Barrier</td>
<td>SBB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock Sock</td>
<td>RS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlet Protection</td>
<td>IP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment Basin</td>
<td>SB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment Trap</td>
<td>ST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetated Buffer</td>
<td>VB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Erosion Control BMPs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Roughening</td>
<td>SR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary &amp; Permanent</td>
<td>TS/ PS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Binders</td>
<td>SB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mulching</td>
<td>MU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolled Erosion Control</td>
<td>RECP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary Slope Drain</td>
<td>TSD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary Outlet</td>
<td>TOP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth Dikes/Drainage</td>
<td>ED/DS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terracing</td>
<td>TER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check Dams</td>
<td>CD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streambank Stabilization</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Erosion/Dust</td>
<td>DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Materials Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Washout Area</td>
<td>CWA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stockpile Management</td>
<td>SP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Housekeeping</td>
<td>GH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Site Management Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection of Existing</td>
<td>PV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Fence</td>
<td>CF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Tracking Control</td>
<td>VTC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stabilized Construction</td>
<td>SCR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roadway</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stabilized Staging Area</td>
<td>SSA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dewatering Operations</td>
<td>DW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary Stream Crossing</td>
<td>TSC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>PGO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CERTIFICATION STATEMENT**

"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, 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."

**Signature:** ________________________________ **Date:** ________________________________
Appendix 8 – Delegation of Authority Form

Delegation of Authority

I, _______________________ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the ____________________________ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

________________________________________ (name of person or position)
________________________________________ (company)
________________________________________ (address)
________________________________________ (city, state, zip)
________________________________________ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in ____________________________ (Reference State Permit), and that the designee above meets the definition of a “duly authorized representative” as set forth in ____________________________ (Reference State Permit).
Appendix B of the Stormwater Regulation Guide

Appendix 9 – Completed Stormwater Inspections

Insert completed 14-day, storm event and stabilization inspections here.
Appendix 10 – Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: __________________________________________________________

Project Title: _____________________________________________________________

Operator(s): ______________________________________________________________

As a subcontractor, you are required to comply with the Erosion and Sediment Control Plan (ESC Plan) for any work that you perform on-site. Any person or group who violates any condition of the ESC Plan may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the ESC Plan. A copy of the ESC Plan is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the ESC PLAN for the above designated project and agree to follow the BMPs and practices described in the ESC Plan.

This certification is hereby signed in reference to the above named project:

Company: ________________________________________________________________

Address: ________________________________________________________________

Telephone Number: _________________________

Type of construction service to be provided: ______________________________________

________________________________________________________________________

Signature: ________________________________

Title: ________________________________

Date: ________________________________
### Temporary and Permanent Seeding (TS/PS) EC-2

**Description**
Temporary seeding can be used to establish herbaceous plants or grasses in areas that are not intended for long-term use. Permanent seeding should be used in areas where a permanent and long-lasting ground cover is desired. Seeds should be planted at the proper depth and watered regularly to ensure successful establishment.

**Appropriate Uses**
Areas that require immediate ground cover for safety or aesthetics, such as construction sites, areas prone to soil erosion, or other similar areas.

**Design and Installation**
Temporary seeding requires regular maintenance and care to ensure successful establishment. Permanent seeding requires less maintenance once established.

**Seeded Preparation**
Prior to seeding, ensure the area is prepared to receive the seeds. This may involve grading, moisture control, and soil preparation.

### Mulching (MU)

**Description**
Mulching has been shown to improve soil condition and protect seeds from predation and damage. It may also help to retain moisture in the soil, which is beneficial for seed germination.

**Appropriate Uses**
Mulching is beneficial for areas with high weed pressure or where soil erosion is a concern. It can also be used to improve soil structure and fertility.

**Design and Installation**
Mulching is typically done after seeding and water application. It is important to avoid compacting the soil when applying mulch.

