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FINAL STORMWATER POLLUTION PREVENTION PLAN NAS BRUNSWICK ME
08/01/2014
TETRA TECH EC INC

**DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC
REMEDIAL ACTION CONTRACT (RAC)
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CONTRACT TASK ORDER NO. WE09**

**FINAL
STORMWATER POLLUTION PREVENTION PLAN
FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE**

August 2014

Prepared for



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ACRONYMS AND ABBREVIATIONS

| | |
|--------|-----------------------------------------------------------------------|
| µg/L | microgram per liter |
| ACM | asbestos-containing material |
| BMP | Best Management Practice |
| BRAC | Base Realignment and Closure |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| Co-60 | Cobalt-60 |
| Cs-137 | Cesium-137 |
| CSO | Caretaker Site Office |
| CTO | Contract Task Order |
| DRMO | Defense Reutilization and Marketing Office |
| EPA | Environmental Protection Agency |
| H-3 | Tritium |
| HRA | Historical Radiological Assessment |
| LLRW | low-level radioactive waste |
| MEDEP | Maine Department of Environmental Protection |
| MPDES | Maine Pollution Discharge Elimination System |
| mg/kg | milligram per kilogram |
| NASB | Naval Air Station Brunswick |
| NAVFAC | Naval Facilities Engineering Command |
| NOSSA | Naval Ordnance Safety and Security Activity |
| NTR | Navy Technical Representative |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| PID | photoionization detector |
| ppb | parts per billion |
| ppm | parts per million |
| Ra-226 | Radium-226 |
| RAC | Remedial Action Contract |
| RASO | Radiological Affairs Support Office |
| RCRA | Resource Conservation Recovery Act |
| ROC | radionuclide of concern |
| RPM | Remedial Project Manager |
| RSO | Radiation Safety Officer |
| Sr-90 | Strontium-90 |
| SWPPP | Stormwater Pollution Prevention Plan |
| Th-232 | Thorium-232 |
| TMDL | Maximum Daily Load Assessment |
| TtEC | Tetra Tech EC, Inc. |
| U-238 | Uranium-238 |
| VOC | volatile organic compounds |
| WMP | Waste Management Plan |

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1.0 STORMWATER PROGRAM INFORMATION

Tetra Tech EC, Inc. (TtEC) has prepared this Stormwater Pollution Prevention Plan (SWPPP) at the former Naval Air Station Brunswick (NASB), Brunswick, Maine for the United States Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic under a Removal Action Contract, N62470-13-D-8007, Contract Task Order (CTO) WE09. This SWPPP has been prepared to support the radiological, munitions, and other environmental remedial related work tasks at ten Sites at the former NASB. The Navy is directing these environmental investigation and remediation activities in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan.

This SWPPP has been prepared for the Navy to comply with the requirements of the Maine Pollutant Discharge Elimination System (MPDES) program, specifically the General Construction Permit-Construction Activity as set forth by the State of Maine Department of Environmental Protection (MEDEP), General Permit No. DEPLW0801. This permit is hereafter referred to as the General Permit and is included as Appendix A.

1.1 Contact Information

Before work commences, Table 1-1 will be filled with a list of the qualified personnel that will be responsible for inspecting the Sites to ensure compliance with this plan. Table 1-2 will be filled with a list of subcontractors who will be directed, as needed, by the inspector.

1.2 Inspection and Noncompliance Documentation

Before and after qualified storm events as discussed in Section 4.3, all stormwater pollution prevention and/or erosion control measures and Best Management Practices (BMPs) will be inspected. The inspections will be documented on forms included in Appendix B; completed inspection forms will be inserted in Appendix C of the NASB Site SWPPP Master Copy to be located in the project site office, where they will be retained for the duration of the radiological, munitions and chemical related work. If applicable during these tasks, the Noncompliance Documentation Form included in Appendix B of this SWPPP can be used to document any instances of noncompliance with the General Permit or with this plan. Any completed Noncompliance Documentation Forms will be inserted into Appendix C of the NASB Site SWPPP Master Copy to be located in the project site office.

2.0 PROJECT INFORMATION

2.1 Project Information

2.1.1 Site Location

NASB is located in Cumberland County, Maine, about 25 miles north of Portland, Maine and 31 miles south of Augusta, Maine (Figure 2-1). The Main Station lies between the Androscoggin River to the north and Casco Bay to the south and encompasses approximately 3,200 acres. It is

bordered by the city of Brunswick, Maine to the east and west. The latitude and longitude of NASB are N 43.89238 and W -69.93819, respectively.

2.1.2 Site Description

NASB was officially closed in 2011 in accordance with the 2005 Base Realignment and Closure (BRAC) Law. As of December 2013, approximately 80 percent of the NASB property has been transferred out of Navy control. The ten sites at which the radiological, munitions, and chemical related work tasks are to be performed are currently on Navy owned property.

The Historical Radiological Assessment (HRA) was revised in 2013 (NAVSEA 2013), and was finalized in March 2014. Sites described below that are listed as HRA sites, as well as several other areas identified in the Site Management Plan (ECC 2008) will require further radiological surveys as well as some degree of radiological materials removal to be performed, in addition to the chemical- or munitions-related remedial actions being performed at the ten sites (Figure 2-2). A brief description of the ten sites is provided below.

Quarry Munitions Site

The quarry is located southwest of the runways at the western boundary of NASB and is approximately four acres in size. Site investigations have discovered significant amounts of debris at the site, including munitions. It is suspected that the area was used as a dump site. During the site inspection performed in 2008, a rocket motor tail fin assembly was discovered on the surface of the Quarry Area. In 2009, the Naval Ordnance Safety and Security Activity (NOSSA) made a determination that there was at least a medium likelihood of encountering munitions related items in the subsurface. Based on this determination, the Navy has included this area in the Military Munitions Response Program. Part of this site was also used for permitted petroleum sludge spreading/treatment in accordance with State of Maine requirements. Investigations accomplished to date have uncovered numerous Munitions and Explosives of Concern items and debris. The quarry is also designated as a radiologically impacted site in the HRA and the radionuclides of concern (ROCs) are Cesium-137 (Cs-137), Radium-226 (Ra-226), Strontium-90 (Sr-90), and Uranium-238 (U-238).

Building 7/10 Groundwater Site

As part of a Resource Conservation Recovery Act (RCRA) closure action, a small parking lot area was evaluated for past contaminant releases. The parking lot area previously had several small buildings on it that were used for industrial operations. As a result of these operations, the solvent tetrachlorethene was found to be as high as 19 parts per billion (ppb) in one groundwater monitoring well at the site. Benzene is also present in levels between 0 and 7.4 micrograms per liter ($\mu\text{g/L}$). Based on discussions with the regulatory agencies, the Navy will initiate a cleanup effort to address these low level volatile organic compounds (VOCs), after the Navy has better defined the areal extent of the plume boundaries.

Site 07 Old Acid/Caustic Pit

Site 07 is a flat open clearing that is approximately 1.4 acres in size located in the northeast portion of NASB. The site is believed to have been used historically for disposal of acidic and caustic liquids, transformer oils, solvents, and miscellaneous liquids and was used more recently by the Defense Reutilization and Marketing Office (DRMO) facility as an outdoor storage and equipment laydown area. The site was remediated in 2002 and approximately 400 cubic yards of soil was removed (one third was disposed of off-site and the remainder was spread across the remainder of the site in six inch lifts). Cadmium-contaminated soils (ranging from 2.5 to 16.3 milligrams per kilogram [mg/kg]) still exist in several areas. The soils also contain elevated levels of manganese. The site has shallow groundwater depth (4 to 7 feet). Groundwater is also contaminated with cadmium ranging from 1 to 50 µg/L and the goal of the soil removal is to eliminate the continued source of groundwater cadmium contamination. The site is currently being managed by the Navy to control exposures to contaminants from soil and groundwater. Site 07 is also designated as a radiologically impacted site in the HRA and the ROCs include Cobalt-60 (Co-60), Cs-137, Tritium (H-3), Ra-226, Sr-90, Thorium-232 (Th-232), and U-238.

Site 09 Neptune Drive Disposal Area

Site 09 is a partially remediated waste disposal area occupying approximately 20 acres in the central portion of NASB. The site contains waste incinerator ash. Wastes reportedly dumped at this location include solvents that were burned on the ground, paint sludge, and wastes from the metal shop. Previous remedial actions for non-radiological contamination removed approximately 50,000 tons of contaminated soil. Clean fill was used to create a temporary cap (polyethylene liner, fill, and vegetation) over most of the remediated areas. However, remediation did not address waste material located under the roads or around the utilities and site investigations have confirmed that the boundary of the disposal area is larger than previously remediated. Based on recent data gap investigations, the soils at various depths may contain low level concentrations of metals such as arsenic (up to 19.9 mg/kg) and chromium (up to 35.5 mg/kg) as well as polycyclic aromatic hydrocarbons (PAHs), including carcinogenic PAHs such as benzo(a)anthracene (up to 19.9 mg/kg), benzo(a)pyrene (up to 15.8 mg/kg), benzo(b)fluoranthene (up to 21.2 mg/kg) as well as other PAHs above the U.S. Environmental Protection Agency (EPA) regional screening criteria. In addition, low-level VOCs such as tetrachloroethene may be present in some soil as a recent field screening using a photoionization detector (PID) detected up to 19.5 parts per million (ppm) during data gap sampling. Site 09 is also designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, Ra-226, Th-232, U-238, and H-3.

Site 1/3 Landfill

Site 1 (Orion Street Landfill) and Site 3 (Hazardous Waste Burial Area) are co-located in the central portion of NASB. The Site 1/3 Landfill is located immediately north of Building 642 and is approximately 10 acres in size and contains an estimated 300,000 cubic yards of waste. Prior disposal included domestic waste and refuse and debris including aircraft parts and construction debris as well as asbestos-containing materials (ACMs). The landfill also was used for disposal of waste oil, solvents, pesticides, herbicides, petroleum products, paints, and other various chemicals. Solvents were detected in soil jar headspace PID readings from waste zones within the landfill from 0.5 to 90 ppm. PAHs, the pesticide dieldrin, polychlorinated biphenyls (PCBs),

dioxin, arsenic, and cadmium were also detected at low levels, but above EPA risk based cleanup levels. The landfill has a RCRA multilayer cap in place, which was constructed in 1995. The Site 1/3 Landfill is also designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

Undocumented Former Orion Street Disposal Area

The Undocumented Former Orion Street Disposal Area is located at the corner of Orion Street and Merriconeag Drive. The exact size of the site is currently not known. The site was identified as an open disposal area where the Ground Electronics Division allegedly disposed of defective electronics components, including electron tubes. The site is designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Ra-226, Sr-90, and Th-232. The site is currently a vacant lot used for athletic activities.

DRMO Site

The DRMO Site consists of Building 584 (approximately 7,200 square feet) and the adjacent DRMO yard. The yard is an approximate 84,000 square foot asphalt paved surface adjacent to Building 584. The eastern portion of Building 584 was built on top of the acid/caustic pit which is part of Site 04. The DRMO Site is designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

Site 02 Orion Street Landfill (South)

Site 02 is located in the vicinity of the southern extent of the main runways within the restricted weapons compound area. The site is approximately three acres and was previously used as the primary landfill for NASB between 1945 and 1955 for disposal of domestic waste, hazardous materials, aircraft parts, and construction debris. All prior boring log soil samples had levels of contaminants that were below EPA risk based cleanup levels. A portion of this site has been capped with 15-inches of topsoil. Reportedly, wastes were incinerated on-site and buried in a two-acre pit (formerly a borrow pit). Site 02 is also designated as a radiologically impacted site in the HRA and the ROC is Ra-226.

Building 9 MWR CPO Wardroom/VPU/Electronics and Ordnance Shop

Building 9 is approximately 8,888 square feet in size and was constructed in 1943. The building had several uses, including a laundry facility; electronics and ordnance shop (1950s to 1960s); Patrol Squadron Special Unit (VPU) (1970s to 1980s); and the Morale, Welfare, and Recreation (MWR) CPO Wardroom from 2006 to 2011. A radiological survey was completed that identified radiological contamination was present. Building 9 is designated as a radiologically impacted site in the HRA and the ROCs include Cs-137, H-3, Ra-226, Th-232, and U-238.

Site 06 (Sandy Road Rubble and Asbestos Disposal Site)

Site 06 is bordered by Sandy Road to the southeast and by a stream behind Building 516 to the north and is approximately one acre in size. At this site, a small depression was reportedly used for general disposal of construction debris, aircraft parts, and other non-putrescible wastes until the late 1970s. Site 06 is designated as a radiologically impacted site in the HRA and the ROCs for the site include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

2.1.3 Project Description

Based on past site history and results from the data gaps investigation, the Navy has determined that the ten sites require radiological, munitions, and chemical investigative and remediation activities to allow property transfer to non-Navy entities. The approximate disturbed area is 4 acres. The project action objectives for the radiological, munitions, and chemical investigative and remediation activities are to protect public health and welfare, and the environment by physically removing munitions and removing and/or capping chemical and radiological contaminated materials at the ten sites.

The primary objectives for each of the sites are summarized below:

- Site 09 Neptune Drive Disposal Area – determine extent of waste ash material and to radiologically free release as much of the area as possible and minimize the size of the restricted release area.
- Site 07 Old Acid/Caustic Pit – achieve radiological free release of the site and remove the source of groundwater cadmium contamination.
- Quarry Area of Concern – radiologically free release as much of the area as possible and minimize the size of the restricted release area.
- Building 7/10 Groundwater Site – initiate treatment of VOC contaminated groundwater.
- Site 1/3 Hazardous Waste Burial Area – Extend existing RCRA cap to include the Site 7 cadmium impacted soil (source of groundwater contamination) and radiologically free release as much of the area as possible and minimize the size of the restricted release area.
- Undocumented Former Orion Street Disposal Area – achieve radiological free release of the site.
- DRMO Site - achieve radiological free release of the site, including Building 584.
- Site 2 Orion Street Landfill (South) - cap debris north of existing capped area and to radiologically free release as much of the area as possible and minimize the size of the restricted release area.
- Building 9 MWR CPO Wardroom/VPU/Electronics and Ordnance Shop – achieve radiological free release of the building.
- Site 6 – Verify the construction debris and asbestos material have been removed and to achieve radiological free release of the site.

To accomplish the above project objectives, the field activities, in general, will include by site:

- Site 09 Neptune Drive Disposal Area – geophysical surveys, vegetation clearing, test pitting to determine horizontal extent of the waste/ash material, radiological surveys and soil sampling, removal of radiologically impacted soil and transfer to the Navy’s low-level radioactive waste (LLRW) contractor, and backfill of test pits with removed material.
- Site 07 Old Acid/Caustic Pit – geophysical surveys, vegetation clearing, upgrade haul road, excavation of 1,200 cubic yards of low-level cadmium contaminated soil over approximately 0.15 acres and transport to the Site 1/3 landfill, radiological surveys and

soil sampling, removal of radiologically impacted soil and transfer to the Navy's LLRW contractor, collection of soil samples for metals analysis, and backfill and compaction with import material.

- Quarry Area of Concern – geophysical surveys, vegetation clearing, establishment of debris screening and debris stockpile areas, radiological surveys and soil sampling, removal of radiologically impacted soil and debris and transfer to the Navy's LLRW contractor, debris removal and consolidation of radiologically cleared debris over an approximate 140 foot by 80 foot area, placement of reusable soil over consolidated debris, soil reuse sampling, dewatering of excavations, placement of soil cover over seven acre site, off-site transport and disposal of radiologically cleared excavated soil not suitable for reuse, and off-site transport and disposal/recycle of radiologically cleared debris.
- Building 7/10 Groundwater Site – geophysical surveys, installation of injection points and groundwater monitoring wells, collection of soil borings and groundwater samples, and restoration of impacted asphalt.
- Site 1/3 Hazardous Waste Burial Area – geophysical surveys, vegetation clearing, radiological surveys and soil sampling, removal of radiologically impacted soil and transfer to the Navy's LLRW contractor, opening of southern edge of landfill, preparation of 0.5 acre of subgrade for landfill extension, placement and stabilization of Site 7 soil, extension of RCRA cap over the Site 7 soil, and installation of fencing.
- Undocumented Former Orion Street Disposal Area - geophysical surveys, vegetation clearing, radiological surveys and soil sampling, and removal of radiologically impacted soil and transfer to the Navy's LLRW contractor.
- DRMO Site – geophysical surveys; radiological survey, removal and stockpile of approximately 84,000 square feet of asphalt pavement; radiological survey and soil sampling of ground surface after asphalt removal; transfer and temporary storage of equipment, etc. from within Building 584; radiological survey and building material sampling within Building 584; removal of radiologically impacted asphalt, soil, and building material and transfer to the Navy's LLRW contractor; and replacement of removed asphalt.
- Site 2 Orion Street Landfill (South) - geophysical surveys, vegetation clearing, test pitting to determine horizontal extent of the debris north of existing capped area (approximately one acre in size), radiological surveys and soil sampling, removal of radiologically impacted soil and transfer to the Navy's LLRW contractor, grading of uncapped area, and placement of soil cover and geotextile liner over uncapped debris in preparation for the MEDEP approved Soil Capping Measures to be accomplished by another contractor.
- Building 9 MWR CPO Wardroom/VPU/Electronics and Ordnance Shop - radiological survey and building material sampling, and removal of radiologically impacted building material and transfer to the Navy's LLRW contractor
- Site 6 – geophysical surveys, vegetation clearing, test pitting to verify waste material has been removed, radiological surveys and soil sampling, removal of radiologically impacted soil and transfer to the Navy's LLRW contractor, and backfill of test pits with removed material.

2.1.4 Existing Site Topography and Stormwater Flows

Topography of NASB is characterized by low, undulating hills with deeply incised brooks and bedrock outcrops. Ground surface elevations range from mean sea level in lowland drainage areas to over 100 feet above mean sea level west and southwest of the southern end of the runways. The topography generally slopes down to the south and the east. Surface water drains primarily in sheet-flow pattern and is collected by the streams and eventually discharged to the Harpswell Cove.

At completion of work activities in each site, site topography and stormwater flow characteristics will be restored similar to preconstruction conditions to the maximum extent practicable.

2.1.5 Construction Schedule

The schedule for the radiological, munitions, and chemical related work tasks to be performed at NASB will be provided to the Navy prior to specific task mobilization, with updates provided during the project quality control meetings during construction activities.

2.1.6 Allowable Non-Stormwater Discharges

Below are the anticipated allowable non-stormwater discharges for the environmental investigation and remedial activities at NASB:

- Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited)
- Dust control runoff in accordance with the General Permit conditions
- Uncontaminated air conditioning or compressor condensate
- Uncontaminated groundwater or spring water
- Uncontaminated excavation dewatering (see requirements in Appendix C(5) of the General Permit)

2.1.7 Site Map

As necessary, the maps with the appropriate BMPs for each of the sites with earth-disturbing activities will be attached in Appendix D before any work commences. The maps will be updated accordingly as changes occur in the field.

These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including;
 - Locations where earth-disturbing activities will occur, noting any phasing of construction activities;
 - Approximate slopes before and after major grading activities. Note areas of steep slopes, as defined in the General Permit provided in Appendix A;
 - Locations where sediment, soil, or other construction materials will be stockpiled;
 - Designated points on the site where vehicles will exit onto paved roads;

- Locations of structures and other impervious surfaces upon completion of construction.
- Locations of all surface waters, including wetlands, that exists on or near each site.
- Topography of the site, existing vegetative cover (e.g., forest, pasture, pavement, structures), and drainage pattern(s) of stormwater and allowable non-stormwater flow onto, over, and from the site property before and after earth-disturbing activities.
- Stormwater and allowable non-stormwater discharge locations, including:
 - Locations of any storm drain inlets on the site and in the immediate vicinity of the site; and
 - Locations where stormwater or allowable non-stormwater will be discharged to surface waters (including wetlands).
- Locations of all potential pollutant-generating activities.
- Locations of stormwater control measures.

3.0 POLLUTANT SOURCES AND BEST MANAGEMENT PRACTICES

This section identifies the materials and activities that may contaminate stormwater (Section 3.1) and discusses implementation of BMPs for stormwater, where applicable, during and after construction (Sections 3.2 through 3.6). Copies of the BMPs that may be used at the sites are provided in Appendix E.

3.1 Inventory of Materials and Activities That May Contaminate Stormwater

The BMPs for construction activities that may pollute stormwater focus on the following potential pollutant sources:

- Contaminated fine-grained soil (silt) from the excavation that can be suspended in stormwater runoff
- Contamination of stormwater with radionuclides, metals, or other chemicals of concern present in the soil
- Track out of soil and sediment from trucks leaving the work sites
- Hazardous materials, including spills of fuel, oil, and lubricant
- Wind erosion of stockpiles of soil built during construction
- Solid waste (asphalt, concrete, building materials [e.g., floor tiles, drywall, etc.], used personal protection equipment (PPE) and sampling supplies, oily rags and sorbents, non-munitions metal debris, etc. from construction activities

3.2 BMPS to be Implemented for Construction Activities

Good housekeeping and maintenance practices are key factors in reducing potential off-site migration of pollution. These practices shall include elimination of brush, litter, or other items, including solid waste that may clog drainage pathways or enter the stormwater flow within the excavation areas. The achievement of good housekeeping and maintenance also requires employee participation as well as specific training and control systems. The following BMPs that will be implemented are essential to maintaining control of potential pollution sources.

Stormwater control structures will be inspected weekly as well as before and after a qualified storm event, and prior to completion of permanent stabilization measures. Any authorized or unauthorized non-stormwater discharges, if observed, will be documented on the site inspection and monitoring forms in Appendix B. Instructions for completing the forms are provided in Section 4.3.

3.2.1 Spill/Release Prevention, Response and Reporting

The following sections describe spill/release prevention, response, and reporting associated with the NASB field activities.

3.2.2 Spill/Release Prevention

The primary activities that may result in a spill or release during this project include vehicle fueling activities, potential hydraulic system failure on construction equipment, and management of decontamination wastewater. Spill/release prevention practices for these activities are as follows:

- **Fueling** – All vehicles will be fueled and serviced prior to moving onto the site. Any on-site fueling of vehicles will be conducted within a designated and controlled area approved by the Caretaker Site Office (CSO). Small fuel containers, if stored onsite, will be kept in a designated secure and covered location within secondary containment. Absorbent pads or drip pans will be placed on the ground at the fueling point to catch any spills. Fueling operations will be attended and observed at all times. No latch-on fueling will be performed. Further, site vehicles and construction equipment will be inspected daily by the operator. If there is any equipment leaking or deficiencies that could cause a spill are observed (e.g., loose fittings, damaged hose, etc.), the equipment will be taken out of service and repaired. A spill kit will be placed at the refueling point and will contain sorbent pads, booms, kitty litter, bags, and gloves.
- **Construction Equipment** – Construction equipment will be maintained in good working condition. Preventative maintenance of equipment will be performed and daily equipment inspections will be performed by the operator of the equipment and documented. Deficiencies found during inspection or as found during operation will result in stopping work and having the equipment repaired prior to being put into service. A small spill kit will be present on each piece of heavy equipment (several sorbent pads and gloves at a minimum) for immediate response to small spills should they occur. Active work sites will have a larger spill kit staged in a readily accessible manner for spill response, which will contain sorbent pads, booms, kitty litter, bags, and gloves.
- **Passenger Vehicles and Trucks** -Passenger vehicles and trucks will be inspected daily for possible leaks, but any service will be performed off-site at commercial facilities.
- **Decontamination Wastewater** – Wastewater will be stored in double-walled temporary tanks or 55-gallon drums within a secondary containment area. Therefore, any spills from the containers or tanks will be contained and will not be released into the surrounding areas. Tanks holding water will be inspected at least weekly.