---

**Temporary and Permanent Seeding (TS/PS) EC-2**

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary seeding can be used to establish herbaceous plants or grasses in areas that are not intended for long-term use. Permanent seeding should be used in areas where a permanent and long-lasting ground cover is desired. Seeds should be planted at the proper depth and watered regularly to ensure successful establishment.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appropriate Uses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Areas that require immediate ground cover for safety or aesthetics, such as construction sites, areas prone to soil erosion, or other similar areas.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design and Installation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary seeding requires regular maintenance and care to ensure successful establishment. Permanent seeding requires less maintenance once established.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seeded Preparation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to seeding, ensure the area is prepared to receive the seeds. This may involve grading, moisture control, and soil preparation.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Mulching (MU)**

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulching has been shown to improve soil condition and protect seeds from predation and damage. It may also help to retain moisture in the soil, which is beneficial for seed germination.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appropriate Uses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulching is beneficial for areas with high weed pressure or where soil erosion is a concern. It can also be used to improve soil structure and fertility.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design and Installation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulching is typically done after seeding and water application. It is important to avoid compacting the soil when applying mulch.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Maintenance and Removal**
After seeding, the seeded surface should not be more than 10% percent exposed. Regular mowing, as needed, is required to control weeds.
Administrative Relief Request

April 3, 2019

Kristin Sullivan
Director of Community and Economic Development
4430 South Adams Parkway, 1st Floor Suite W2000
Brighton, CO 80601

RE: Extraction Oil and Gas, Inc. Warbler Pad – Request for Administrative Relief form Adams County Development Standards and Regulations Chapter 4-16 – Design and Performance Standards—Landscaping

Dear Ms. Sullivan,

Extraction Oil and Gas, Inc. ("Extraction") respectfully requests Administrative Relief from the Chapter 4 Design and Performance Standards—Landscaping for the proposed Warbler well pad located in southeast quarter of Section 13, Township 1 South, Range 66 West.

Section 4-16-21 provides that “Administrative relief is provided to add flexibility in the application of the landscaping regulations in this Section 4-16 when a standard is inapplicable or inappropriate to a specific use or design proposal.” Extraction proposes an alternate landscaping plan to comply with the spirit of the Chapter 4-16 requirements and surface owner requests.

Extraction is requesting administrative relief from Landscaping Code 4-16-19 on south and east portions of the proposed location. Due to lack of development and natural topography, there are no visible structures or public roadways to the South and East of the location. Additionally, no Right-of-Way currently exists adjoined to the East or South of the parcel location, and the adjoined Right-of-Way to the north of the location is approximately one (1) mile away, a distance at which landscaping is likely to have minimal visual benefit. Therefore, Extraction requests relief from landscaping for the un-landscaped portions as shown on the attached exhibit.

Extraction believes this administrative relief plan serves to meet the Chapter 4-16 Landscaping requirements, while respecting the Landowners requests and utilizing existing vegetation and topography of the surrounding area.

Based on the aforementioned information, Extraction respectfully requests Adams County approve the requested administrative relief for landscaping plans. Extraction appreciates the time and consideration of this request. If you have any questions or comments, please contact Bonnie Lamond at 720-354-4619 or blamond@extractionog.com.

Sincerely,

Bonnie Lamond
Extraction Oil and Gas, Inc
AMENDMENT AND RATIFICATION TO SURFACE USE AGREEMENT

This Amendment and Ratification to Surface Use Agreement ("Amendment") is entered into this 24th day of August, 2018 and dated effective September 5th, 2012, by and between Rock Family Farm LLC, whose address is 15000 Picadilly Road, Brighton, Colorado 80603 herein called “Owner,” and Extraction Oil & Gas, Inc. whose address is 370 17th Street, Suite 5300, Denver, Colorado 80202, herein called “Extraction.” Together, the Owner and Extraction are referred to as the “Parties.”

RECITALS

A. Owner and Great Western Oil and Gas Company, LLC entered into a Surface Use Agreement on September 5th, 2012 (the “Surface Agreement”) setting forth the terms under Great Western Oil and Gas Company, LLC would enter and utilize surface lands related to its oil and gas operations upon those Lands owned by the Owner;

B. Extraction Oil and Gas, Inc. is the successor to Great Western Oil and Gas Company, LLC under the terms of the Surface Agreement; and

C. The Parties wish to ratify the Surface Agreement and amend certain terms thereof according to the terms and conditions set forth in this Amendment.