- **Secondary Containment** - Whenever possible, indoor or covered storage areas will be used. If outdoor secondary containment structures are used; the secondary containment must be inspected no less than weekly and after rain events. Water accumulation must be managed so that adequate secondary containment is maintained (100 percent volume of the largest container in the containment area at a minimum). Water that is visually inspected and does not have a sheen can be pumped from secondary containment onto the ground away from surface waters. If water has a sheen, it must be pumped into another container and cannot be released to the ground.

3.2.3 Spill/Release Response

In the event of a release of hazardous material into the environment, per the Accident Prevention Plan/Site Safety and Health Plan (TtEC 2013a) TtEC will contain or control the release or evacuate the area if the spill is significant or represents an immediate health threat. Spills, leaks, and fires at NASB must be reported to the Remedial Project Manager (RPM), Navy Technical Representative (NTR), and CSO. In addition, all spills involving radioactive material must be reported to the Radiation Safety Officer (RSO) and the Radiological Affairs Support Office (RASO). Absorbent pads, shovels, and U.S. Department of Transportation-approved containers will be kept on-site to address the possibility of spills as stated above.

Spill cleanup materials and waste will be containerized, managed, and disposed of as described in the Waste Management Plan (WMP) (TtEC 2013b).

3.2.4 Spill/Release Reporting

The steps below outline the chain of communication that will be followed should a significant spill of any hazardous substance occur. Any spill over the reportable quantity as determined by federal and/or state regulations will be considered a significant spill, as will any spill below the reportable quantity not properly contained and released into the environment.

1. Site personnel involved in the spill will immediately contact the Site Superintendent, who will notify the Project Manager (PM), Safety and Health Manager, and RSO (if radioactive material is involved). The TtEC Site Superintendent or PM will contact the RPM, NTR, and CSO. The RSO will contact the RASO.
2. If a release of a waste or hazardous substance, regardless of quantity, could threaten human health or the environment outside the facility, the PM will verify that the National Response Center (800-424-8802), MEDEP Agency (800-482-0777), and the local Fire Department have been notified by the Navy. Releases will be reported, and written follow-up emergency notices will be submitted under the Superfund Amendments and Reauthorization Act, Title II requirements.
3. Any release of fuels or other products that causes a sheen on water at the site or any release into the nearby streams must be reported to the Navy immediately, who will then contact the National Response Center (800-424-8802).

3.2.5 Management of Solid Waste

All construction waste shall be disposed of in dumpsters, roll-off bins, or other similarly approved containers in designated areas located throughout the site. Specific procedures to handle all types of waste expected within TtEC work areas at NASB are included in the WMP (TtEC 2013b). These plans will be maintained at the site.

3.2.6 Management of Contaminated Soil

Stockpiles of excavated soil generated during the environmental investigation and remediation activities will be stored in a designated storage area in consultation with the CSO. Radiologically contaminated soil will be placed directly in lined and covered bins, and chemical contaminated soil will be placed on a polyethylene liner. To provide dust control and prevent runoff, stockpiled soil will either be covered with polyethylene liner or will be treated with a soil tackifier and surrounded with continuous contained berms.

3.2.7 Track Out of Material

Track out of loose materials will be controlled by use of tire-cleaning gravel pads (as described in Section B-1 of the Maine Erosion and Sediment Controls BMPs [MEDEP 2003]) or equivalent at the access and egress points of each project site to prevent tracking of mud or loose soils onto paved roadways when deemed necessary. To ensure that the tires are free from mud or loose soils prior to leaving each of the project sites, as applicable, bulk-loaded trucks and commercial vehicles will be required to pass over a gravel pad where the soil residue from the tires will be removed. Any visible tracking onto a paved road where vehicles exit the NASB project sites will be removed at the end of the work day, or more frequently as necessary.

3.2.8 Employee and Subcontractor Training

Primary work policies will be centered on requiring extensive training for employees and any subcontractor working on-site. Each employee is required to be current with appropriate federal hazardous waste training requirements and other training programs, as defined in the Accident Prevention Plan/Site Safety and Health Plan (TtEC 2013a). Each subcontractor will be required to attend daily safety meetings at the worksite, and each work phase is reviewed during project orientation meetings. During the meetings, potential problems, including weather conditions and stormwater control, will be discussed, and the response actions that will be implemented if a particular spill or pollution situation occurs will be reviewed.

3.3 BMPS to be Implemented for Erosion and Sediment Control

BMPs for erosion and sediment control will be implemented, as necessary, during construction activities. Erosion and sediment control structures will be inspected weekly and prior to and at the end of qualified storm events (see Section 4.3 for inspection frequency). Any authorized or unauthorized non-stormwater discharges, if observed, will be documented on the site inspection and monitoring forms in Appendix C. Instructions for completing the forms are provided in

Section 4.3. The following sections identify BMPs that will or may be implemented to prevent erosion of sediment.

3.3.1 Construction Sequence and Scheduling

The radiological, munitions, and chemical related activities for the ten sites will be sequenced to minimize the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

3.3.2 Dust Controls

Dust Controls for Construction Traffic

Fugitive dust emissions from construction traffic traveling on unpaved surfaces will be controlled through the following mitigation methods:

- Actively used unpaved roads in the project construction sites will be watered as needed to maintain adequate dust suppression. The frequency of watering will be determined in the field to properly accommodate actual site conditions to minimize fugitive dust and to not create an over-wet condition creating mud. Watering will be reduced or eliminated during periods of precipitation.
- Vehicle speeds will be maintained as deemed appropriate for actual site conditions; however, no vehicle will exceed 15 miles per hour (mph) within the construction site and 5 mph in work areas.

Dust Controls for Site Preparation and Remediation Activities

Fugitive dust emissions from site preparation, excavation, loading, spreading, stockpiling, backfill, and compaction activities will be controlled using the following methods:

- During asphalt removal, surface soils will be moistened in the area to be removed prior to commencing the activity. Soil moisture content will be sufficiently maintained during the site preparation and remediation phases to minimize generating fugitive dust.
- All unpaved, inactive portions of the work area and inactive storage piles that are inactive for more than seven days will be watered or an appropriate soil stabilizer will be applied to minimize fugitive dust creation.

Dust Controls for Excavation Activities

Fugitive dust emissions from excavation and loading activities will be controlled using the following methods:

- Soil will be moistened prior to excavation activities to reduce dust migration. If deemed necessary, additional water will be added during active excavation, material handling, and loading activities on an as-needed basis. Active excavation areas will be conditioned appropriately during periods of dry weather and or windy conditions. A

water truck or similar equipment shall be dedicated to the site activities such as excavation, hauling, and removal operations.

- The area subject to excavation and other construction activity will be limited to only the amount of active areas that can be properly maintained. A soil stabilizer will be applied to on-site storage piles of soil or sand that are inactive for an extended period and/or if dust generation is a nuisance.
- The height from which excavated soil is placed either into trucks or stockpiles will be minimized.
- Trucks moving potentially radiologically impacted soils will be loaded over a plastic liner to assist in the cleanup of any soil from the loading process.
- Trucks shall be equipped with tarping systems to cover loads during soil transport.
- Truck traffic shall be minimized to the shortest haul routes from the various work areas.
- When extreme conditions warrant additional protection, a soil stabilizer will be applied in sufficient quantities to disturbed areas so as to stabilize the surface.
- Backfill materials will be wetted on an as-needed basis to maintain moisture. Loader buckets will be emptied slowly and drop height from loader bucket minimized. A water truck or similar equipment will be utilized as necessary during backfilling operations.
- A soil stabilizer will be applied to backfill material and storage piles when not actively handled (i.e., no activity in seven days).

Dust Controls for Bulk Solid Material Transport

- All trucks used to transport import solid bulk material to NASB will be covered (tarpred). The material will be loaded in such a manner that there will be no spillage of the material. All disposal truck delivering materials to the site will meet and or exceed all applicable federal, state and local rules and regulations.
- All trucks used to transport solid bulk material from the NASB project sites will be covered (tarpred for non-radiologically impacted material or hard-top containers/bins used for radiologically impacted material) prior to leaving the site. All disposal trucks departing the site will meet and/or exceed all applicable federal, state, and local rules and regulations.
- Vehicles will be checked to ensure that they are tarpred or covers are closed to prevent any spillage, and any spillage material on the shelf, on exterior surfaces of the truck body or on wheels will be removed prior to leaving the project sites.
- Trucks used for solid bulk material transport will be inspected to ensure that the truck body is in an appropriate condition suitable to haul the material and ensure no spillage can occur from holes or other openings in the truck body.
- Bulk loaded trucks will exit the NASB project sites via an established construction entrance gravel pad tracking control point.

3.3.3 Stabilization of Disturbed Areas

Areas disturbed during excavation, grading, and/or construction activities will be covered with one of the following to stabilize the site:

- Seeding as described in Section C-3 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003).
- Geotextile Liner as described in Section D-1 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003).
- Asphalt Pavement

If a construction site is not stabilized by November 15, then the site will need to be protected with over-winter stabilization as described in Section A-3 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003). An area considered open is any area not stabilized with pavement, vegetation, mulching, erosion control mix, erosion control mats, riprap, or gravel base. The winter construction period is from November 1 through April 15.

3.3.4 Soil Stockpile

Because the soil will be stockpiled in a generally uncompacted condition, it is subject to erosion. In addressing stockpiling, BMPs may include diversion of drainage from the stockpiles, installation of silt fencing or continuous contained berms on the downgradient toe of stockpile slope, and dust control. In addition, the slope of large stockpiles shall not exceed 2 to 1 (2 horizontal to 1 vertical). Plastic sheeting or soil tackifiers will be used for short duration protection of soil stockpiles. Temporary vegetation cover should be applied to stockpiles that would be inactive for 30 days to a year as described in Section A-2 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003). Stockpiles should be covered, seeded or mulched within 7 days of the formation of the stockpile.

Stockpiles of soil will be mulched for over winter protection with hay or straw at twice the normal rate or with a four-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Soil stockpiles will not be placed (even covered with mulch) within 100 feet from any natural resources.

3.3.5 Storm Drain Inlets

Storm drain inlets within 50 feet of construction activities will be protected from any authorized or unauthorized non-stormwater discharges. Hay Bale Drop Inlet Structures, Silt Fence Drop Inlet Sediment Filter, Gravel and Wire Mesh Drop Inlet, Sediment Filter, or Curb Inlet Sediment Filter will be installed on the ground surface around the inlets as described in Section B-3 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003). In areas where heavy traffic occurs, filter fabric will be placed inside the inlets.

3.3.6 Temporary Swales or Berms

Swales and berms may need to be cut to divert and control stormwater runoff during excavation. They can be used to divert sheet flow over slopes, prevent run-on into open excavations or active construction zones, and control erosion along with transport of sediment.

3.3.7 Silt Fence and Sandbags

Silt fencing may be used as a temporary sediment trapping and filtering device downgradient of all disturbed areas where sheet flow might occur. Silt fences will be installed on a level contour receiving no more than 1/4 acre of runoff per 100 linear feet of silt fence, the maximum length of slope above the barrier is 100 feet, and the maximum gradient behind the barrier is 50 percent (2 to 1 slope). Silt Fencing will be installed as described in Section B-1 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003).

Sandbags will be used as a drainage diversion and for sediment trapping and stormwater velocity and erosion control. The sandbags will be installed on level contours up to 1/4 acre and in areas of concentrated flows and drainage courses.

Silt fences and sandbags may be used at the following locations at the site:

- Silt fencing or sandbags around and along the downgradient toe of all soil stockpiles
- Silt fencing or sandbags below active construction areas
- Silt fencing along the downgradient toe of any work performed near creeks or adjacent steeply sloping bank
- Sandbags in concentrated drainage flow course and in areas downgradient of active work areas, as needed
- Sandbags as a diversion berm to stormwater run-on upgradient of active work areas and excavations

3.3.8 Continuous Contained Berm

Continuous contained berms are designed to pond sediment laden water, reducing the flow velocity for a long enough period of time to promote settlement of sediment. Continuous contained berms include a geotextile mesh tubular sock filled with wood based material and fiber rolls composed of straw, flax, or other similar material.

Continuous contained berms may be used at the following locations at the site:

- Around stockpiles and stockpile staging areas
- Downgradient of any active areas where soil disturbance may be expected
- Along the perimeter of the project
- At operational storm drains as a form of inlet protection

3.3.9 Construction Dewatering

Dewatering of excavations may be required at some of the work sites. In most cases the collected water is heavily silted and hinders correct and safe construction practices. If the collected water has been contaminated by toxic and hazardous materials then the water will be disposed by a MEDEP licensed transporter. A list of the chemicals of concern, munitions and radionuclides of concern for each of the ten sites are listed below in Section 4.2. If not contaminated, the collected water removed from the excavations, either through gravity or

pumping, must be spread through vegetated buffers or equivalent as described in Section G-3 of the Maine Erosion and Sediment Controls BMPs (MEDEP 2003).

3.4 Non-Stormwater Management

The non-stormwater control structures will be inspected weekly. Any authorized or unauthorized non-stormwater discharges, if observed, will be documented on the site inspection and monitoring forms in Appendix B. Instructions for completing the forms are provided in Section 4.3.

3.5 Post-Construction BMPS

Final graded slopes throughout NASB, not including Site 1/3 Landfill, Site 2 Orion Street Landfill (South), and the Quarry Munitions Site, will be approximately equal to the current existing slopes to the maximum extent practicable. The final graded slopes at Site 1/3 Landfill, Site 2 Orion Street Landfill (South), and the Quarry Munitions Site will be implemented in accordance with the Navy and Agency approved Work Plans. The grading and drainage plans will be designed to maintain sheet flow of stormwater over the site to minimize ponding of water.

4.0 MONITORING PROGRAM

Monitoring requirements are based on the receiving waters and the source of pollutants at each work site. Section 4.1 describes the receiving waters at NASB. The pollutant source assessment of the historical, current, and proposed site activities is presented in Section 4.2. Site inspections and monitoring program for the project are discussed in Sections 4.3 and 4.4, respectively.

4.1 Receiving Waters

Table 1 – Names of Receiving Waters

| |
|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Name(s) of the first surface water that receives stormwater directly from your site and/or from the Municipal Separate Storm Sewer System (MS4). |
| 1. Mere Brook, a.k.a Mare Brook (Waterbody ID: ME0106000106_602R02) |
| 2. |
| 3. |

Table 2 – Impaired Waters / Total Maximum Daily Load Assessments (TMDLs) (Answer the following for each surface water listed in Table 1 above)

| | Is this surface water listed as "impaired"? | If you answered yes, then answer the following: | | |
|-----------|---------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------|------------------------------------|
| | | What pollutant(s) are causing the impairment? | Has a TMDL been completed? | Title of the TMDL document |
| 1. | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | Pollutants in Urban Stormwater | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | Mere Brook a.k.a Mare Brook |
| 2. | <input type="checkbox"/> YES <input type="checkbox"/> NO | | <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| 3. | <input type="checkbox"/> YES <input type="checkbox"/> NO | | <input type="checkbox"/> YES <input type="checkbox"/> NO | |

Source: EPA's Waters Mapper and the Maine Impervious Cover Total Maximum Daily Load Assessment (TMDL) for impaired streams 2012.

4.2 Pollutant Source Assessment

Based on historical activities, the soil and groundwater at NASB has been impacted. A list of the chemicals of concern, munitions, and ROCs for each of the ten sites is listed below.

Quarry Munitions Site

In 2009, the NOSSA made a determination that there was at least a medium likelihood of encountering munitions related items in the subsurface. Part of this site was also used for permitted petroleum sludge spreading/treatment in accordance with State of Maine requirements. Investigations accomplished to date have uncovered numerous Munitions and Explosives of Concern items and debris. The quarry is also designated as a radiologically impacted site in the HRA and the ROCs are Cs-137, Ra-226, Sr-90, and U-238.

Building 7/10 Groundwater Site

The parking lot area previously had several small buildings on it that were used for industrial operations. As a result of these operations, the solvent tetrachlorethene was found to be as high as 19 ppb in one groundwater monitoring well at the site. Benzene is also present at levels up to 7.4 µg/L. Based on discussions with the regulatory agencies, the Navy will initiate a cleanup effort to address these low level VOCs, after the Navy has better defined the areal extent of the plume boundaries.

Site 07 Old Acid/Caustic Pit

The site is believed to have been used historically for disposal of acidic and caustic liquids, transformer oils, solvents, and miscellaneous liquids and was used more recently by the DRMO facility as an outdoor storage and equipment laydown area. The site was remediated in 2002 and approximately 400 cubic yards of soil was removed (one third was disposed of off-site and the remainder was spread across the remainder of the site in six inch lifts). Cadmium-contaminated soils (ranging from 2.5 to 16.3 mg/kg) still exist in several areas. The soils also contain elevated levels of manganese. The site has shallow groundwater depth (4 to 7 feet). Groundwater is also contaminated with cadmium ranging from 1 to 50 µg/L and the goal of the soil removal is to eliminate the continued source of groundwater cadmium contamination. The site is currently being managed by the Navy to control exposures to contaminants from soil and groundwater. Site 07 is also designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

Site 09 Neptune Drive Disposal Area

The site contains waste incinerator ash. Wastes reportedly dumped at this location include solvents that were burned on the ground, paint sludge, and wastes from the metal shop. Based on recent data gap investigations, the soils at various depths may contain low level concentrations of metals such as arsenic (up to 19.9 mg/kg) and chromium (up to 35.5 mg/kg) as well as PAHs, including carcinogenic PAHs such as benzo(a)anthracene (up to 19.9 mg/kg), benzo(a)pyrene (up to 15.8 mg/kg), benzo(b)fluoranthene (up to 21.2 mg/kg) as well as other PAHs above the EPA regional screening criteria. In addition, low-level VOCs such as tetrachloroethene may be present in some soil as a recent field screening using a PID detected up to 19.5 ppm during data

gap sampling. Site 09 is also designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, Ra-226, Th-232, U-238, Sr-90, and H-3.

Site 1/3 Landfill

Prior disposal included domestic waste and refuse and debris including aircraft parts and construction debris as well as ACMs. The landfill also was used for disposal of waste oil, solvents, pesticides, herbicides, petroleum products, paints, and other various chemicals. Solvents were detected in soil jar headspace PID readings from waste zones within the landfill from 0.5 to 90 ppm. PAHs, the pesticide dieldrin, PCBs, dioxin, arsenic, and cadmium were also detected at low levels, but above EPA risk based cleanup levels. The landfill has a RCRA multilayer cap in place, which was constructed in 1995. The Site 1/3 Landfill is also designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

Undocumented Former Orion Street Disposal Area

The area was identified as an open disposal area where the Ground Electronics Division allegedly disposed of defective electronics components, including electron tubes. The Goldner Site is designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Ra-226, Sr-90, and Th-232.

DRMO Site

The eastern portion of Building 584 was built on top of the acid/caustic pit which is part of the DRMO Site. The DRMO Site is designated as a radiologically impacted site in the HRA and the ROCs include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

Site 02 Orion Street Landfill (South)

The site was previously used as the primary landfill for NASB between 1945 and 1955 for disposal of domestic waste, hazardous materials, aircraft parts, and construction debris. All prior boring log soil samples had levels of contaminants that were below EPA risk based cleanup levels. A portion of this site has been capped with 15-inches of topsoil. Reportedly, wastes were incinerated on-site and buried in a two-acre pit (formerly a borrow pit). Site 02 is also designated as a radiologically impacted site in the HRA and the ROCs are Ra-226 and Sr-90.

Building 9 MWR CPO Wardroom/VPU/Electronics and Ordnance Shop

A radiological survey of Building 9 identified radiological contamination was present. Building 9 is designated as a radiologically impacted site in the HRA and the ROCs include Cs-137, H-3, Ra-226, Th-232, and U-238.

Site 06 (Sandy Road Rubble and Asbestos Disposal Site)

At this site, a small depression was reportedly used for general disposal of construction debris, aircraft parts, and other non-putrescible wastes until the late 1970s. Site 06 is designated as a radiologically impacted site in the HRA and the ROCs for the site include Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238.

4.3 Site Inspections

All stormwater pollution prevention measures and BMPs will be inspected in accordance with the General Permit monitoring requirement provided in Appendix A. All stormwater pollution prevention measures and BMPs will be inspected weekly as well as before and after a qualified storm event, defined by the EPA as 0.25 inch of rain or more during normal business hours for any day. The work sites at NASB and BMPs will be inspected during construction activities by trained and qualified personnel, and the appropriate forms will be filled out. A log must be kept to summarize the inspections performed. These forms are provided in Appendix B. Completed Site Inspection Forms will be inserted into Appendix C of the NASB Site SWPPP Master Copy to be located in the project site office. The following instructions apply to the forms that will be used to document these inspections:

- Use the Site Inspection Form for inspecting the BMPs described in Section 3.0 weekly, before, and after qualified storm events.
- Include in the weather information the best estimate of when (date) the storm event began, the duration of the qualified storm event, the time elapsed since the last storm, and the approximate amount of rainfall.
- List observations of all BMPs: temporary erosion controls, temporary sediment controls, wind erosion controls, non-stormwater controls, and waste management and materials pollution controls.
- Evaluate BMPs for adequacy and proper implementation and whether additional BMPs are required in accordance with the terms of the General Permit.
- Inspect one-time discharges of non-stormwater when such discharges occur.
- Describe any inadequate BMPs or any BMPs that will need maintenance.
- Note the corrective actions required, including any changes to the SWPPP and implementation dates.
- If corrective action(s) are required, note when the corrective action(s) are to be completed. Should more space be needed to describe corrective actions, identify the response numerically and use additional sheets, as necessary.
- Any corrective action(s) must be completed within 7 calendar days and prior to any qualified storm event.
- Visual observations (inspections) shall be conducted during normal business hours. Inspections will not be performed during dangerous weather conditions such as flooding and electrical storms. Inspections not performed as a result of weather conditions or outside of scheduled site business hours will be documented on the inspection form.

4.4 Monitoring for Pollutants Not Visually Detectable In Stormwater

Water samples will be collected and analyzed should visual monitoring indicate that there has been a breach, malfunction, leakage, or spill from a BMP that could result in the discharge of pollutants. If a point discharge were to occur as a result of a breach of a BMP along the border during construction activities, the monitoring point would be designated as the point closest to where the breach occurred, if water is present at the time of observation. Should a BMP near a stream fail, the monitoring and sampling location would be nearest to the point where the BMP

failed. The water samples will be analyzed for the ROCs and the chemicals of concern from the site which the breach, malfunction, leakage, or spill originated.

This stormwater monitoring program will be amended if conditions at the work sites at NASB or the scope of work changes. Any such amendments will be documented using the Amendment Summary Form that is provided as Appendix F of this SWPPP, and any completed forms will be inserted into Appendix G of the NASB Site SWPPP Master Copy to be located in the project field office.

4.5 Corrective Action

The qualified personnel in charge of the inspections will direct corrective actions when any BMP failures have been identified. All corrective actions shall be completed within 7 calendar days and prior to any qualified storm event.

5.0 RECORDS

Records of all monitoring information and copies of all inspection reports required by the General Permit will be retained in the project files for a period of at least 3 years from the date of completion of permanent stabilization. Copies of the monitoring information and reports will be placed in the Langhorne Pennsylvania project files on a monthly basis.

6.0 TRAINING AND CERTIFICATION REQUIREMENTS

To ensure that water quality is being protected, the General Permit requires that all SWPPPs be written, amended, and certified by a professional who is registered, licensed, or certified in a related land-use field, or by education, training, or experience is knowledgeable in erosion and sediment control. The General Permit also requires that all BMPs required by the General Permit are implemented by a person with knowledge of erosion and stormwater control, including the standards of the General Permit. The inspector is responsible for non-stormwater and stormwater visual observations/inspections, and sampling and analysis, if required. The qualified personnel that will be responsible for inspecting the sites will be listed in Table 1-1. Documentation of formal and informal training required for project team members will be provided in Appendix H.

7.0 REFERENCES

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- TtEC. 2013b. Waste Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress

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TABLES

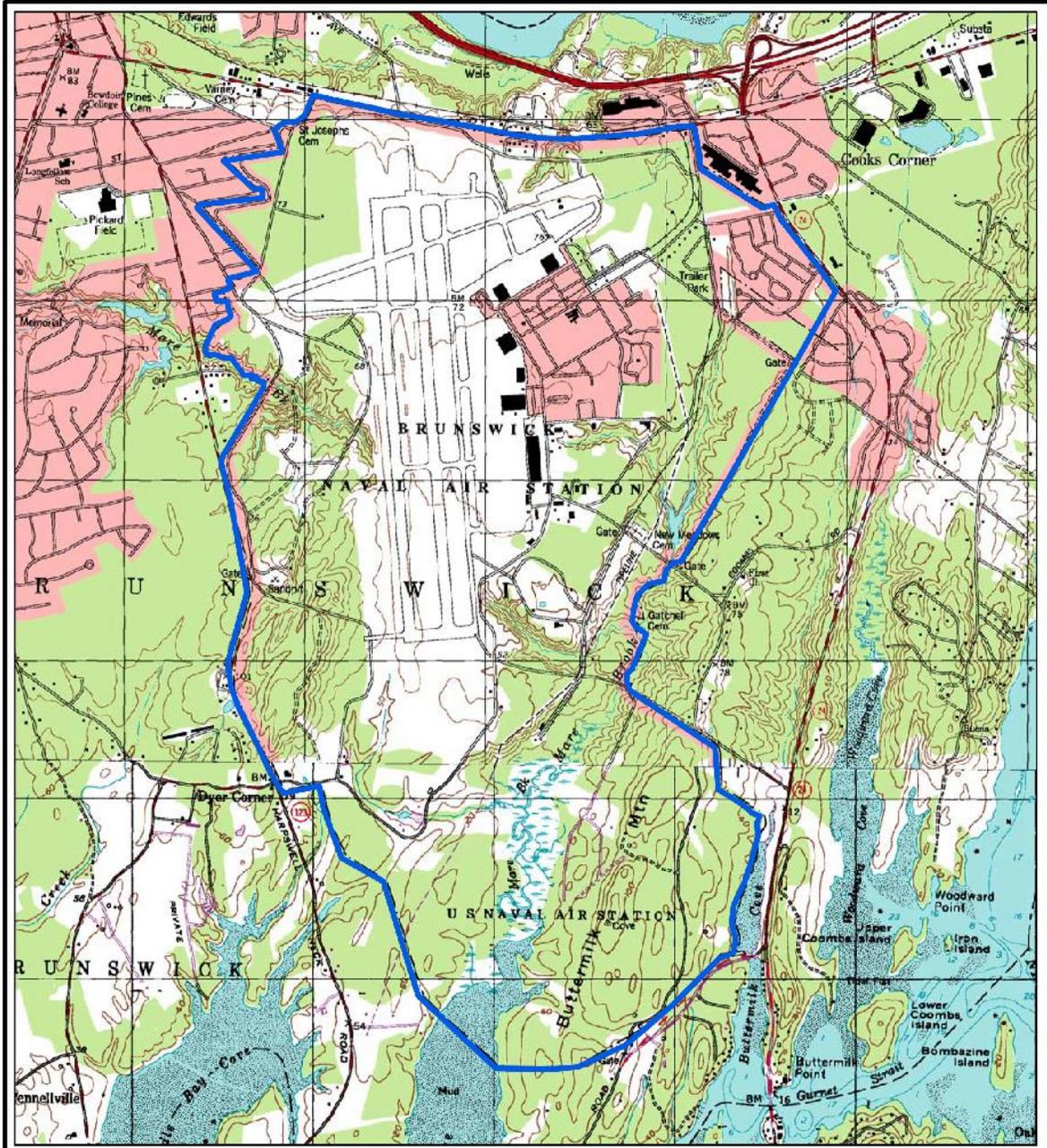
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**TABLE 1-1
SWPPP CONTACT INFORMATION**

| Qualified personnel in charge of the inspections | | |
|---------------------------------------------------------|-----------------------|---------------------|
| Name | Qualifications | Contact Info |
| | | |
| | | |
| | | |
| | | |
| | | |

FIGURES

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| | | | |
|-------------------|-----|------|---------|
| Contract No. | | | |
| Description | | | |
| Coordinate system | | | |
| Sources | | | |
| Date | Rev | Date | App. By |
| | | | |
| | | | |



Legend

 NAS Brunswick Boundary

 **TETRA TECH EC, INC.**

FIGURE 2-1

**REGIONAL LOCATION MAP
 FORMER NAVAL AIR STATION
 BRUNSWICK, MAINE**

0 875 1,750 3,500 Feet



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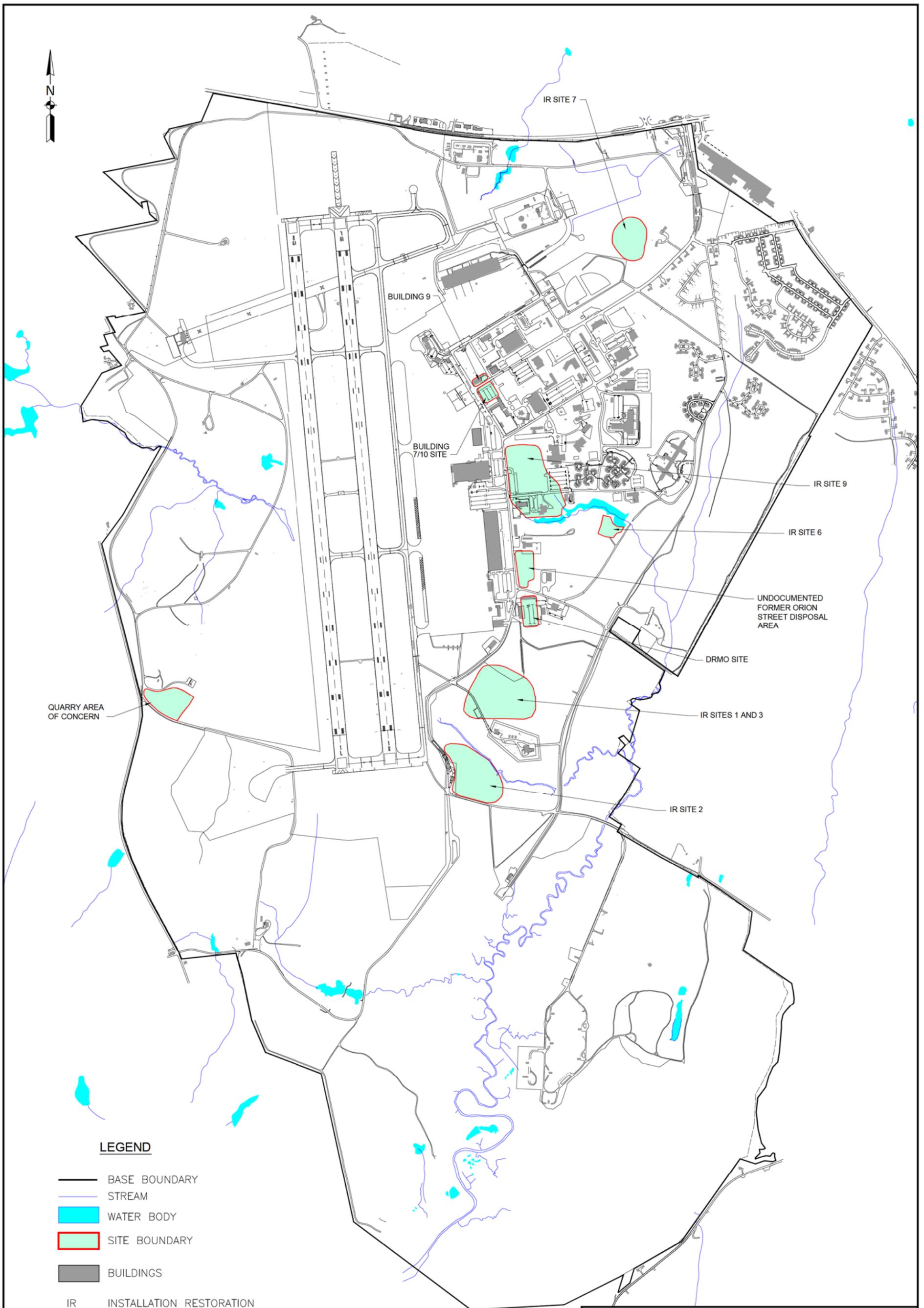


FIGURE 2-2
SITES LOCATION MAP
FORMER NAVAL AIR STATION
BRUNSWICK, MAINE

REVISION: —
 AUTHOR: A. CRABTREE
 PROJECT NO:
 FILE: SEE BELOW

 **TETRA TECH EC, INC.**

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APPENDIX A

GENERAL PERMIT
(including appendices)

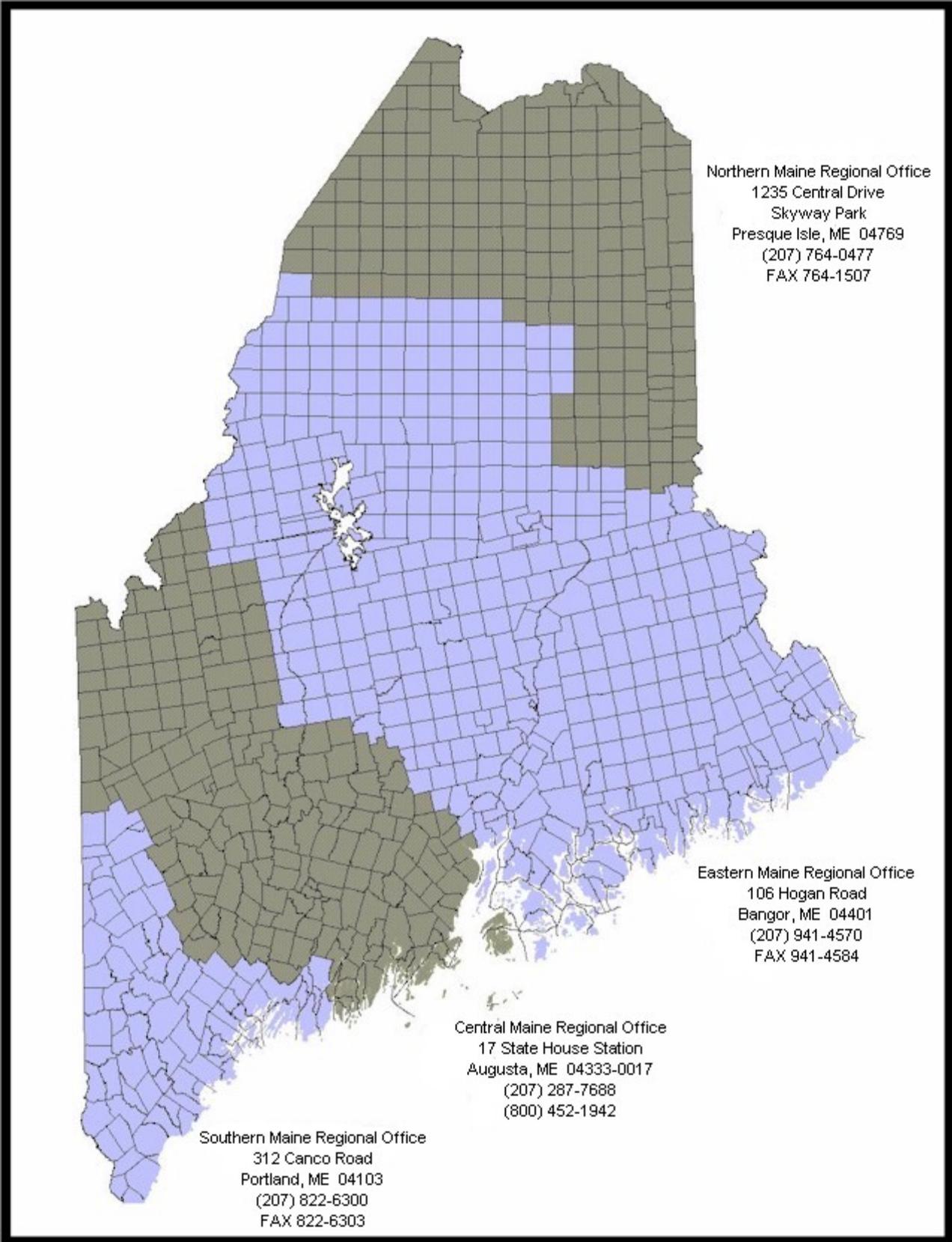
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STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

General Permit – Construction Activity

Maine Pollutant Discharge Elimination System (MPDES)
With Basic Performance Standards Appendices





Northern Maine Regional Office
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Skyway Park
Presque Isle, ME 04769
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FAX 764-1507

Eastern Maine Regional Office
106 Hogan Road
Bangor, ME 04401
(207) 941-4570
FAX 941-4584

Central Maine Regional Office
17 State House Station
Augusta, ME 04333-0017
(207) 287-7688
(800) 452-1942

Southern Maine Regional Office
312 Canco Road
Portland, ME 04103
(207) 822-6300
FAX 822-6303

GENERAL PERMIT -- CONSTRUCTION ACTIVITY
Maine Pollutant Discharge Elimination System (MPDES)

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PART I -- General Permit Coverage

A. General coverage of this permit. This general permit authorizes the direct discharge (point source discharge) of stormwater associated with construction activity to waters of the state other than groundwater, provided that the discharge meets the requirements of this general permit and applicable provisions of Maine's waste discharge and water classification statutes and rules. This general permit also authorizes the direct discharge of stormwater from support activities. "Construction activity" is defined in Part II (page 2).

This general permit is effective July 21, 2006, and authorization to discharge under this general permit expires January 20, 2008. This general permit applies in those parts of the State of Maine for which the Department has received delegated authority under the federal NPDES program. See Part V (page 10), for a list of specific limitations on coverage of this general permit.

B. Authority. A permit is required for the direct or indirect discharge of pollutants to waters of the State.¹ A general permit may be issued for point discharges (direct discharges) of stormwater.² A violation of a condition or requirement of a general permit constitutes a violation of Maine's water quality laws and the federal Clean Water Act, and subjects the discharger to penalties under 38 M.R.S.A. § 349, and § 309 of the Clean Water Act. Nothing in this general permit is intended to limit the Department's authority under the waste discharge and water classification statutes or rules. This general permit does not affect requirements under other applicable Maine statutes such as Site Location of Development (Site Law), Stormwater Management, Land Use Regulation Commission (LURC), and Natural Resources Protection (NRPA).

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

¹ See 38 M.R.S.A. § 413.

² See 06-096 CMR 529(2)(a)(2)(i).

1. Reissuance or replacement of this general permit, at which time the permittee must comply with the notice of intent conditions of the new permit to maintain authorization to discharge; or
2. The permittee's submittal of a Notice of Termination; or
3. Issuance of an individual permit for the permittee's discharges; or
4. A formal permit decision by the Director not to reissue this general permit, at which time the permittee must seek coverage under an alternative general permit or individual permit.

This general permit does not prevent a municipality from adopting stricter standards than contained in this general permit, or in state or federal law.

PART II -- Definitions

The following terms have the following meanings when used in this general permit. Additional definitions are found in 06-096 CMR 520 and in the waste discharge and classification laws.

A. Construction activity. "Construction activity" or "activity" means:

1. Construction activity including one acre or more of disturbed area, or activity with less than one acre of total land area that is part of a common plan of development or sale, if the common plan of development or sale will ultimately disturb equal to or greater than one acre; or
2. Any other construction activity designated by the Department based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the State.

Note: Based upon Maine's soils, topography, and extensive water resources, the Department has determined that the great majority of construction activities disturbing one acre or more will result in discernable concentrated flows (direct discharges) to waters of the state.

B. Common plan of development or sale. A "common plan of development or sale" means a subdivision as determined by the Land Use Regulation Commission (LURC), or a subdivision under municipal law as determined by the municipality where the subdivision is located.

C. Department. "Department" means the State of Maine Department of Environmental Protection.

D. Direct discharge. "Direct discharge" or "point source" means any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation or vessel or other floating craft, from which pollutants are or may be discharged.³

E. Direct watershed of a waterbody or wetland. "Direct watershed of a waterbody or wetland" is the land area that drains, via overland flow, natural or man-made drainage systems, or waterbodies or wetlands, to a given waterbody or wetland without first passing through an upstream waterbody classified as GPA.

F. Disturbed area. "Disturbed area" is clearing, grading and excavation, which means all the land areas that are stripped, graded, grubbed, filled, or excavated at any time during the site preparation or removing vegetation for, or construction of, a project. "Disturbed area" does not include routine

³ 38 MRSA § 466(5) (definition of "direct discharge") and 06-096 CMR 520 (definition of "point source").

maintenance, but does include redevelopment and new impervious areas. "Routine maintenance" is maintenance performed to maintain the original line and grade, hydraulic capacity, and original purpose of the facility. Paving an impervious gravel surface while maintaining the original line and grade, hydraulic capacity and original purpose of the facility is considered *routine* maintenance. Cutting of trees, without grubbing, stump removal, disturbance or exposure of soil is not considered "disturbed area".

- G. Drainageway.** "Drainageway" is a natural or man-made channel or course within which and from which surface discharge of water may occur. Drainageways include, but are not limited to rivers, streams and brooks (whether intermittent or perennial), swales, ditches, pipes, culverts, and wetlands with localized discharge of water.
- H. Impaired waterbody.** An "impaired waterbody" means a waterbody that is not attaining water quality criteria or standards, as determined by the Department and listed in Chapter 502.⁴
- 1. Best currently available data.** The Department may use the best currently available data to determine the status of a waterbody, rather than relying upon the list published in Chapter 502, Direct Watersheds of Lakes Most at Risk from New Development, and Urban Impaired Streams, when the activity itself may have caused or contributed to the impairment, or when the Department reviews an application for a permit such as an individual Waste Discharge license or Site Law permit.
- I. Notice of Intent ("NOI").** "Notice of Intent or "NOI" means a notification of intent to seek coverage under this general permit made by the applicant to the Department on a notification form provided by the Department.
- J. Notice of Termination ("NOT").** "Notice of Termination" or "NOT" means a notification of intent to end coverage under this general permit on a form provided by the Department.
- K. Person.** "Person" means an individual, firm, corporation, municipality, quasi-municipal corporation, state agency, federal agency or other legal entity.⁵
- L. Stormwater.** "Stormwater" means the part of precipitation, including runoff from rain or melting ice and snow that flows across the surface as sheet flow, shallow concentrated flow, or in drainageways. "Stormwater" has the same meaning as "storm water".
- M. Stream.** "Stream" means a river, stream or brook as defined in the Natural Resources Protection Act at 38 M.R.S.A. § 480-B.
- N. Support activities.** "Support activities" means support activities associated with a construction activity (e.g. concrete or asphalt batch plants, equipment storage yards, material storage areas, excavated material disposal areas, borrow areas) provided the following requirements are met.
- 1. Direct relationship.** The support activity is directly related to a construction site that is required to have waste discharge permit coverage for discharges of storm water associated with construction activity.
- 2. Type of operation.** The support activity is not a commercial operation serving multiple unrelated construction projects by different persons, and does not operate beyond the completion of the construction activity at the last construction project it supports.

⁴ See 06-096 CMR 502

⁵ See 38 M.R.S.A. § 361-A(4).

PART III -- Requirements

Part III describes the requirements for obtaining authorization under this general permit. See Part IV for general submission requirements and procedures related to Notices of Intent (NOIs) and Notices of Termination (NOTs).

A person may not construct or cause to be constructed or operate or cause to be operated or, in the case of a common plan of development or sale (subdivision), sell or lease, offer for sale or lease or cause to be sold or leased any area affected by construction activity without obtaining approval from the Department. A person having an interest in or undertaking an activity on a parcel of land affected by this general permit may not act contrary to this general permit.

A. Construction activity (other than a common plan of development or sale). Construction activity including one acre or more of disturbed area on the parcel, or other construction activity designated by the Department, must meet the following requirements.

1. Submit NOI and NOT.
2. Meet the standards in Appendices A-C of this general permit.
3. Erosion and sedimentation control (ESC) plan development and maintenance. This plan demonstrates how the standards in Appendix A will be met. An ESC plan is required pursuant to the Site Law and this general permit, however additional requirements may apply pursuant to the Site Law. See Part III (D) concerning referencing a plan submitted as part of a Site Law application.

B. Common plan of development or sale. A common plan of development or sale must meet the following requirements.

1. **Site Law, Stormwater, or LURC.** A common plan of development or sale is considered to meet the requirements of this general permit if:
 - a. A Site Law, Stormwater (38 M.R.S.A. § 420-D), or LURC permit is required, and the requirements of Part III (A) are met; and
 - b. If a Stormwater permit is required, the requirements of Part III(A) are also met on all associated lots in the subdivision, as determined by the Department.

The Department will assume that one acre of disturbed area will be created per 3 lots (1/3 ac. per lot), unless the person proposing the common plan of development or sale provides information concerning actual disturbed area.

2. **Other.** If the project does not require a Site Law, Stormwater, or LURC permit, and is not located within an area subject to the jurisdiction of LURC, then the project must meet the standards of the Maine Erosion and Sedimentation Control Law. An NOI is not required.

A lot buyer or subsequent transferee within a common plan of development or sale must submit an individual NOI if he or she proposes a construction activity as defined at Part II (A), regardless of whether the developer has filed an NOI.

The standards apply to the lots in the subdivision as well as associated facilities such as roads, pads, and ponds.