NOW, THEREFORE, in consideration of the foregoing recitals and of the conditions, covenants and agreements set forth below, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties do hereby ratify, confirm, approve, and adopt the Surface Agreement for the uses and purposes set forth therein, and subject to all terms and conditions of said Surface Agreement. Furthermore, the Parties agree to amend the Surface Agreement as follows:

1. SURFACE AGREEMENT. The Owners and Extraction agree to amend the Surface Agreement to provide for, among other things, certain additional surface activities, a relocation of those activities within the Lands, and compensation related thereto, as described below, effective as of the date of this Amendment. The Surface Agreement is amended as follows:

   a. Compensation:

   The following shall replace Paragraph 5 of the Surface Agreement entitled “Compensation” in its entirety:

   The Parties acknowledge that Operator will provide Owner with certain good and valuable consideration, as described in that confidential Letter Agreement of even date herewith, prior to the commencement of drilling operations for each Well drilled which consideration is agreed to be and
constitutes full, complete and final consideration for settlement and complete satisfaction for any and all detriment, depreciation, injury, or damage of any nature to the Lands or crops growing thereon that may occur as a result from Operator's operations pursuant to this Agreement or the Leases. Subsequent operations related to the Wells including but not limited to refracs, recompletions, deepening, or redrilling, except in case of emergency, shall require prior notice to Owner. Operator shall pay Owner actual damages caused by said subsequent operations.

b. Additional Surface Use Provisions, Access Roads, Fences and Facilities:

The following shall replace Paragraph 6.A.(i) of the Surface Agreement entitled entitled "Access Roads" in its entirety:

(i) Access Roads shall not exceed thirty (30) feet in width.

c. Notices:

The following shall supplement and amend Paragraph 12 of the Surface Agreement by replacing the notice provision addressed to Operator with the following:

Operator:

Extraction Oil & Gas Inc.
370 17th Street, Suite 5300
Denver, CO 80202
Attn: Land Department
Phone: 720-382-7741
Email: landdepartment@extractionoe.com

2. DEFINED TERMS. Subject to the following defined terms, all capitalized terms used in this Amendment but not defined in this Amendment shall have the same meaning as set forth in the Surface Agreement:

a. Exhibit "A": All references to the Exhibit "A" attached to and incorporated into the Surface Agreement shall, pursuant to this Amendment, reference the Amended Exhibit "A," attached hereto.

3. LETTER AGREEMENT. The Owner and Extraction shall execute a confidential Letter Agreement, dated of even date herewith, containing the terms and conditions of Compensation Amounts related to the Surface Agreement and Amendment between the Parties.

4. RATIFICATION OF SURFACE AGREEMENT. Except as specified in this Amendment, the Surface Agreement shall remain in full force and effect. If there is a conflict between the terms of this Amendment and those of the Surface Agreement, or any other document executed and delivered in connection therewith, the terms of this Amendment shall control.
The failure of any party owning an interest in the Lands covered by the Surface Agreement to execute this Amendment or a counterpart hereof shall not affect the binding force of this Amendment as to those who executed this Amendment or a counterpart hereof.

This Amendment is signed by the Owner as of the date below, but is effective for all purposes as of the Effective Date of the Surface Agreement.

5. **SINGULAR AND PLURAL.** Reference to the singular includes a reference to the plural and vice versa.

*The remainder of this page intentionally left blank.*
OWNER:

Rock Family Farms, LLC

By: David Rock
Its: Manager
Date:

EXTRACTION:

Extraction Oil & Gas, Inc.

By: Matthew R. Owens
Title: President
Date:
ACKNOWLEDGEMENTS

State of Colorado )
                   ) ss.
County of Adams )

The foregoing instrument was acknowledged before me this 23rd day of August, 2018, by David Rock, in his capacity as Manager of Rock Family Farms, LLC.

ROBIN ENFAENTE
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID #20084024741
MY COMMISSION EXPIRES 04/12/2020

Robin Enfaente
Notary Public
My commission expires: 4/12/2020

State of Colorado )
                   ) ss.
County of Adams )

The foregoing instrument was acknowledged before me this 24th day of August, 2018, by Matthew R. Owens, in his capacity as President of Extraction Oil & Gas, Inc.

ANNE MICHELLE PIERINI
Notary Public
State of Colorado
Notary ID # 20124036744
My Commission Expires 01-04-2021

Anne Pierini
Notary Public
My commission expires: 1/4/21