Note: The LURC Development Law only applies to areas of the state administered by the Land Use Regulation Commission (LURC). The Maine Site Law (in regard to subdivisions), Erosion and Sedimentation Control Law, and Stormwater Management Law, apply to projects or portions of projects outside the jurisdiction of LURC.

- C. **Total maximum daily load (TMDL).** If the waterbody to which a direct discharge drains is impaired and has an EPA approved TMDL, then the discharge must be consistent with any waste load allocation (WLA) contained in the TMDL and any implementation plan.
- D. **ESC plan.** Material submitted with an application for a Site Law or Stormwater Management Law permit may be referenced to the extent it substantively addresses the standards in Appendix A. If all the standards are not addressed, supplementary material must be provided with the NOI. If an applicant wishes the Department to rely in whole or part on a submission that is part of a Site Law or Stormwater Management Law application, the applicant should submit a letter with the NOI describing the previous submission and the extent to which it should be relied upon, and listing the standards addressed by any supplementary material.

PART IV. Procedure

- A. **Notice of Intent (NOI).** When the applicant submits a notification form, NOI, he or she agrees to comply with the standards and requirements of this general permit. An NOI must be submitted to the Department with the appropriate fee.

- 1. **Processing of NOI.** An NOI must be reviewed and approved by the Department prior to beginning construction activity or causing soil disturbance except as provided in Part IV(K).

The NOI is deemed approved 14 calendar days after the Department receives the notification form, unless the Department approves the notification or finds the notification deficient prior to that date. Within the 14 day period, the Department may notify the applicant in writing or through verbal communication that the project is ineligible for coverage under this general permit, or that additional information is needed or further review is required. If the DEP does not inform the applicant that the notification is unacceptable within this 14-day period, the notification is deemed accepted by the Department and the applicant may proceed to carry out the activity

Activities that require a permit under the Site Location of Development or the Storm Water Management Acts may not proceed until any required permit under those laws is obtained. Any NOI and supplementary information required by this subsection should be submitted at the same time as any required Stormwater Management or Site Law application for the activity in order to avoid delays in processing. The NOI may not be filed before these applications. The Department may consolidate application materials with these or other programs. When application materials are consolidated, the review period for the NOI is extended to coincide with the review period of the other program.

- 2. **Submission.** Applicants for a Maine CGP must submit the notification form, fee and other information for the Department's review and approval. This information includes a location map, site plan, erosion and sedimentation plan, and photographs of the area to be developed. Also, if the project is located in Essential Habitat, approval from Department of Inland Fisheries and Wildlife will need to be submitted. A landowner or leasehold owner, or his or her authorized representative, must file the NOI using a form provided by the Department. The NOI must contain information specified by the Department that is listed in this subsection. The Department

may require the submission of additional information as necessary. Send the completed NOI form to the DEP office serving the area where the project is located. This general permit contains a map showing the municipalities served by the Department regional offices and the regional office mailing addresses.

- a. The legal name, address, telephone number, and any email address of the landowner or leasehold owner.
- b. The legal name, address, telephone number, and any email address of the agent or contractor.
- c. A narrative describing in detail how to get to and access the parcel and construction activities, and a USGS or similar map with the location marked.
- d. A narrative describing the project and its purpose.
- e. UTM Northing and UTM Easting (if known)
- f. The size of disturbed area proposed.
- g. Name of the receiving water(s) or if the discharge is through a municipal separate storm sewer system, the name of the municipal operator of the storm sewer.
- h. Signature of applicant (landowner or lessee) or authorized representative with documentation showing authorization. For signatory requirements, see 06-096 CMR 521(5).
- i. For any construction activity occurring within an essential habitat or that may violate protection guidelines, written approval of the activity from the Department of Inland Fisheries and Wildlife (IF&W). The applicant must follow any conditions stated in the IF&W approval.⁶

Note: Maps showing areas of essential habitat are available from the Department of Inland Fisheries and Wildlife regional headquarters, municipal offices, the Land Use Regulation Commission (or areas within LURC's jurisdiction) and DEP regional offices. If the activity is located in essential habitat, IF&W must be contacted to request and obtain a "certification of review and approval."

- B. Location map.** The Notification form must be accompanied by a photocopy of a portion of a 7.5 minute USGS topographic map or a DeLorme Atlas map showing the site's location and approximate property boundaries, if the size of the parcel and scale of the map allows it. A USGS topographic map can be useful for showing the general contour and topography of the project site.
- C. Site plan.** Submit a scaled plan showing, at a minimum, the locations of structures and roads, the extent of disturbed land, pre-construction site topography, post-construction site topography, on-site and adjacent surface waterbodies, and all erosion and sedimentation control measures to be used on the site. Such measures include, but are not limited to, sedimentation barriers, ditch lining, rip rap, and culvert inlet and outlet designs. Identify retained downgradient buffers, or explain in a narrative why such buffers will not be retained (see Pollution Prevention standard, Appendix A(1)). Identify protected natural resources, such as wetlands, streams, or high water line of ponds or coastal wetlands on the site plan. It is not necessary to have the plan professionally prepared. However, it must be legible and drawn to a scale that allows clear representation of distances and measurements on the plan.

An applicant may substitute the following information for surveyed pre-development and post-development site topography on the location plans:

1. the locations of high points on the site,
2. the locations of any ponds or other runoff storage depressions on the site,

⁶ A state agency may not license a project that will significantly alter habitat of any species designated as threatened or endangered, or violate protection guidelines, without a determination from IF&W. See 12 M.R.S.A. § 7755-A.

3. the locations and flow direction of any drainage ditches, brooks, or streams,
4. the locations of any catch basin inlets or culvert inlets, and
5. arrows showing the general direction(s) of overland drainage for the site.

D. Erosion and Sedimentation Control plan. In addition to a site plan, an erosion control plan must be included which contains, at a minimum, permanent stabilization measures to be taken (e.g. paving or planting vegetation), installation details of the erosion control measures proposed to be used, seeding and mulching rates, and a construction schedule with the proposed construction dates and timeframe for major earth moving and construction events. **This plan and its details may be included on the site plan instead of being a separate submission.**

An erosion and sedimentation control plan must be designed by a professional who is registered, licensed, or certified in a related land-use field, or by education, training, or experience is knowledgeable in erosion and sedimentation control, or has received specific training in erosion and sedimentation control at a department-sponsored erosion and sedimentation control workshop.

Note: A person who conducts, or causes to be conducted, an activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in 38 M.R.S.A. § 480-B. Sediment control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken. The site must be maintained to prevent unreasonable erosion and sedimentation. See 38 M.R.S.A § 420-C (in part). Other or additional standards may apply, under the Natural Resources Protection Act, to a project located in or adjacent to a protected natural resource.

E. Photos. Provide photographs of the project site that show the existing character and topography of the area proposed for development.

F. Notice of Termination (NOT). The permittee shall submit a Notice of Termination (NOT) on a form provided by the Department within 20 days of the completion of permanent stabilization or within 20 days of obtaining coverage under an alternative MEPDES permit. If the property is transferred and construction activity is ongoing, the permittee is not required to file an NOT if the new owner or lessee files an NOI to continue authorization under this general permit for a continuing discharge.

1. Common plan of development or sale. A person who has filed an NOI for a common plan of development or sale shall file an NOT as follows.

- a. For areas of the site over which the developer has control, the NOT must be filed after permanent stabilization has been completed.-
- b. For areas of the site over which the developer does not have control (ex. lots sold in an undeveloped or partially undeveloped state), the NOT must be filed after (i) temporary stabilization including perimeter controls for individual lots have been completed if the developer has done prep work (stripping or grading) on the lots, (ii) the developer has informed the lot buyers of the requirements of this general permit, and (iii) the developer has provided the buyers with copies of any erosion control plan, or portion of a plan applicable to the lots, required to be certified or provided to the Department under the requirements of this general permit.

A lot buyer within a common plan of development or sale is required to meet the standards of this general permit, except that residential lot buyers are not required to maintain inspection logs as provided in Appendix A(2).

2. **Timing.** A permittee's authorization to discharge under this permit terminates at midnight on the day the NOT is signed.
3. **Submission.** The NOT must include information specified by the Department, including the following:
 - a. The legal name, address, telephone number, and any email address of the landowner or leasehold owner.
 - b. The legal name, address, telephone number, of the agent or contractor.
 - c. Photographs showing the completed project and the affected area. Exception: a person filing an NOT for a common plan of development is not required to include photographs for disturbed areas created by lot buyers or lessees.
 - d. Signature of the permittee or authorized person together with documentation demonstrating authorization. If documentation has been previously submitted and is still current, it may be referenced.

G. Mail/copy. The notification forms must be sent to the DEP by certified mail (return receipt requested) or other service providing a record of DEP's receipt of the item to the sender, or hand delivered to the DEP and date stamped by the Department. The applicant must keep a copy of the notification forms and all materials provided to the Department.

H. Retention of records

1. **Documents.** The permittee shall retain copies of the ESC plan and any forms, submissions, reports, or other materials required by this general permit for a period of at least three years from the completion of permanent stabilization. This period may be extended by request of the Department.
2. **Accessibility.** Employees and agents of the Department may enter any property at reasonable hours in order to determine compliance.⁷ The permittee shall retain a copy of the ESC plan and this general permit at the construction site or other location accessible to the Department, local government officials, and any operator of a municipal separate stormwater sewer receiving discharges from the site, from project initiation to permanent stabilization. The permittee shall ensure that a copy of the ESC plan and this general permit are available for the use of any contractors on the site undertaking work regulated by this general permit.

I. Changes in the activity or owner/lessee. Coverage under this general permit will be continued provided there are no changes in the discharge as described in the NOI and associated submissions. If any changes are proposed in the activity, the person having filed the NOI must notify the Department through the submission of updated information in writing, including submitting or obtaining certification for any revisions to an ESC plan required in Part III.

The updated information must be submitted with a new NOI if the permittee proposes to expand or relocate disturbed area of one acre or more beyond what was indicated in the original NOI, or to

⁷ See 38 M.R.S.A. § 347-C(in part).

change the waterbody to which the stormwater will be discharged. Information concerning other changes may be submitted in a letter.

If the owner or lessee of the land changes, the new owner or lessee must file an NOI if he or she wishes to continue coverage under this general permit. Materials submitted with an NOI by a prior owner or lessee may be referenced if they are still current. Exception: a lot buyer or subsequent transferee of a lot within a common plan of development or sale is not required to file an NOI unless he or she proposes a construction activity as defined in Part II(A).

J. Request to be excluded. A person may request that an activity be excluded from coverage under this general permit and apply for an individual waste discharge permit pursuant to the Department's rules. When an individual permit is issued to a person otherwise subject to this general permit, the applicability of this general permit to that person is automatically terminated on the effective date of the individual permit.

K. Effect of prior approvals.

1. Construction activity including one acre or more of disturbed area. This subsection applies for purposes of determining jurisdiction under the "one acre" threshold only.

- a. Persons disturbing less than 5 acres. A person with on-going construction activity as of July 21, 2006, who received authorization to discharge under a prior MCGP(s) and whose activity includes less than 5 acres of disturbed area and, that have not submitted a NOT do not have to submit a new NOI to obtain coverage under this general permit and are authorized under this general permit provided that the activity meets the standards of this general permit.
- b. Persons disturbing 5 or more acres. A person with on-going construction activity as of July 21, 2006, who received authorization to discharge for the activity under a prior MCGP(s) and have or will disturb five or more acres shall submit a new notice of intent (NOI) prior to or on October 20, 2006. The new NOI may reference information in prior NOI submissions to the extent it is still current.

2. Common plan of development or sale. This subsection applies for purposes of determining jurisdiction under the "common plan of development or sale" threshold only.

A common plan of development or sale (subdivision) is not required to meet the requirements of this general permit if it received approval from LURC or the municipality where it is located before March 10, 2003.

- a. If a subdivision that received municipal or LURC approval prior to March 10, 2003, is modified on or after the effective date of this permit so as to add three or more subdivision lots as determined by LURC or the municipality, this general permit applies to those lots and their associated facilities as provided in Part III.
- b. If a subdivision receives approval on or after March 10, 2003, then this general permit does not apply to lots transferred before March 10, 2003.

Note: A person subdividing land must still file an NOI if he or she will undertake construction activity on the parcel that includes one or more acres of disturbed area, as provided in Part III(A). Examples of such activity would be road or pad construction, or stripping and grading. A single NOI may be filed for both the common plan of development or sale and this disturbed area.

PART V -- Limitations on Coverage

- A. Individual permit or other general permit.** This general permit does not authorize a stormwater discharge associated with construction activity that requires an individual waste discharge permit or is required to obtain coverage under another waste discharge general permit. See Part VI(A) for information on related waste discharge permits.

The Department may require any person with a discharge authorized by this general permit to apply for and obtain an individual permit.⁸ When the DEP notifies an applicant that an individual permit is required, no work may be begun or continued unless and until the individual permit is obtained. Any interested person may petition the Department to take action under this paragraph. Examples of when an individual waste discharge permit may be required are specified in rule.⁹

- B. Compliance with this general permit.** This general permit does not authorize a stormwater discharge that is not in compliance with the requirements of this general permit. If the Department determines that the standards of this general permit have not been met, the Department shall notify the person and may:

1. Authorize coverage under this general permit after appropriate controls and implementation procedures designed to bring the discharge into compliance with this general permit and water quality standards have been implemented as determined by the Department;
2. Require an individual waste discharge permit; or
3. Inform the person that the discharge is prohibited.

Compliance with this subparagraph does not preclude any enforcement activity under Maine law for an underlying violation.

- C. Non-stormwater.** This general permit does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with Appendix C(6).
- D. Total maximum daily load (TMDL).** This general permit does not authorize a direct discharge that is inconsistent with any EPA approved TMDL for the waterbody to which the direct discharge drains as provided in Part III(C).
- E. Discharge of hazardous substances, chemicals, or oil.** This general permit does not authorize the discharge of hazardous substances, chemicals, or oil resulting from an on-site spill.
- F. Violation of water quality standards.** This general permit does not authorize a discharge that may cause or contribute to a violation of a water quality standard.
- G. Related laws.** This general permit does not authorize stormwater discharges that are not in conformance with the terms and conditions of permits issued under Site Location of, 38 M.R.S.A. §§ 481-490; Stormwater Management, 38 M.R.S.A. § 420-D; Natural Resources Protection, 38 M.R.S.A. §§ 480-A - 480-Z; or the Land Use Regulation Commission §§ 481 *et. seq.*. This general permit does not authorize stormwater discharges that are not in conformance with the Maine Erosion and Sedimentation Control Law, 38 M.R.S.A. § 420-C.

⁸ See 06-096 CMR 529(2)(B)(3).

⁹ 06-096 CMR 529(2)(b)(3)

- H. Post-construction discharges.** This general permit does not authorize stormwater discharges after the completion of permanent stabilization.
- I. Metallic mineral mining or advanced exploration.** This general permit does not authorize discharges from metallic mineral mining or advanced exploration. Stormwater and erosion and sedimentation standards related to construction are specified in the Site Location of Development permit and LURC permit and, if required, an individual waste discharge permit.
- J. Exemptions.** Certain exemptions apply and are specified in the Maine Waste Discharge Law. An exemption in a Maine law other than the Maine Waste Discharge Law, such as the Site Law or Maine Stormwater Management Law, does not create an exemption to the Maine Waste Discharge Law or the requirements of this general permit. Each law has its own set of statutory exemptions.
- K. Reopener.** This general permit may be modified or reopened as provided in 38 M.R.S.A. § 414-A(5).

Part VI -- Relationship to other programs

An activity may include "construction activity" and also be regulated under other programs.

A. Related waste discharge permits

- 1. Multi-sector.** A stormwater discharge requiring approval as an industrial activity other than 06-096 CMR 521(b)(14)(x) is not authorized under this general permit.
- 2. Waste discharge permit (surface water).** A waste discharge permit may be required for activities such as combined sewer overflows (CSOs), spray irrigation, process water treatment systems, metallic mine drainage, and other discharges inadequately covered by this general permit, as determined by the Department.
- 3. Waste discharge permit (groundwater).** A waste discharge permit may be required for the discharge of stormwater through any well or wells, including drywells and subsurface fluid distribution systems. For complete requirements, see 06-096 CMR 543.

A "subsurface fluid distribution system" is an assemblage of perforated pipes, drain tiles, or similar mechanisms intended to distribute fluids below the surface of the ground. A "well" is a bored, drilled, or driven shaft the depth of which is greater than the largest surface dimension, whether the shaft is typically dry or contains liquid; or a dug hole the depth of which is greater than the largest surface dimension; or a subsurface fluid distribution system. "Well injection" means the subsurface discharge of fluids into or through a well.

- B. Quarry or an excavation for borrow, clay, topsoil, or silt.** Clearing, grading or excavation activities conducted as part of the exploration and construction phase of a mineral mining operation must meet the requirements of this general permit, if they will result in the direct discharge of stormwater to waters of the state other than groundwater, will disturb one or more acres of land, and occur on or after March 10, 2003. These requirements do not apply to an area that is internally drained. Construction activity includes the building of site access roads and removal of overburden and waste rock to expose mineable materials. If the activity must meet the requirements of this general permit, the following exceptions apply.

- 1. Stabilization deadlines.** The 14 day time limit for temporary stabilization in Appendix A(3), and the one-year time limit for permanent stabilization in Appendix A(5) do not apply.
- 2. If under the Gravel Pit or Quarry Program -- may need to do an ESC plan.** If the clearing, grading, or excavation activity subject to this general permit is also required to meet the Performance Standards for Excavations for Borrow, Clay, Topsoil or Silt,¹⁰ or Performance Standards for Quarries¹¹, then the operator does not have to meet the requirements specified in Part III of this general permit, except for the ESC plan requirements in Part III(A)(2).

In some cases, an area that is not internally drained initially may become internally drained during construction. For an area that has become internally drained, it is not necessary to undertake stabilization as otherwise required under this general permit before filing the NOT.

- C. Other programs such as Site Law, Stormwater, and Waste.** The Department may combine application requirements for this general permit and other programs administered by the Department. Other programs may include facilities and projects regulated pursuant to programs such as 38 M.R.S.A. § 1310-N (Solid waste facility licenses), 1319-R (facility siting), 1319-X (criteria for development of waste oil facilities and biomedical facilities), 38 M.R.S.A. § 483-A (Site Location), 38 M.R.S.A. 420-C (Stormwater Management), and 12 M.R.S.A. § 685-A (LURC). In case of a conflict between the standards in Appendix A, B, and C and those adopted pursuant to any of these laws, the stricter standard applies, as determined by the Department. The review period for the NOI may be extended as provided in Part IV(A)(1)(b). The Department may waive the fee required with the NOI pursuant to this general permit for certain combined applications. Completing a stormwater Permit By Rule notification meets the requirements of this general permit.
- D. Silvicultural activities.** Authorization under this general permit is not required for non-point silvicultural activities as provided in 06-096 CMR 521(10).
- E. Maine Department of Transportation.** Construction activities conducted by the Maine Department of Transportation (MDOT) or the Maine Turnpike Authority (MTA) pursuant to a Memorandum of Agreement between the Department, and MDOT and MTA, are authorized under this general permit within the limits of coverage specified in this general permit. MDOT and MTA are considered qualifying state programs as provided in 40 CFR 122.44(s).

PART VII -- Standard Conditions

A. General restrictions. A discharge covered by a General Permit may not:

1. Be to a body of water classified as Class GPA, AA, A or SA;¹²
2. Be to a body of water having a drainage area of less than 10 square miles;
3. Contain any pollutant, including toxic substances, in quantities or concentrations, which may cause or contribute to any adverse impact on the receiving water;

¹⁰ 38 M.R.S.A. §§ 490-A et. seq.

¹¹ 38 M.R.S.A. §§ 490-W et. seq.

¹² This standard condition is required by 06-096 CMR 529(3), effective January 12, 2001. However, note that 38 M.R.S.A. 465-A(1)(C), 465(1)(C) allow discharge of stormwater to GPA, AA and SA waters if the discharge is in compliance with state and local requirements. For requirements applicable to discharges to Class A waters, see 38 M.R.S.A. 465(2)(C). The Department is proposing emergency legislation to allow certain stormwater discharges to Class A waters and to watersheds of less than 10 square miles. The statutory provisions control for purposes of this general permit.

4. Be to a receiving water which is not meeting its classification standard for any characteristic which may be affected by the discharge; or
 5. Impart color, taste, turbidity, radioactivity, settleable materials, floating substances or other properties that cause the receiving water to be unsuitable for the designated uses ascribed to its classification.
- B. Removed substances.** Pollutants removed or resulting from the treatment of wastewaters must be disposed of in a manner approved by the Department.
- C. Monitoring requirement.** The Department may require monitoring of an individual discharge as may be reasonably necessary in order to characterize the nature, volume or other attributes of that discharge or its sources.
- D. Other information.** When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report to the Department, he or she shall promptly submit such facts or information.
- E. Other applicable conditions.** The conditions in 06-096 CMR 523(2) also apply to discharges pursuant to this general permit¹³ and are incorporated herein as if fully set forth. These conditions address areas such as: duty to comply; need to reduce or halt activity not a defense; duty to mitigate; permit actions; property rights; duty to provide information; and inspection and entry.
- F. Duty to reapply.** If the permittee wishes to continue an activity regulated by this general permit after the expiration date of this general permit, the permittee must apply for and obtain a new permit.
- G. Severability.** The conditions of this general permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

¹³ See 06-096 CMR 529(3)(i).

APPENDICES -- BASIC PERFORMANCE STANDARDS

Appendix A. Erosion and sedimentation control..... 1
Appendix B. Inspection and maintenance 4
Appendix C. Housekeeping..... 4

APPENDIX A. Erosion and sedimentation control

A person who conducts, or causes to be conducted, an activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in 38 M.R.S.A § 480-B. Erosion control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken.

NOTE: The site must be maintained to prevent unreasonable erosion and sedimentation. See 38 M.R.S.A § 420-C (in part). A license is required for any stormwater discharge that the department "determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the State". 06-096 CMR 521(9)(a)(1)(v)(in part).

(1) Pollution prevention. Minimize disturbed areas and protect natural downgradient buffer areas to the extent practicable. The discharge may not result in erosion of any open drainage channels, swales, upland, or coastal or freshwater wetlands.

Note: Buffers improve water quality by helping to filter pollutants in run-off both during and after construction. Minimizing disturbed areas through phasing limits the amount of exposed soil on the site through retention of natural cover and by retiring areas as permanently stabilized. Less exposed soil results in fewer erosion controls to install and maintain. If work within an area is not anticipated to begin within two weeks time, consider leaving the area in its naturally existing cover.

(2) Sediment barriers. Prior to construction, properly install sediment barriers at the edge of any downgradient disturbed area and adjacent to any drainage channels within the disturbed area. Maintain the sediment barriers until the disturbed area is permanently stabilized.

(3) Temporary stabilization. Stabilize with mulch, or other non-erodible cover any exposed soils that will not be worked for more than 7 days. Stabilize areas within 75 feet of a wetland or waterbody within 48 hours of the initial disturbance of the soil or prior to any storm event, whichever comes first.

NOTE: For guidance on erosion and sedimentation controls, consult *the Maine Erosion and Sediment Control Handbook for Construction -- Best Management Practices* or *the Maine Erosion and Sedimentation Control Best Management Practices*.

(4) Removal of temporary measures. Remove any temporary control measures, such as silt fence, within 30 days after permanent stabilization is attained. Remove any accumulated sediments and stabilize.

NOTE: It is recommended that silt fence be removed by cutting the fence materials at ground level so as to avoid additional soil disturbance.

- (5) **Permanent stabilization.** If the area will not be worked for more than one year or has been brought to final grade, then permanently stabilize the area within 7 days by planting vegetation, seeding, sod, or through the use of permanent mulch, or riprap, or road sub-base. If using vegetation for stabilization, select the proper vegetation for the light, moisture, and soil conditions; amend areas of disturbed subsoils with topsoil, compost, or fertilizers; protect seeded areas with mulch or, if necessary, erosion control blankets; and schedule sodding, planting, and seeding so to avoid die-off from summer drought and fall frosts. Newly seeded or sodded areas must be protected from vehicle traffic, excessive pedestrian traffic, and concentrated runoff until the vegetation is well-established. If necessary, areas must be reworked and restabilized if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. One or more of the following may apply to a particular site.
- (a) **Seeded areas.** For seeded areas, permanent stabilization means a 90% cover of the disturbed area with mature, healthy plants with no evidence of washing or rilling of the topsoil.
 - (b) **Sodded areas.** For sodded areas, permanent stabilization means the complete binding of the sod roots into the underlying soil with no slumping of the sod or die-off.
 - (c) **Permanent Mulch.** For mulched areas, permanent mulching means total coverage of the exposed area with an approved mulch material. Erosion Control Mix may be used as mulch for permanent stabilization according to the approved application rates and limitations.
 - (d) **Riprap.** For areas stabilized with riprap, permanent stabilization means that slopes stabilized with riprap have an appropriate backing of a well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Stone must be sized appropriately. It is recommended that angular stone be used.
 - (e) **Agricultural use.** For construction projects on land used for agricultural purposes (e.g., pipelines across crop land), permanent stabilization may be accomplished by returning the disturbed land to agricultural use.
 - (f) **Paved areas.** For paved areas, permanent stabilization means the placement of the compacted gravel subbase is completed.
 - (g) **Ditches, channels, and swales.** For open channels, permanent stabilization means the channel is stabilized with mature vegetation at least three inches in height, with well-graded riprap lining, or with another non-erosive lining capable of withstanding the anticipated flow velocities and flow depths without reliance on check dams to slow flow. There must be no evidence of slumping of the lining, undercutting of the banks, or down-cutting of the channel.
- (6) **Winter Construction.** "Winter construction" is construction activity performed during the period from November 1 through April 15. If areas within the construction activity are not stabilized with temporary or permanent measures outlined above by November 15, then the site must be protected with additional stabilization measures that are specific to winter conditions. No more than one acre of the site may be without stabilization at one time.

- (a) **Site Stabilization.** For winter stabilization, hay mulch is applied at twice the standard temporary stabilization rate. At the end of each construction day, areas that have been brought to final grade must be stabilized. Mulch may not be spread on top of snow.
- (b) **Sediment Barriers.** All areas within 75 feet of a protected natural resource must be protected with a double row of sediment barriers.
- (c) **Ditch.** All vegetated ditch lines that have not been stabilized by November 1, or will be worked during the winter construction period, must be stabilized with an appropriate stone lining backed by an appropriate gravel bed or geotextile unless specifically released from this standard by the department.
- (d) **Slopes.** Mulch netting must be used to anchor mulch on all slopes greater than 8% unless erosion control blankets or erosion control mix is being used on these slopes.

NOTE: For guidance on winter construction standards, see the "Maine Erosion and Sediment Control BMPs", Maine Department of Environmental Protection.

- (7) **Stormwater channels.** Ditches, swales, and other open stormwater channels must be designed, constructed, and stabilized using measures that achieve long-term erosion control. Ditches, swales and other open stormwater channels must be sized to handle, at a minimum, the expected volume run-off. Each channel should be constructed in sections so that the section's grading, shaping, and installation of the permanent lining can be completed the same day. If the channel's final grading or lining installation must be delayed, then diversion berms must be used to divert stormwater away from the channel, properly-spaced check dams must be installed in the channel to slow the water velocity, and a temporary lining installed along the channel to prevent scouring. Permanent stabilization for channels is addressed under Appendix A(5)(g) above.

NOTE: (1) The channel should receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes. (2) When the watershed draining to a ditch or swale is less than 1 acre of total drainage and less than ¼ acre of impervious area, diversion of runoff to adjacent wooded or otherwise vegetated buffer areas is encouraged where the opportunity exists.

- (8) **Roads.** Gravel and paved roads must be designed and constructed with crowns or other measures, such as water bars, to ensure that stormwater is delivered immediately to adjacent stable ditches, vegetated buffer areas, catch basin inlets, or street gutters.

NOTE: (1) Gravel and paved roads should be maintained so that they continue to conform to this standard in order to prevent erosion problems. (2) The department recommends that impervious surfaces, including roads, be designed and constructed so that stormwater is distributed in sheet flow to natural vegetated buffer areas wherever such areas are available. Road ditches should be designed so that stormwater is frequently (at least every 100 to 200 feet) discharged via ditch turnouts in sheet flow to adjacent natural buffer areas wherever possible.

- (9) **Culverts.** Culverts must be sized to avoid unintended flooding of upstream areas or frequent overtopping of roadways. Culvert inlets must be protected with appropriate materials for the

expected entrance velocity, and protection must extend at least as high as the expected maximum elevation of storage behind the culvert. Culvert outlet design must incorporate measures, such as aprons or plunge pools, to prevent scour of the stream channel. Outlet protection measures must be designed to stay within the channel limits. The design must take account of tailwater depth.

(10) Parking areas. Parking areas must be constructed to ensure runoff is delivered to adjacent swales, catch basins, curb gutters, or buffer areas without eroding areas downslope. The parking area's subbase compaction and grading must be done to ensure runoff is evenly distributed to adjacent buffers or side slopes. Catch basins must be located and set to provide enough storage depth at the inlet so to allow inflow of peak runoff rates without by-pass of runoff to other areas.

(11) Additional requirements. Additional requirements may be applied on a site-specific basis.

APPENDIX B. Inspection and maintenance

(1) Inspection and maintenance. Inspect disturbed and impervious areas, and erosion and stormwater control measures, areas used for storage that are exposed to precipitation, and locations where vehicles enter or exit the site. Inspect these areas at least once a week as well as and before and after a storm event, and prior to completion of permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards in this permit and any departmental companion document to this permit, must conduct the inspection. This person must be identified in the inspection log. If best management practices (BMPs) need to be modified or if additional BMPs are necessary, implementation must be completed within 7 calendar days and prior to any storm event (rainfall). All measures must be maintained in effective operating condition until areas are permanently stabilized.

(2) Inspection log (report). A log (report) must be kept summarizing the scope of the inspection, name(s) and qualifications of the personnel making the inspection, the date(s) of the inspection, and major observations relating to operation of erosion and sedimentation controls and pollution prevention measures. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to department staff and a copy must be provided upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

APPENDIX C. Housekeeping

These performance standards apply to all sites.

(1) Spill prevention. Controls must be used to prevent pollutants from construction and waste materials stored on-site, including storage practices to minimize exposure of the materials to

stormwater, and appropriate spill prevention, containment, and response planning and implementation.

- (2) **Groundwater protection.** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

NOTE: Lack of appropriate pollutant removal best management practices (BMPs) may result in violations of the groundwater quality standard established by 38 M.R.S.A. §465-C(1). Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

- (3) **Fugitive sediment and dust.** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

Examples of BMPS -- Operations during wet months, that experience tracking of mud off the construction site onto public roads, should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently if needed.

NOTE: Dewatering a stream without a permit from the department violates state water quality standards and the Natural Resources Protection Act.

- (4) **Debris and other materials.** Litter, construction debris, and construction chemicals exposed to stormwater must be prevented from becoming a pollutant source.

NOTE: To prevent these materials from becoming a source of pollutants, construction activities related to a project may be required to comply with applicable provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements.

- (5) **Trench or foundation de-watering.** Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site.

NOTE: For guidance on de-watering controls, consult the Maine Erosion and Sediment Control BMPs", Maine Department of Environmental Protection."

(6) Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

- (i) Discharges from firefighting activity;
- (ii) Fire hydrant flushings;¹
- (iii) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
- (iv) Dust control runoff in accordance with permit conditions and Appendix (C)(3);
- (v) Routine external building washdown, not including surface paint removal, that does not involve detergents;
- (vi) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
- (vii) Uncontaminated air conditioning or compressor condensate;
- (viii) Uncontaminated groundwater or spring water;
- (ix) Foundation or footer drain-water where flows are not contaminated; and
- (x) Uncontaminated excavation dewatering (see requirements in Appendix C(5)).
- (vi) Potable water sources including waterline flushings.²

Allowable non-stormwater discharges cannot be authorized under this permit unless they are directly related to and originate from a construction site or dedicated support activity (e.g., a pressure washing company cannot broadly use this general permit for their business operations, because general vehicle washing is not associated with a construction site). It is not necessary to list these sources of non-stormwater in the NOI.

¹ This non-stormwater discharge is authorized under this general permit until the Department issues a separate general permit containing requirements specific to this type of discharge, which would replace this authorization.

² See previous footnote.

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APPENDIX B

**SITE INSPECTION FORM, LOG, AND
NONCOMPLIANCE DOCUMENTATION FORM**

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Stormwater Construction Site Inspection

| General Information | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------|--|
| Project Name | | | |
| Date of Inspection | | Location | |
| Inspector's Name(s) | | Start/End Time | |
| Inspector's Title(s) | | | |
| Type of Inspection <input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event | | | |
| Weather Information | | | |
| Has it rained since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| Weather at time of this inspection? | | | |
| Do you suspect that discharges may have occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |

Site-specific BMPs

Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below. Carry a copy of this numbered site map with you during your inspections. This list will help ensure that you are inspecting all required BMPs at your site. Customize this section as needed.

| | BMP Description | BMP Installed and Operating Properly? | Corrective Action Needed | Date for corrective action/responsible person |
|----|-----------------|----------------------------------------------------------|--------------------------|-----------------------------------------------|
| 1 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 2 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 3 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 4 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 5 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 6 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 7 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 8 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 9 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 10 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 11 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 12 | | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |

| | BMP/activity | Implemented? | Maintained? | Corrective Action/ Comments | Date for corrective action/responsible person |
|----|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|-----------------------------------------------------|
| 1 | Are all slopes and disturbed areas not actively being worked properly stabilized? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 2 | Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 3 | Are perimeter controls and sediment barriers adequately installed and maintained? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 4 | Are discharge points and receiving waters free of sediment deposits? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 5 | Are storm drain inlets properly protected? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 6 | Is there evidence of sediment being tracked into the street? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 7 | Is trash/litter from work areas collected and placed in covered dumpsters? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 8 | Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 9 | Are materials that are potential stormwater contaminants stored inside or under cover? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 10 | Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 11 | (Other) | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| 12 | (Other) | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |

Print name: _____

Signature: _____

| Name of Construction Site | Location of Construction Site | | |
|---------------------------|-------------------------------|---------------------------------------------------------------|-----------------------------|
| | | | |
| Date of Inspection | Inspector Name | Does Inspection Report require maintenance of installed BMPs? | |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

NONCOMPLIANCE DOCUMENTATION FORM

Noncompliance Event Description: _____

Noncompliance Event Date: _____

Initial Assessment of Impact of Noncompliance Event: _____

Actions Necessary to Achieve Compliance and Time Schedule

| Action | Completion Date |
|---------------|------------------------|
| | |
| | |
| | |

Approval

Name _____

Signature _____

Title _____

Date _____

APPENDIX C

COMPLETED SITE INSPECTION FORMS, LOG AND NONCOMPLIANCE DOCUMENTATION FORMS

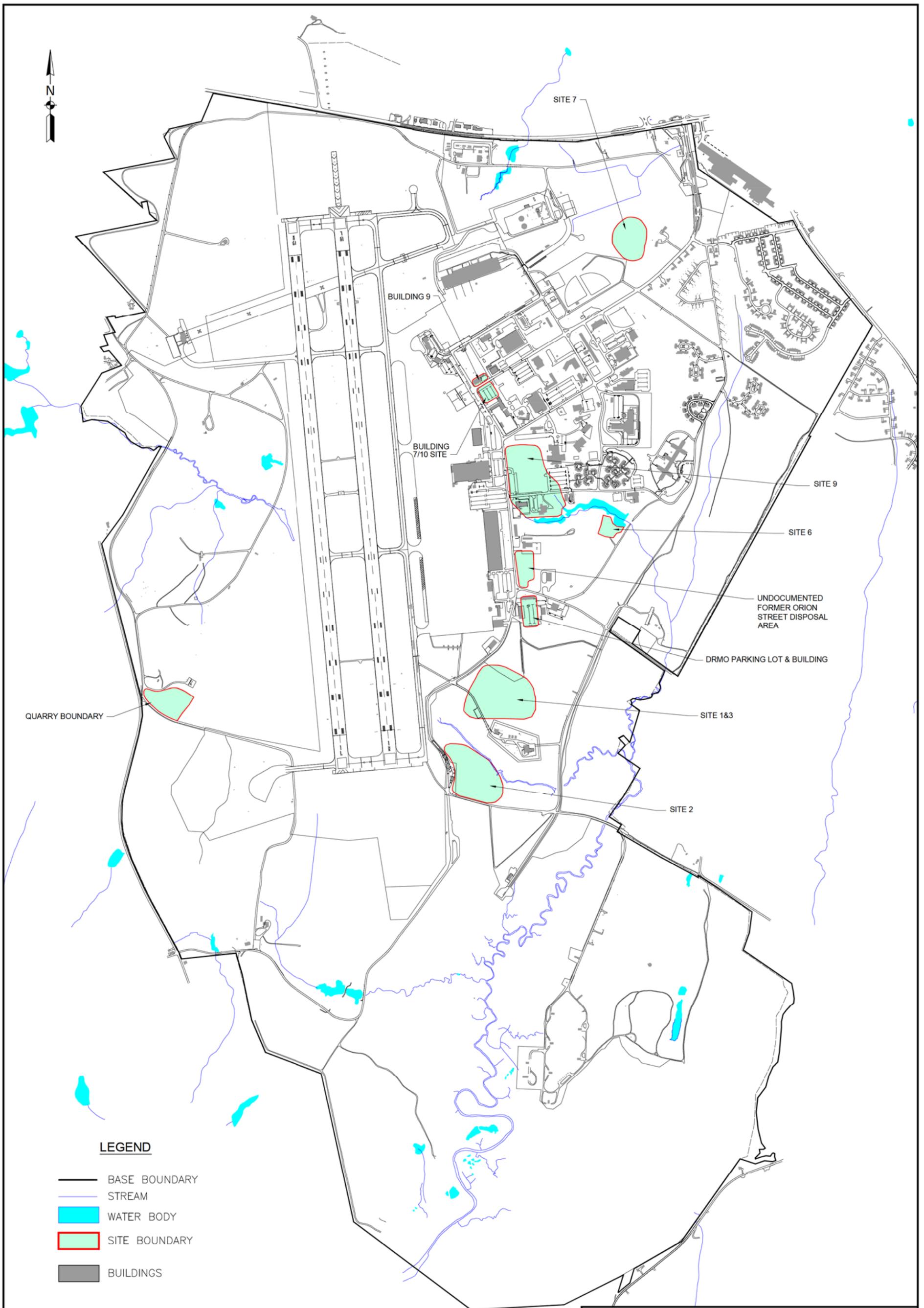
Photocopies of the completed field forms will be appended to the field copy of the SWPPP that will be maintained on-site. Original copies of the completed forms will be kept in the TtEC filing system.

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APPENDIX D

SITE MAP

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LEGEND

- BASE BOUNDARY
- STREAM
- WATER BODY
- SITE BOUNDARY
- BUILDINGS

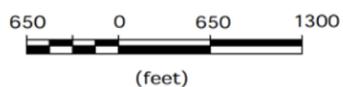


FIGURE 2-2
SITES LOCATION MAP
FORMER NAVAL AIR STATION
BRUNSWICK, MAINE

| | |
|----------------------------------------------------------------------|--------------------------------|
| REVISION: — AUTHOR: A. CRABTREE PROJECT NO: FILE: SEE BELOW | TETRA TECH EC, INC. |
|----------------------------------------------------------------------|--------------------------------|

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APPENDIX E
BMP SHEETS

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A-2 TEMPORARY VEGETATION***PURPOSE & APPLICATIONS***

Temporary grass and legume cover is the establishment of vegetative cover on soils exposed for periods of up to 12 months. The purpose is to reduce erosion and sedimentation by stabilizing disturbed areas that will not be brought to final grade for a year or less and to reduce problems associated with mud and dust production from exposed soil surface during construction.

Runoff and sheet erosion caused by splash erosion (rain drop impact on bare soil), is the source of most fine particles in sediment. To reduce the sediment load in runoff, the soil surface itself should be protected. The most efficient and economical means of controlling sheet and rill erosion is to establish a vegetative cover. Annual plants that sprout rapidly and survive for only one growing season are suitable for establishing temporary vegetative cover.

Temporary seeding may prevent costly maintenance operations on other erosion control systems. For example, sediment basin clean-outs will be reduced if the drainage area of the basin is vegetated where grading and construction are not taking place.

Temporary seeding is essential to preserve the integrity of earthen structures used to control sediment, such as dikes, diversions, and the banks and dams of sediment basins.

Temporary vegetative cover should be applied where exposed soil surfaces are not to be fine-graded for periods from 30 days to one year. Such areas include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, temporary roadbanks, etc.

CONSIDERATIONS

- Proper seedbed preparation and the use of quality seed are important in this practice just as in permanent seeding. Failure to carefully follow sound agronomic recommendations will often result in an inadequate stand of vegetation that provides little or no erosion control.
- Nutrients and pesticides used to establish and maintain a vegetation cover must be managed to protect the surface and ground water quality.
- Temporary seeding should be used extensively in sensitive areas (ponds and lake watersheds, steep slopes, streambanks, etc.).
- Late fall seeding may fail and cause water quality deterioration in spring runoff events, thus other measures such as mulching should be implemented.

SPECIFICATIONS**Site Preparation**

Grade as needed and feasible to permit the use of equipment for seedbed preparation, seeding, mulch application, and mulch anchoring. Install needed erosion control measures such as diversions, grade stabilization structures sediment basins and grassed waterways.

Seedbed Preparation

Apply limestone and fertilizer according to soil test recommendations such as those offered by the University of Maine Soil Testing Laboratory. Soil sample mailers are available from the local Cooperative Extension Service office. If soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 600 pounds per acre or 13.8 pounds per 1,000 square feet of 10-10-10 (N-P₂O₅-K₂O) or equivalent. Apply limestone (equivalent to 50 percent calcium plus magnesium oxide) at a rate of 3 tons per acre (138 lb. per 1,000 square feet).

Seeding

- Select seed from recommendations in enclosed table.
- Where the soil has been compacted by construction operations, loosen soil to a depth of 2 inches before applying fertilizer, lime and seed.
- Apply seed uniformly by hand, cyclone seeder, drill, cultipacker type seeder or hydroseeder (slurry including seed and fertilizer). Hydroseeding that includes mulch may be left on soil surface. Seeding rates must be increased 10 % when hydroseeding.

Mulching

Apply mulch over seeded area according to the TEMPORARY MULCHING BMP.

MAINTENANCE

Temporary seeding shall be periodically inspected. At a minimum, 95% of the soil surface should be covered by vegetation. If **any evidence of erosion or sedimentation is apparent**, repairs shall be made and other temporary measures used in the interim (mulch, filter barriers, check dams, etc.).

Temporary Seeding Rates and Dates

| Seed | Lb./Ac | Seeding Depth | Recommended Seeding Dates | Remarks |
|-------------------------------------------------|-------------|---------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Winter Rye | 112(2.0 bu) | 1-1.5 in | 8/15-10/1 | Good for fall seeding. Select a hardy species, such as Aroostook Rye. |
| Oats | 80 (2.5 bu) | 1-1.5 in. | 4/1-7/1 8/15-9/15 | Best for spring seeding. Early fall seeding will die when winter weather moved in, but mulch will provide protection. |
| Annual Ryegrass | 40 | .25 in | 4/1-7/1 | Grows quickly but is of short duration. Use where appearance is important. With mulch, seeding may be done throughout growing season. |
| Sudangrass | 40 (1.0 bu) | .5-1in | 5/15-8/15 | Good growth during hot summer periods. |
| Perennial | 40 (2.0 bu) | .25 in | 8/15-9/15 | Good cover, longer lasting than Annual Ryegrass. Mulching will allow seeding throughout growing season. |
| Temporary mulch with or without dormant seeding | | | 10/1-4/1 | Refer to TEMPORARY MULCHING BMP and/or PERMANENT VEGETATION BMP. |

A-3 OVERWINTER CONSTRUCTION AND STABILIZATION**PURPOSE & APPLICATIONS**

If a construction site is not stabilized with pavement, a road gravel base, 75 % mature vegetation cover or riprap by November 15 then the site needs to be protected with over-winter stabilization. An area considered open is any area not stabilized with pavement; vegetation, mulching, erosion control mix, erosion control mats, riprap or gravel base on a road. The winter construction period is from November 1 through April 15.

CONSIDERATIONS

Winter excavation and earthwork shall be completed such that no more than 1 acre of the site is without stabilization at any one time. Limit the exposed area to those areas in which work is to occur during the following 15 days and that can be mulched in one day prior to any snow event. All area shall be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded and mulched. A cover of erosion control mix performs the best. Refer to the TEMPORARY MULCHING BMP.

Any added measures, which may be necessary to control erosion/sedimentation, must be installed. These may be dependent upon site conditions, the actual site size and weather conditions.

To minimize areas without erosion control protection, continuation of earthwork operations on additional areas shall not begin until the exposed soil surface on the area being worked has been stabilized.

SPECIFICATIONS**Natural Resource Protection**

Any areas within 100 feet from any natural resources, if not stabilized with a minimum of 75 % mature vegetation catch, shall be mulched by December 1 and anchored with plastic netting or protected with an erosion control cover.

During winter construction, a double row of sediment barriers (i.e. silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource shall be protected a minimum distance of 100 feet on either side from the resource. Existing projects not stabilized by December 1 shall be protected with the second line of sediment barrier to ensure functionality during the spring thaw and rains.

Sediment Barriers

During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

Mulching

All area shall be considered to be denuded until seeded and mulched. Hay and straw mulch shall be applied at a rate of 150 lb. per 1,000 square feet or 3 tons/acre (twice the normal accepted rate of 75-lbs./1,000 s.f. or 1.5 tons/acre) and shall be properly anchored. Erosion control mix must be applied with a minimum 4 inch thickness.

Mulch shall not be spread on top of snow. The snow will be removed down to a one-inch depth or less prior to application.

After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.

An area shall be considered to have been stabilized when exposed surfaces have been either mulched or adequately anchored so that ground surface is not visible though the mulch.

Between the dates of November 1 and April 15, all mulch shall be anchored by either mulch netting, asphalt emulsion chemical, tracking or wood cellulose fiber. The cover will be considered sufficient when the ground surface is not visible through the mulch. After November 1st, mulch and anchoring of all exposed soil shall occur at the end of each final grading workday.

Soil Stockpiling

Stockpiles of soil or subsoil will be mulched for over winter protection with hay or straw at twice the normal rate or with a four-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpile will not be placed (even covered with mulch) within 100 feet from any natural resources.

Seeding

Between the dates of October 15 and April 1st, loam or seed will not be required. During periods of above freezing temperatures finished areas shall be fine graded and either protected with mulch or temporarily seeded and mulched until such time as the final treatment can be applied. If the date is after November 1st and if the exposed area has been loomed, final graded with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched.

Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas shall receive 4' of loam and seed at an application rate of 5lbs/1000 s.f. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75 % catch) shall be revegetated by replacing loam, seed and mulch.

If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

Overwinter stabilization of ditches and channels

All stone-lined ditches and channels must be constructed and stabilized by November 15. All grass-lined ditches and channels must be constructed and stabilized by September 1. If a ditch or channel is not grass-lined by September 1, then one of the following actions must be taken to stabilize the ditch for late fall and winter.

Install a sod lining in the ditch: A ditch must be lined with properly installed sod by October 1. Proper installation includes: pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring sod at the base of the ditch with jute or plastic mesh to prevent the sod from sloughing during flow conditions. See the PERMANENT VEGETATION BMP section.

Install a stone lining in the ditch: A ditch must be lined with stone riprap by November 15. A registered professional engineer must be hired to determine the stone size and lining thickness needed to withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the contractor will regrade the ditch prior to placing the stone lining so to prevent the stone lining from reducing the ditch's cross-sectional area.

Overwinter stabilization of disturbed slopes

All stone-covered slopes must be constructed and stabilized by November 15. And all slopes to be vegetated must be seeded and mulched by September 1. The department will consider any area having a grade greater than 15% to be a slope. If a slope to be vegetated is not stabilized by September 1, then one of the following actions must be taken to stabilize the slope for late fall and winter.

Stabilize the soil with temporary vegetation and erosion control mats -- By October 1 the disturbed slope must be seeded with winter rye at a seeding rate of 3 pounds per 1000 square feet and then install erosion control mats or anchored mulch over the seeding. If the rye fails to grow at least three inches or fails to cover at least 75% of the slope by November 1, then the contractor will cover the slope with a layer of erosion control mix or with stone riprap as described in the following standards.

Stabilize the soil with sod -- The disturbed slope must be stabilized with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The contractor will not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H:1V) or having groundwater seeps on the slope face.

Stabilize the soil with erosion control mix -- Erosion control mix must be properly installed by November 15. The contractor will not use erosion control mix to stabilize slopes having grades greater than 50% (2H:1V) or having groundwater seeps on the slope face. See the TEMPORARY MULCHING BMP section.

Stabilize the soil with stone riprap -- Place a layer of stone riprap on the slope by November 15. The development's owner will hire a registered professional engineer to determine the stone size needed for stability on the slope and to design a filter layer for underneath the riprap. See the RIPRAP SLOPE STABILIZATION BMP section.

Overwinter stabilization of disturbed soils

By September 15, all disturbed soils on areas having a slope less than 15% must be seeded and mulched. If the disturbed areas are not stabilized by this date, then one of the following actions must be taken to stabilize the soil for late fall and winter.

Stabilize the soil with temporary vegetation -- By October 1, seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1000 square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1000 square feet, and anchor the mulch with plastic netting. Monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or fails to cover at least 75% of the disturbed soil before November 1, then mulch the area for over-winter protection as described below.

Stabilize the soil with sod -- Stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.

Stabilize the soil with mulch -- By November 15, mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1000 square feet on the area so that no soil is visible through the mulch. Immediately after applying the mulch, anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

MAINTENANCE

Maintenance measures shall be applied as needed during the entire construction season. After each rainfall, snow storm or period of thawing and runoff, the site contractor shall perform a visual inspection of all installed erosion control measures and perform repairs as needed to insure their continuous function.

Following the temporary and/or final seeding and mulching, the contractor shall, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 85 to 90 % of areas vegetated with vigorous growth.

STABILIZATION SCHEDULE BEFORE WINTER

- September 15** All disturbed areas must be seeded and mulched.
All slopes must be stabilized, seeded and mulched.
All grass-lined ditches and channels must be stabilized with mulch or an erosion control blanket.
- October 1** If the slope is stabilized with an erosion control blanket and seeded.
All disturbed areas to be protected with an annual grass must be seeded at a seeding rate of 3 pounds per 1000 square feet and mulched.
- November 15** All stone-lined ditches and channels must be constructed and stabilized.
Slopes that are covered with riprap must be constructed by that date.

December 1 All disturbed areas where the growth of vegetation fails to be at least three inches tall or at least 75% of the disturbed soil is covered by vegetation, must be protected for over-winter.

NOTE: The dates given are for projects in South-Central Maine. Adjust the dates given based on the project's location within the state – reducing times up to three weeks for project's in Northern Maine and extending times up to two weeks for project's on the coast in extreme Southern Maine.

B-1 SEDIMENT BARRIERS**PURPOSE & APPLICATIONS**

A sediment barrier is a temporary barrier installed across or at the toe of a slope. Sediment barriers may consist of filter fence, straw or hay bales, a berm of erosion control mix, or other filter materials. Its purpose is to intercept and retain small amounts of sediment from disturbed or unprotected areas.

The sediment barrier is used where:

- Sedimentation can pollute or degrade adjacent wetland and/or watercourses.
- Sedimentation will reduce the capacity of storm drainage systems or adversely affect adjacent areas.
- The contributing drainage area is less than 1/4 acre per 100 ft of barrier length, the maximum length of slope above the barrier is 100 feet, and the maximum gradient behind the barrier is 50 percent (2:1). If the slope length is greater, other measures such as diversions may be necessary to reduce the slope length.
- Sediment barriers shall not be used in areas of concentrated flows. Under no circumstances should hay bale or erosion control mix barriers be constructed in live streams or in swales where there is the possibility of a washout.

CONSIDERATIONS

- Sediment barriers are effective only if installed and maintained properly.
- Silt fencing generally is a better filter than hay bale barriers.
- If there is evidence of end flow on properly installed barriers, extend barriers uphill or consider replacing them with temporary check dams.
- Straw or hay bales should only be used as a temporary barrier for no longer than 60 days.
- Silt fences (synthetic filter) can be used for 60 days or longer depending on ultraviolet stability and manufacturer's recommendations.
- Sediment barriers should be installed prior to any soil disturbance of the contributing drainage area above them.

SPECIFICATIONS**Filter Fences**

This sediment barrier utilizes synthetic filter fabrics. It is designed for situations in which only sheet or overland flows are expected. Generally pre-manufactured synthetic silt fencing with posts attached is used. See the detail drawing located at the back of this section for the proper installation of silt fences.

- The filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier.
- The filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F.
- Posts for silt fences shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of 5 feet. Steel posts shall have projections for fastening wire to them.
- The height of a silt fence should not exceed 36 inches as higher fences may impound volumes of water sufficient to cause failure of the structure.
- The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth shall be spliced together only at support post, with a minimum 6-inch overlap, and securely sealed.
- Post spacing shall not exceed 6 feet.

- A trench shall be excavated approximately 4 inches wide and 4 inches deep along the line of posts and upgradient from the barrier.
- The standard strength of filter fabric shall be stapled or wired to the post, and 8 inches of the fabric shall be extended into the trench. The fabric shall not extend more than 36 inches above the original ground surface. Filter fabric shall not be stapled to existing trees.
- The trench shall be backfilled and the soil compacted over the filter fabric.
- Silt fences shall be removed when they have served their useful purpose, but not before the upslope areas have been permanently stabilized.

Straw/Hay Bales

See the detail drawing located at the back of this section for the proper installation of hay bales.

- Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.
- All bales shall be either wire-bound or string-tied. Bales shall be installed so that bindings are oriented around the sides, parallel to the ground surface to prevent deterioration of the bindings.
- The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches.
- After the bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be build up to 4 inches against the uphill side of the barrier. Ideally, bales should be placed 10 feet away from the toe of slope.
- At least two stakes or rebars driven through the bale shall securely anchor each bale. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or re-bars shall be driven deep enough into the ground to securely anchor the bales.
- The gaps between bales shall be chinked (filled by wedging) with hay to prevent water from escaping between the bales.

Problems with Straw or Hay Bale Barriers

There are three major reasons why straw bale barriers are not as effective as hoped they would be:

- When improperly placed and installed (such as staking the bales directly to the ground with no soil seal or entrenchment), hay bales allow undercutting and end flow.
- Inadequate maintenance.
- Inspection shall be frequent and repair or replacement shall be made promptly as needed. Bale barriers shall be removed when they have served their usefulness, but not before the up-slope areas have been permanently stabilized.

Erosion Control Mix Berms

Erosion control mix can be manufactured on or off the project site. It must consist primarily of organic material, separated at the point of generation, and may include: shredded bark, stump grindings, composted bark, or acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix.

Composition

Erosion control mix shall contain a well-graded mixture of particle sizes and may contain rocks less than 4" in diameter. Erosion control mix must be free of refuse, physical contaminants, and material toxic to plant growth. The mix composition shall meet the following standards:

- The organic matter content shall be between 80 and 100%, dry weight basis.
- Particle size by weight shall be 100 % passing a 6" screen and a minimum of 70 %, maximum of 85%, passing a 0.75" screen.
- The organic portion needs to be fibrous and elongated.
- Large portions of silts, clays or fine sands are not acceptable in the mix.
- Soluble salts content shall be < 4.0 mmhos/cm.

- The pH should fall between 5.0 and 8.0.

Installation

- The barrier must be placed along a relatively level contour. It may be necessary to cut tall grasses or woody vegetation to avoid creating voids and bridges that would enable fines to wash under the barrier through the grass blades or plant stems.
- On slopes less than 5 % or at the bottom of steeper slopes (<2:1) up to 20 feet long, the barrier must be a *minimum of 12" high*, as measured on the uphill side of the barrier, *and a minimum of two feet wide*. *On longer or steeper slopes*, the barrier should be wider to accommodate the additional runoff.
- Frozen ground, outcrops of bedrock and very rooted forested areas are locations where berms of erosion control mix are most practical and effective.
- Other BMPs should be used at low points of concentrated runoff, below culvert outlet aprons, around catch basins and closed storm systems, and at the bottom of steep perimeter slopes that are more than 50 feet from top to bottom (i.e., a large up gradient contributing watershed).

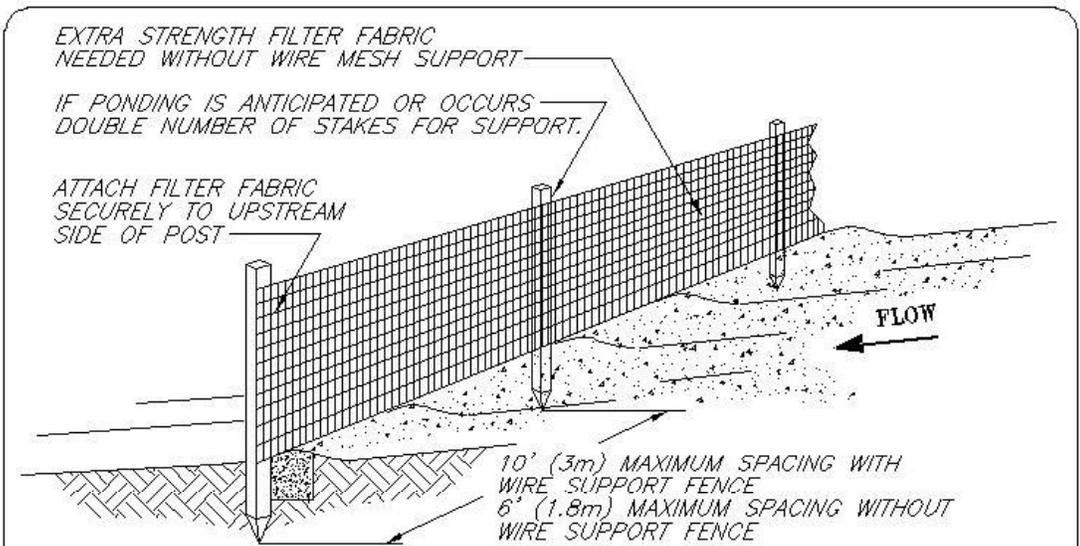
Continuous Contained Berms

A new product, the filter sock can be an effective sediment barriers as it adds containment and stability to a berm of erosion control mix. The organic mix is placed in the synthetic tubular netting and performs as a sturdy sediment barrier (a vehicle may drive over it without ill effect). It works well in areas where trenching is not feasible such as over frozen ground or over pavement. A continuous contained berm of erosion control mix may be effective when placed in waterways such as ditches and swales or in area of concentrated water flow as the netting prevents the movement and displacement of the organic material. See the detail drawing located at the back of this section for the proper installation of continuous contained berms.

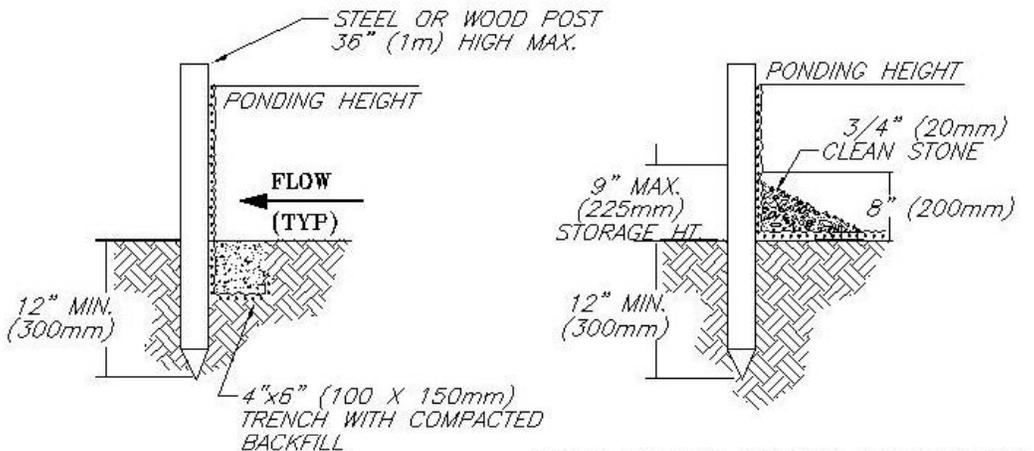
Seeds may be added to the organic filler material and can permanently stabilize a shallow slope. The containment will provide stability while vegetation is rooting through the netting.

MAINTENANCE

- Hay bale barriers, silt fences and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. They shall be repaired immediately if there are any signs of erosion or sedimentation below them. If there are signs of undercutting at the center or the edges of the barrier, or impounding of large volumes of water behind them, sediment barriers shall be replaced with a temporary check dam.
- Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and the barrier still is necessary, the fabric shall be replaced promptly.
- Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
- Filter berms should be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.



NOTE: PRE-FABRICATED SILT FENCE IS ACCEPTABLE IF INSTALLED PER MANUFACTURER.



TRENCH DETAIL

**LEDGE, FROZEN GROUND, HEAVY ROOTS
INSTALLATION WITHOUT TRENCHING**

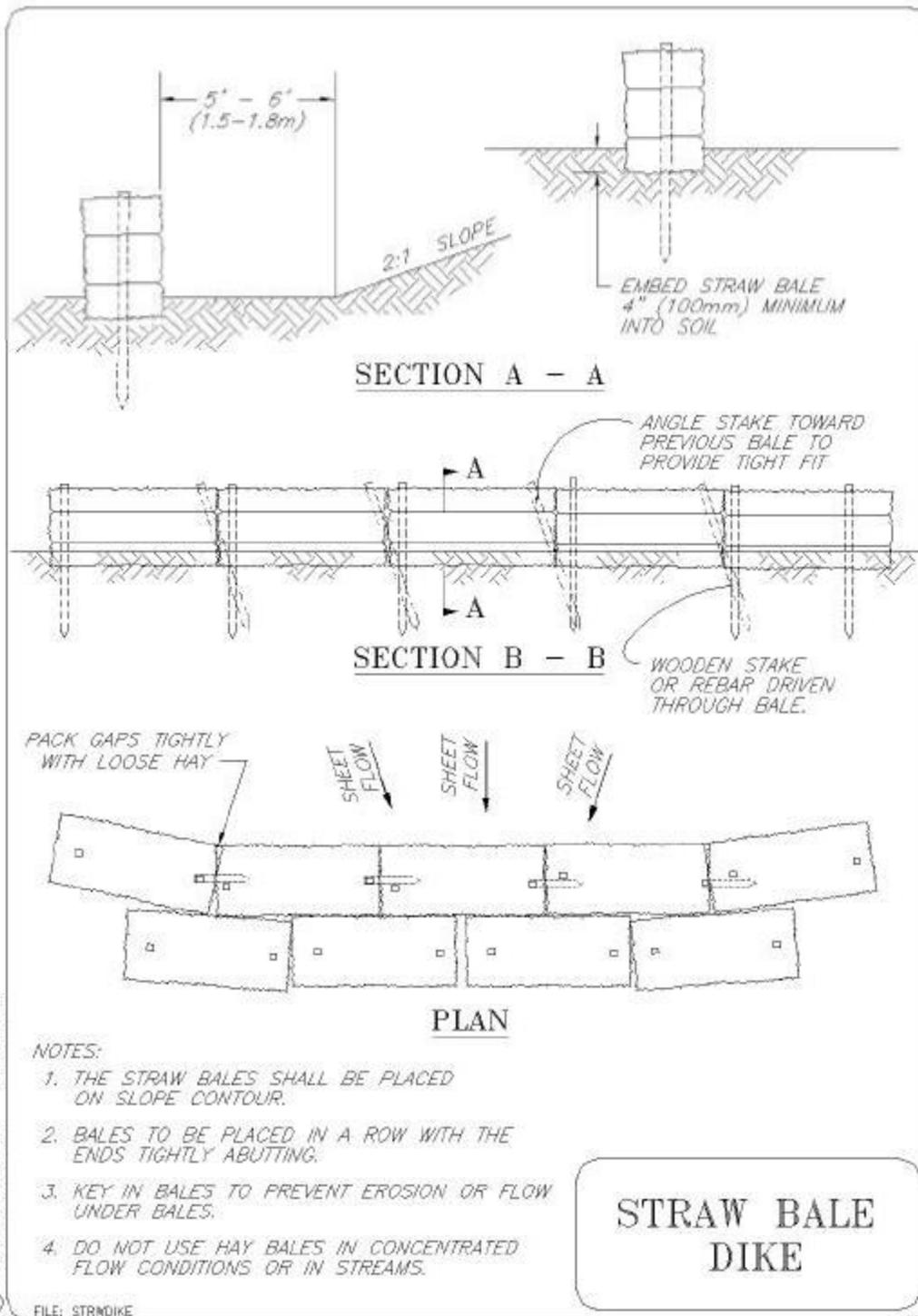
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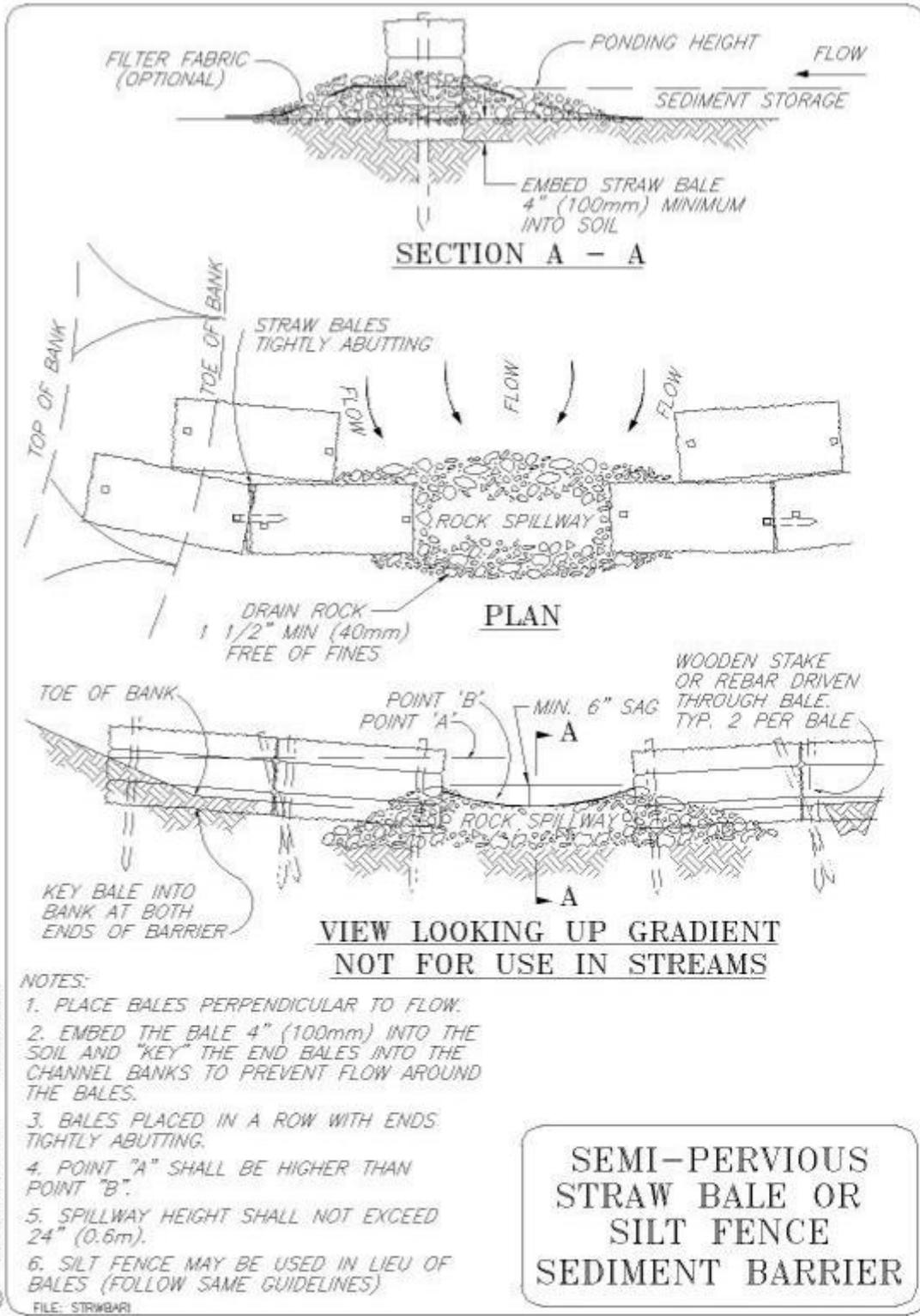
1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" (225mm) MAXIMUM RECOMMENDED STORAGE HEIGHT.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
4. DO NOT PLACE SILT FENCE IN STREAMS OR CONCENTRATED FLOW CONDITIONS.

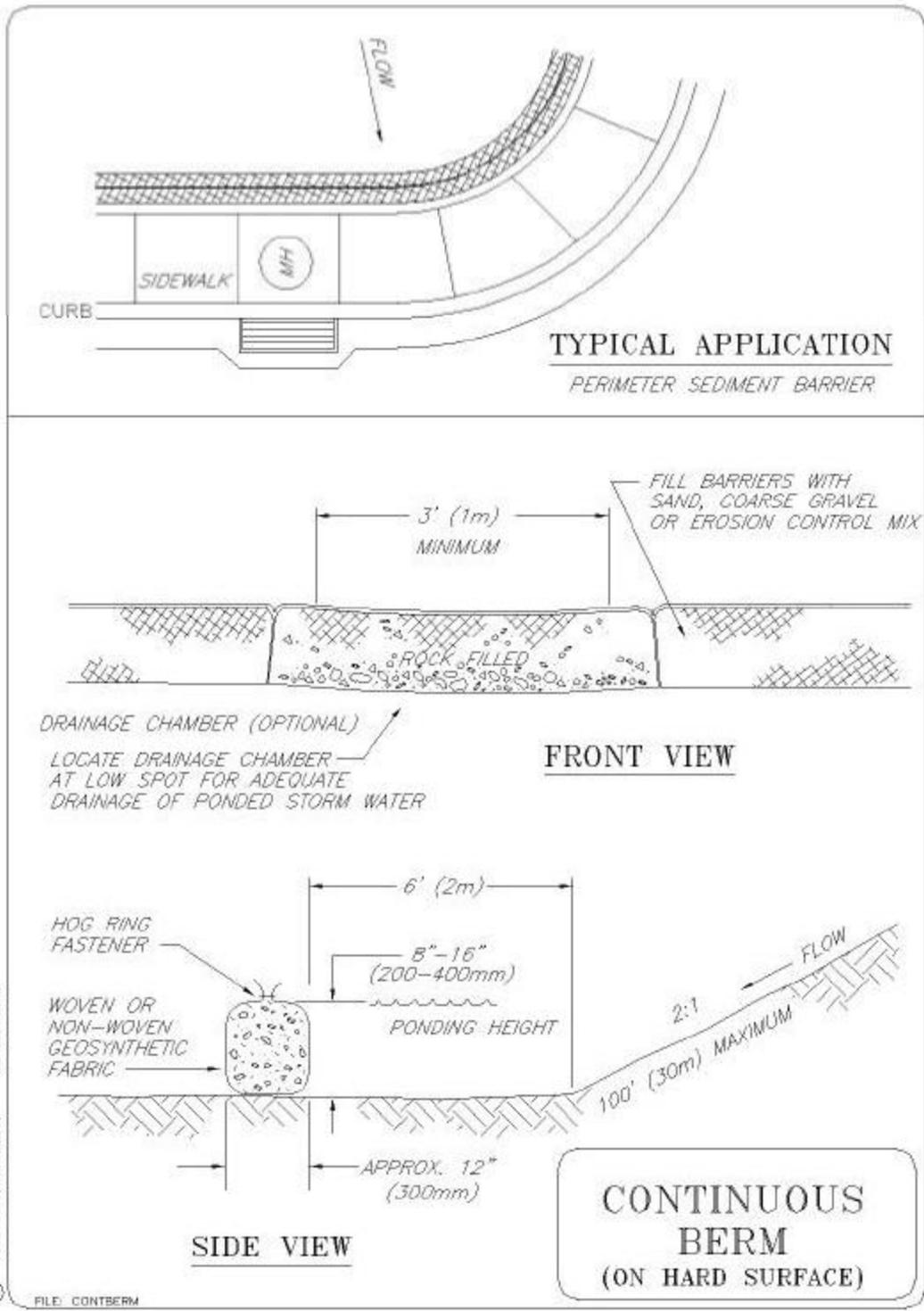
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SILT FENCE

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B-3 STORMDRAIN INLET PROTECTION***PURPOSE & APPLICATIONS***

A storm drain inlet protection is a sediment filter installed around a storm drain drop inlet or curb inlet to reduce sediment discharge. The purpose of storm drain inlet protection is to prevent sediment from entering a storm drainage system prior to permanent stabilization of the disturbed area. Stormdrains made operational before their drainage area is stabilized can convey large amounts of sediment to storm sewer systems or natural drainage ways and in extreme cases, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

CONSIDERATIONS

- This practice applies mainly to enclosed drainage systems.
- If these systems outlet to a stream, water quality must be protected.
- This practice contains several types of inlet filters and traps which have different applications dependent upon site conditions and the type of inlet. Other innovative techniques for accomplishing the same purpose are encouraged, but they should be installed only after careful study of their effectiveness.
- Note that these various inlet protection devices are for drainage areas of **less than one acre**. Runoff from large disturbed areas should be routed through a sediment trap or sediment basin.
- The best way to prevent sediment from entering the storm sewer system is to stabilize the site as quickly as possible, preventing erosion and stopping sediment at its source.

SPECIFICATIONS**Design Criteria**

- The drainage area shall be no greater than 1 acre.
- The inlet protection device shall be constructed in a manner that will facilitate clean-out and disposal of trapped sediments and minimize interference with construction activities.
- Any resultant ponding of stormwater must not cause excessive inconvenience or damage to adjacent areas or structures.

Hay Bale Drop Inlet Structure

See the detail drawing located at the back of this section for the proper installation of hay bale sediment barrier.

- Hay Bales shall be as specified in the SEDIMENT BARRIER BMP
- Bales shall be string-tied with the bindings oriented around the sides rather than over and under the bales.
- Bales shall be placed lengthwise in a single row surrounding the inlet, with the ends of adjacent bales pressed together.
- The filter barrier shall be entrenched and backfilled. A trench shall be excavated around the inlet the width of a bale to a minimum depth of 4 inches. After the bales are staked, the excavated soil shall be backfilled and compacted against the filter barrier.
- Each bale shall be securely anchored and held in place by at least two stakes or rebars driven through the bale.
- Loose straw shall be wedged between bales to prevent water from entering between bales.

Silt Fence Drop Inlet Sediment Filter

See the detail drawing located at the back of this section for the proper installation of silt fence sediment barrier.

- Silt fence shall be as specified in the SEDIMENT BARRIER BMP and shall be cut from a continuous roll to avoid joints.
- Stakes shall be spaced around the perimeter of the inlet a maximum of 3 feet apart and securely driven into the ground (minimum of 8 inches).
- A trench shall be excavated approximately 4 inches wide and 4 inches deep around the outside perimeter of the stakes and 8 inches of the fabric shall be extended into the trench.
- The height of the filter barrier shall be a minimum of 15 inches and shall not exceed 18 inches.
- The trench shall be backfilled and the soil compacted over the fabric.

Gravel and Wire Mesh Drop Inlet Sediment Filter

This filtering device has no overflow mechanism; therefore, ponding is likely especially if sediment is not removed regularly. This type of device must never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc. See the detail drawing located at the back of this section for the proper installation of block and gravel sediment barrier.

With Gravel

- Wire mesh shall be laid over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure. Hardware cloth or comparable wire mesh with 1/2-inch openings shall be used. If more than one strip of mesh is necessary, the strips shall be overlapped.
- Stone for French drains shall be placed over the wire mesh as indicated on Figure 16.3. The depth of stone shall be at least 12 inches over the entire inlet opening. The stone shall extend beyond the inlet opening at least 18 inches on all sides. Stone gradation shall be well graded with the maximum stone size of 6 inches and a minimum stone size of 1 inch.
- If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and replaced.

With Concrete Blocks and Gravel

- Place concrete blocks lengthwise on their side in a single row around the perimeter of the inlet, with the ends of adjacent blocks abutting. The height of the barrier can be varied, depending on design needs, by stacking combinations of 4-inch, 8-inch and 12-inch wide blocks. The barrier of blocks shall be at least 12 inches high and no greater than 24 inches high.
- Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Hardware cloth or comparable wire mesh with 1/2-inch openings shall be used.
- Stone shall be piled against the wire to the top of the block barrier. Stone gradation shall be well graded with the maximum stone size of 6 inches and minimum stone size of 1 inch.
- If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

Curb Inlet Sediment Filter

With Gravel

- Hardware cloth or comparable wire mesh with 1/2-inch openings shall be placed over the curb inlet opening so that at least 12 inches of wire extends across the inlet cover and at least 12 inches of wire extends across the concrete gutter from the inlet opening.
- Stone shall be piled against the wire so as to anchor it against the gutter and inlet cover and to cover the inlet opening completely. Maine Department of Transportation stone for French drains shall be used.
- If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, cleaned and replaced.

With Concrete Blocks and Gravel

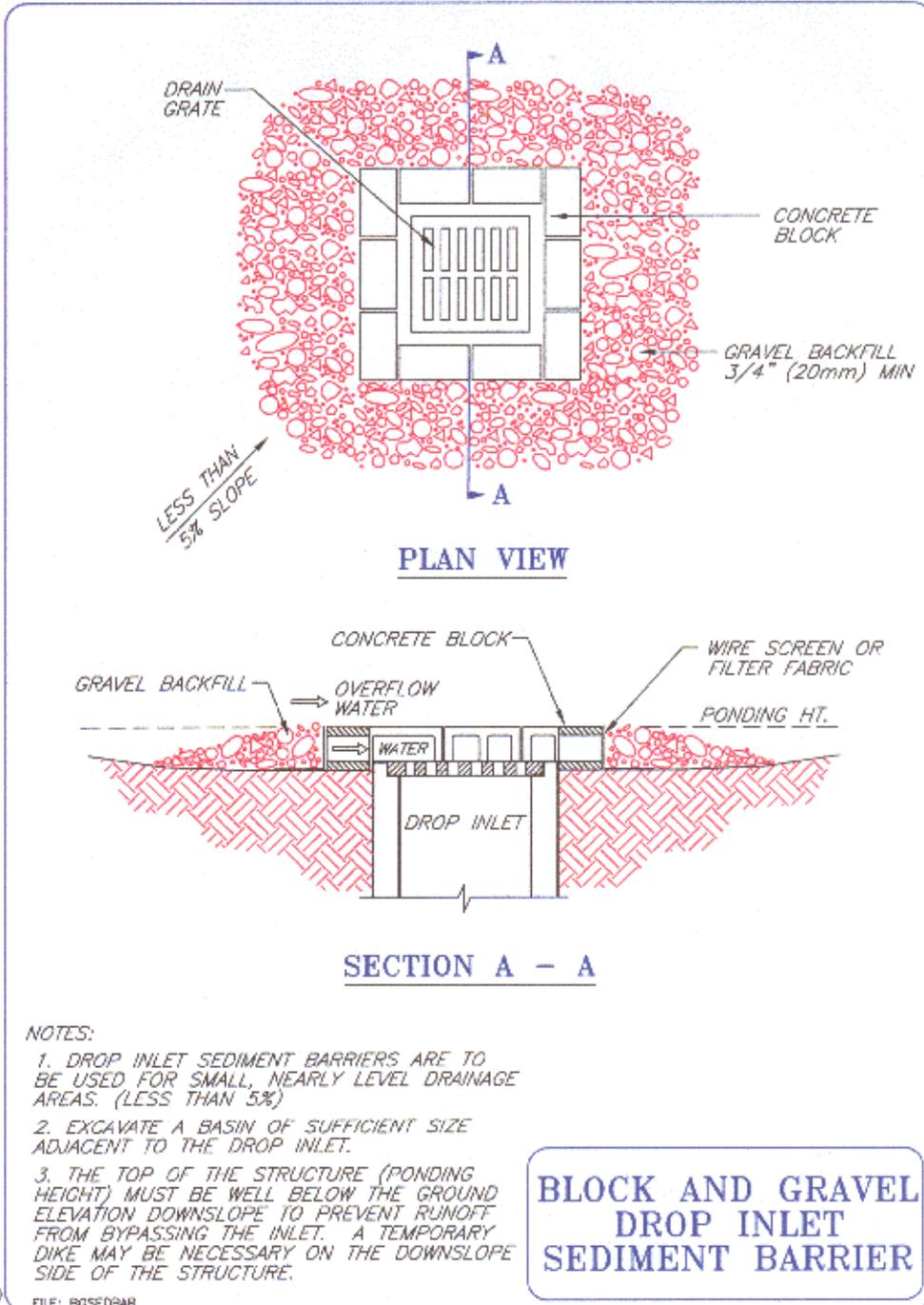
- Two concrete blocks shall be placed on their sides abutting the curb at either side of the inlet opening.
- A 2-inch by 4-inch stud shall be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.
- Concrete blocks shall be placed on their sides across the front of the inlet and abutting the spacer blocks.
- Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Chicken wire or hardware cloth with 1/2-inch openings shall be used.
- Maine Department of Transportation stone for French drains shall be piled against the wire to the top of the barrier.
- If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

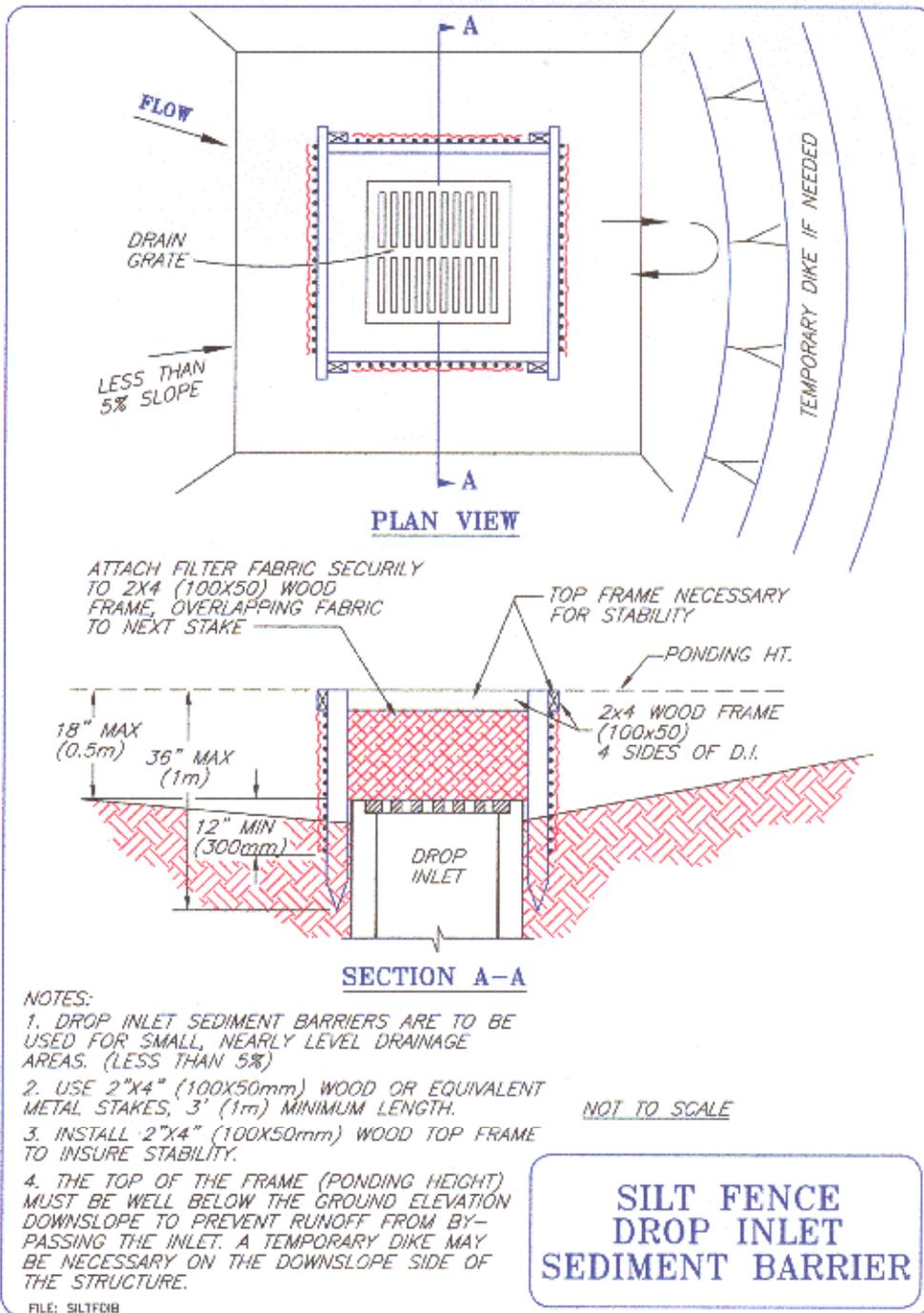
Manufactured Sediment barriers and filters

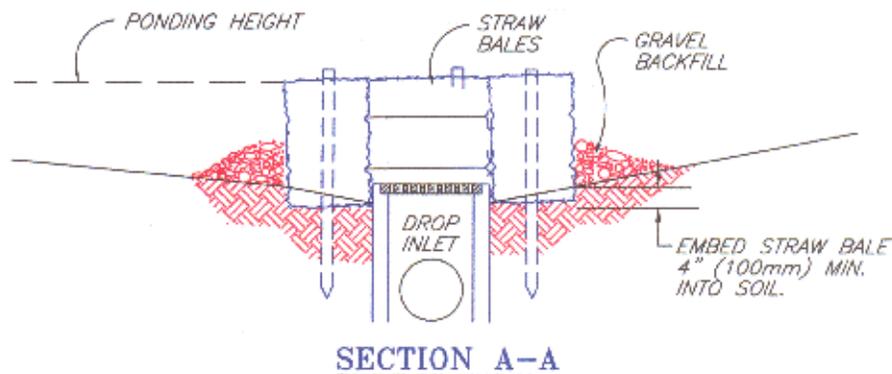
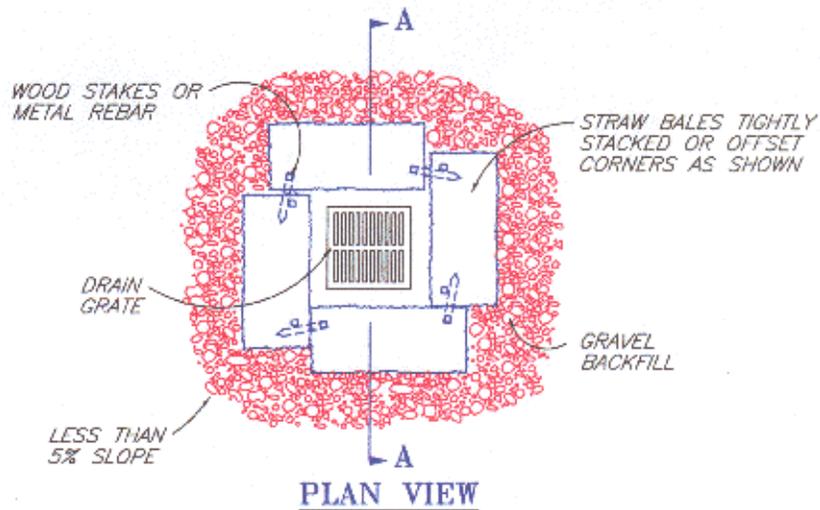
There are now various types of off-the-shelf systems with the function to detain stormwater and collect sediments such as the silt sock or other manufactured materials. These measures are acceptable as long as they are installed, used and maintained as specified by the vendor or manufacturer.

MAINTENANCE

- The structure shall be inspected before and after each rain event and repaired as needed.
- Sediment shall be removed and the stormdrain sediment barrier restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.
- Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.
- All catchbasins and stormdrain inlet must be cleaned at the end of construction and after the site has been fully stabilized.



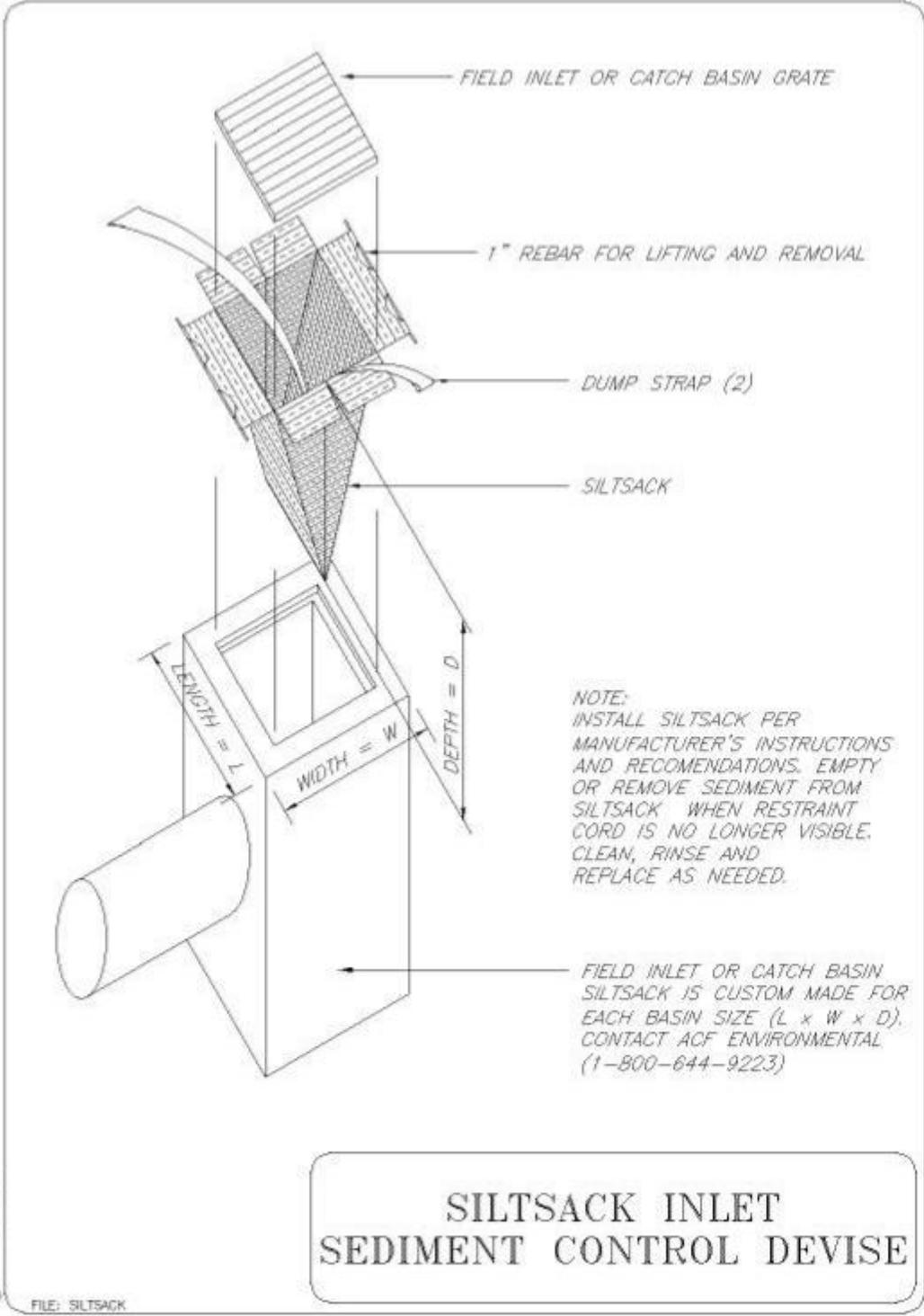




- NOTES:
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
 2. EMBED THE BALES 4" (100mm) INTO THE SOIL AND OFFSET CORNERS OR PLACE BALES WITH ENDS TIGHTLY ABUTING. GRAVEL BACKFILL WILL PREVENT EROSION OR FLOW AROUND THE BALES.
 3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. EXCAVATION OF A BASIN ADJACENT TO THE DROP INLET OR A TEMPORARY DIKE ON THE DOWNSLOPE OF THE STRUCTURE MAY BE NECESSARY.

**STRAW BALE/GRAVEL
DROP INLET
SEDIMENT BARRIER**

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B-4 STABILIZED CONSTRUCTION EXIT**PURPOSE & APPLICATIONS**

A stabilized construction entrance or exit is a stabilized pad of aggregate underlain with filter cloth located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk or parking area. Its purpose is to reduce or eliminate the tracking of sediment onto public roads by motor vehicles. This will protect water quality in areas where public roads drain to surface waters. This BMP is applicable wherever traffic will be leaving a construction site and moving directly onto a public road or other paved area.

It applies to areas where water quality is an issue and stormwater runoff from public roadways is considered an important source of non-point source pollution in the watershed. Finally, mud deposited on public roadways eventually becomes maintenance cost to the municipal public works department increasing the expense of catch basin, ditch and culvert clean-out.

CONSIDERATIONS

Only construction traffic *leaving* the site should be directed over the temporary stabilized exit. Consider providing a separate, unprotected, entrance for traffic entering the site. This will increase the longevity of the stabilized exit by eliminating heavy loads entering the site and reducing the total traffic by half.

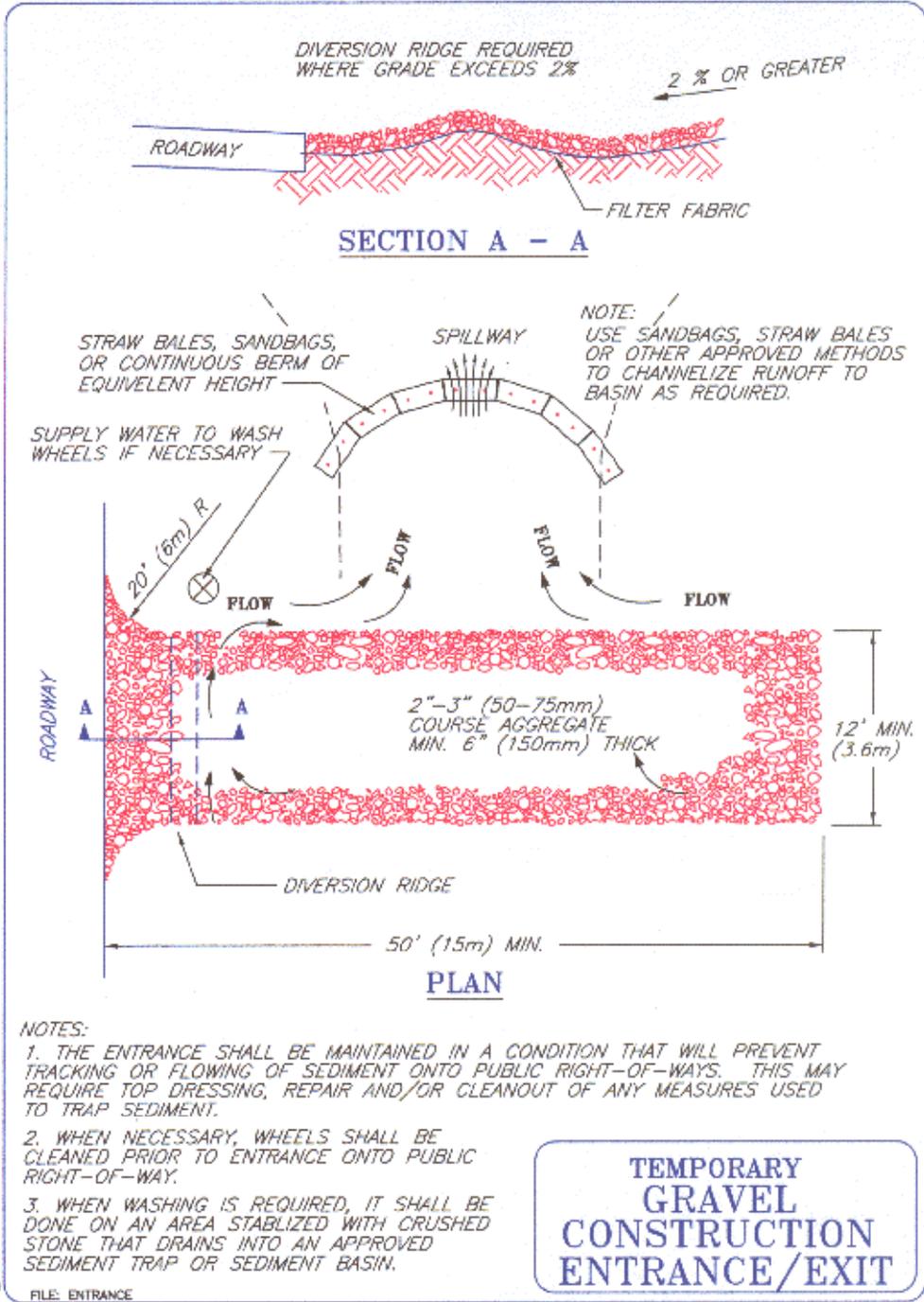
SPECIFICATIONS

See the detail drawing located at the back of this section for the proper installation of construction exit. It should include:

- **Aggregate Size:** Use 2-3 inch stone, or reclaimed or recycled concrete equivalent.
- **Aggregate thickness:** Not less than six (6) inches.
- **Width:** 10-foot minimum, but not less than the full width of points where ingress or egress occurs.
- **Length:** As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).
- **Geotextile:** To be placed over the entire area to be covered with aggregate. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.
- **Criteria for Geotextile:** The filter cloth shall be woven or non-woven fabric. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

MAINTENANCE

The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way. When the control pad becomes ineffective, the stone shall be removed along with the collected soil material and redistributed on site in a stable manner. The entrance should then be reconstructed. The contractor shall sweep or wash pavement at exits, which have experienced mud-tracking on to the pavement or traveled way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches, or waterways.



B-5 DUST CONTROL**PURPOSE & APPLICATIONS**

Dusty conditions occur when a disturbed site or road surface has dried out. Soil fines can actually shrink due to moisture loss which, in turn, loosens and weakens the soil surface. It is necessary to prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust. Dust can cause off-site damage, be a health hazard to humans, wildlife and plant life, or become a traffic safety hazard. This practice is applicable to areas subject to dust blowing and soil movement where on-site and off-site damage is likely to occur if preventive measures are not taken. Water or calcium chloride can help to control dusting by preserving the moisture level in the road surface materials.

- A gravel road surface may lose one half inch of material per year resulting in a significant cost.
- This material which is mostly fine soils is essential in maintaining the integrity of a gravel road surface. Soil fines are the binders that hold the road surface material in a tight, hard mass and the fewer the fines, the looser the gravel, which adversely affects traction and can result in washboarding.

CONSIDERATIONS

- Use traffic control to restrict traffic to predetermined routes.
- Maintain as much natural vegetation as is practicable.
- Use phasing of construction to reduce the area of land disturbed at any one time.
- The use of temporary mulching, permanent mulching, temporary vegetative cover, permanent vegetative cover, or sodding will reduce the need for dust control.
- Use mechanical sweepers on paved surfaces where necessary to prevent dust buildup. Stationary sources of dust, i.e., rock crushers, should utilize fine water sprays to control dust.

SPECIFICATIONS

Water: The exposed soil surface should be moistened periodically with adequate water to control dust.

Calcium Chloride: A commercial chemical product that is either loose dry granules or flakes and to be used only when other methods are not practical. The flakes are fine enough to feed through a spreader at a rate that will keep the surface moist but not cause pollution or plant damage.

Liquid applications are more cost-effective on larger sites and the application rate will vary, depending on the relative quality of materials in a given road surface. Some calcium chloride suppliers may require a road sample before recommending an application rate. Generally, 30% calcium chloride is recommended for most gravel roads.

Stone: Cover surface with crushed stone or coarse gravel. In areas adjacent to waterways, use only chemically stable aggregate.

Other Products: There are now other products that are available to stabilize roads. These have not been tested in the state however; the DEP would entertain their use. However, it is the contractor's ultimate responsibility to mitigate dust and soil loss.

MAINTENANCE

When temporary dust control measure are used, repetitive treatment shall be applied as needed to accomplish control.

C-3 PERMANENT VEGETATION***PURPOSE & APPLICATIONS***

Permanent vegetative cover should be established on disturbed areas where permanent, long lived vegetative cover is needed to stabilize the soil, to reduce damages from sediment and runoff, and to enhance the environment.

CONSIDERATIONS

- Nutrients and pesticides used to establish and maintain vegetation must be minimized to protect surface and ground water quality.
- Water temperatures may be altered due to changes in shading reduction of natural and manmade channels and ponds.
- Provisions shall be made for surface and subsurface drainage, and for disposal of runoff without causing erosion. Facilities may include diversions, grade stabilization structures, streambanks stabilization or waterways.
- Refer to the First Killing Frost map located at the back of this section.

SPECIFICATIONS**Seedbed Preparation**

- Grade as feasible to permit the use of conventional equipment for seedbed preparation, seeding, mulch application and anchoring, and maintenance.
- Apply limestone and fertilizer according to soil tests such as those offered by the University of Maine Soil Testing Laboratory. Soil sample mailers are available from the local Cooperative Extension Service Office. If soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 800 pounds per acre or 18.4 pounds per 1,000 square feet using 10-20-20 (N-P2O5-K2O) or equivalent. Apply ground limestone (equivalent to 50% calcium plus magnesium oxide) at a rate of 3 tons per acre (138 lb. Per 1,000 sq. ft).
- Work lime and fertilizer into the soil as nearly as practical to a depth of 4 inches with a disc, spring tooth harrow or other suitable equipment. The final harrowing operation should be on the general contour. Continue tillage until a reasonably uniform, fine seedbed is prepared. All but clay or silty soils and coarse sands should be rolled to firm the seedbed wherever feasible.
- Remove from the surface all stones 2 inches or larger in any dimension. Remove all other debris, such as wire, cable, tree roots, concrete, clods, lumps or other unsuitable material.
- Inspect seedbed just before seeding. If traffic has left the soil compacted; the area must be tilled and firmed as above.

Seeding Dates

Spring seeding usually give the best results for all seed mixes or with legumes. Permanent seeding should be made 45 days prior to the first killing frost or as a dormant seeding with mulch after the first killing frost and before snowfall. When crown vetch is seeded in later summer, at least 35% of the seed should be hard seed (unscarified).

If seeding cannot be done within the seeding dates, mulch according to the TEMPORARY MULCHING BMP and OVERWINTER STABILIZATION AND CONSTRUCTION to protect the site and delay seeding until the next recommended seeding period.

- Select a seed mixture that is appropriate for the soil type and moisture content as found at the site, for the amount of sun exposure and for level of use. Select a mixture

recommended by the Maine Department of Transportation (MDOT), the USDA Soil Conservation Service or your local Soil and Water Conservation District. Recommendations for seed mixtures can be found in Appendix A.

- Inoculate all legume seed with the correct type and amount of inoculant.
- Apply seed uniformly by hand, cyclone seeder, drill, cultipacker type seeder or hydroseeder (slurry including seed and fertilizer). Normal seeding depth is from 1/4 to 1/2 inch. Hydroseeding with mulch may be left on soil surface.
- Where feasible, except where either a cultipacker type seeder or hydroseeder is used, the seedbed should be firmed following seeding operations with a roller, or light drag. Seeding operations should be on the contour.
- Apply mulch according to the TEMPORARY MULCHING BMP. All newly seeded areas will need mulching and mulch anchoring.

Hydroseeding

When hydroseeding (hydraulic application), a seedbed is prepared in the conventional way or by hand raking to loosen and smooth the soil and to remove surface stones larger than 6 inches in diameter. Slopes must be no steeper than 2 to 1 (2 feet horizontally to 1 foot vertically). Lime and fertilizer may be applied simultaneously with the seed. The use of fiber mulch on critical areas is not recommended (unless it is used to hold straw or hay). Better protection is gained by using straw mulch and holding it with adhesive materials or 500 pounds per acre of wood fiber mulch. Seeding rates must be increased 10% when hydroseeding.

Dormant Seeding

Seeding should not occur within 45 days of the first killing frost. During this period the seeds are likely to germinate but probably will not be able to survive the winter. The following methods may be used to perform a dormant seeding:

- When soil conditions permit, between the first killing frost and before snow fall, prepare the seedbed, lime and fertilize, apply the selected seed mixture, and mulch and anchor. Double the regular seeding rates for this type of seeding.
- Dormant seeds need to be anchored extremely well on slopes, but should not be used in ditch bases and areas of concentrated flows. Dormant seeding shall not be used in watersheds sensitive to water quality impacts (fisheries, phosphorus sensitive lakes and ponds, etc.). Instead, construction sites next to sensitive areas shall be stabilized with temporary or permanent seeding by September 15.
- Dormant seeding requires inspection in the spring. All areas where cover is inadequate must be immediately reseeded and mulched as soon as possible.

Sodding

Sodding is the stabilization of eroding areas by covering them with cut pieces of turf. It is an important emergency measure, which may be used between September 15th, and November 15th when new seeding cannot be guaranteed. Locations particularly suited to stabilization with sod are:

- Waterways carrying intermittent flow
- The areas around drop inlets in grassed swales
- Residential or commercial lawns where aesthetics is a factor

In swales and waterways where concentrated flow will occur, properly pegged sod is preferable to seed because there is no lag time between installation and the time when the channel is protected by vegetation. By framing the inlet with sod strips, drop inlets in grassed areas can be kept free of mulch, seed, and mud, and the grade immediately around the inlet can be maintained. It is initially more costly to install sod than to seed. But this cost is justified in places where sod can perform better than seed in controlling erosion. Ground preparation and proper maintenance are as important with sod as with seed.

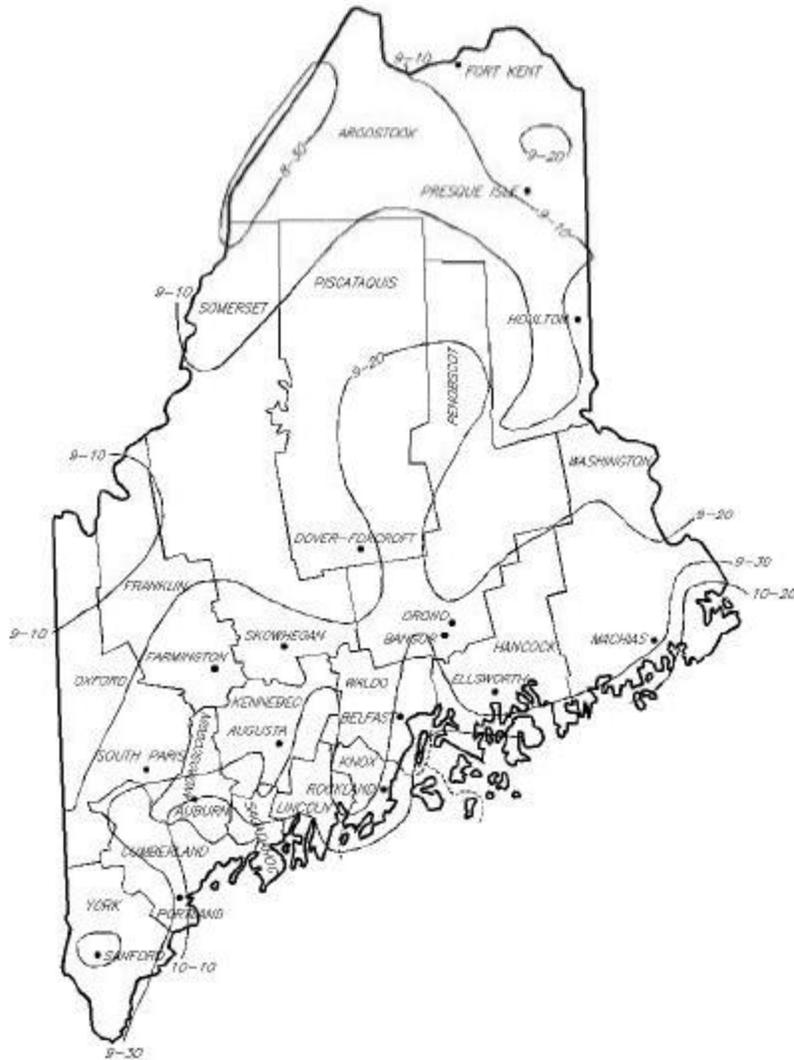
- Before laying sod, provide adequate drainage where internal water movement, especially at the toe of slopes, may cause seeps or soil slippage. And grade slopes 2:1 or flatter.
- Seedbed Preparation

- Provide the best possible soil conditions for sodding. The desirable soil textures include sandy loam, loam, and silt loam
- Fill areas must be compacted enough to prevent uneven settling. The entire surface to be sodded shall be free from large clods, stones, or other debris. The soil shall be loosened to a depth of 1 inch and thoroughly dampened, if not already moist and incorporate needed lime and fertilizer uniformly. Sod shall not be laid on dry soil.
- Lay strips of sod at right angles to direction of slope or flow of water starting at the lowest elevation. Wedge the edges and ends of the sod strips together and tamp or roll. Stagger joints. Make the top of the sod strips flush with the top of the undisturbed ground.
- Use wire staples, fine mesh wire or wood pins and binder twine on very steep slopes to hold sod in place until secured by plant growth.
- Irrigate sodded area immediately after installation.
- Establishment Dates: In Maine, sod can be established from April 1st to November 15th (may vary with region of state).
- In sodded Waterways, care shall be taken to prepare the soil adequately in accordance with this specification. The sod type shall consist of plant materials able to withstand the designed velocity (See VEGETATED WATERWAYS BMP).
- Sod strips in waterways shall be laid perpendicular to the direction of flow. Care should be taken to butt ends of strips tightly.
- After rolling or tamping, sod shall be pegged or stapled to resist washout during establishment. Chicken wire, jute or other netting may be pegged over the sod for extra protection.
- When sod is installed to stabilize areas of concentrated flow (inlets, diversions, ditches, etc.), installation must be completed before runoff is directed to that area.
- After the first week, sod shall be watered as necessary to maintain moisture in the root zone and prevent dormancy of sod.
- No more than 1/3 of the shoot (grass leaf) should be removed by mowing. Grass height should be maintained between 2 and 3 inches unless otherwise specified.

MAINTENANCE

- Lime according to a soil test or at a minimum of every five years using a rate of 2 tons per acre (100 pounds per 1,000 sq. ft).
- Fertilize grasses according to a soil test or broadcast biennially, 300 pounds of 10-10-10 or equivalent per acre (7.5 pounds per 1,000 sq. ft).
- Fertilize legumes according to a soil test or broadcast every three years 300 pounds of 0-20-20 or equivalent per acre (7.5 pounds per 1,000 sq. ft).

FIRST KILLING FROST DATES FOR MAINE (UNIVERSITY OF MAINE)
 32 DEGREE AVERAGE DATE OF FIRST FREEZE IN FALL



32° AVERAGE DATE OF FIRST FREEZE IN FALL (BASED ON DATA FROM 1931-1968)

SOURCE: MAINE AGRIC. EXP. STA.,
 BULLETIN 679 "FREEZE IN MAINE"
 G.R. COOPER, PROF. OF BOTANY, UNIVERSITY OF MAINE
 R.E. LAUTZENHEISER, CLIMATOLOGIST FOR NEW ENGLAND

FIRST KILLING
 FROST DATES

ME DEP 2003

1984 JOHN McCULLAH

©

FILE: FROSTDATES

C-5 VEGETATED BUFFERS**PURPOSE & APPLICATIONS**

A vegetated buffer strip is a constructed or natural strip or area of vegetation for removing sediment, organic matter and other pollutants from runoff. Its purpose is to use the vegetation to remove sediment and other pollutants from runoff by filtration, infiltration, absorption, adsorption, decomposition, and volatilization. In addition to filtering sediment, vegetated buffers of well-developed native vegetation also provide shade, coarse woody debris, nutrient uptake and numerous other benefits to water bodies.

This practice applies to land undergoing development where buffers are needed to reduce sediment damage to adjacent property. Buffer strips shall only be used to remove sediment from overland (sheet) flow. Buffers are not effective in removing sediment from concentrated flows. Vegetated buffers are especially valuable as a "polishing" step from sedimentation traps and basins where a suspended silt and clay material is a problem.

CONSIDERATIONS

- Buffer is effective only as long as the flow through the filter is shallow sheet flow.
- Vegetative buffers cannot be expected to remove all sediments or adequately protect adjacent areas from sediment damage. Vegetative filters should only be considered as one component of the erosion and sediment control system. The effectiveness of buffers can vary considerably depending on the type of vegetation, the height and density of the vegetation, season of the year, type of sediment (sand, silt or clay), the size of the area exposed, and the topography of the exposed area.
- It is always preferable to use existing vegetation rather than replanting. Existing vegetation should be well developed, preferably composed of a suitable density of woody shrubs and tree stems of a range of sizes, age classes and species, and an intact forest floor. Naturally occurring coarse woody debris adds surface roughness, increasing water residence time and infiltration, and should not be removed or otherwise disturbed.
- Vegetative buffers shall be planned and established prior to disturbing the land that will produce the sediment.
- There are not precise design criteria that will guarantee a particular level of sediment removal.
- Careful plant selection can improve wildlife habitat for food and nesting.

Restabilization of a Disturbed Area

Disturbed areas may be stabilized in many different ways. Most commonly, a permanent cover of grasses and legumes is established. There are locations, however, where other types of vegetation are preferred. The following situations are examples of ways in which trees, shrubs, vines, and ground covers may be used:

- Protecting or re-establishing native forest cover is highly preferred in buffer areas of adequate width adjacent to surface water bodies.
- On cut and fill slopes adjacent to paved areas of shopping centers, schools, industrial parks, or other non-residential projects to control erosion.
- Where ornamentals are desirable for landscaping purposes.
- To reduce or eliminate the need for mowing and maintenance, especially in problem areas (shade, steep slopes, inaccessible places).
- In areas where pedestrian movement should be limited.
- Where woody plants are desirable for soil conservation or to establish wildlife habitat.
- Along streambanks to provide shading and leaf litter for fish habitat and as a buffer from runoff filled with sediment and nutrients.

SPECIFICATIONS

In unorganized areas, contact the Land Use Regulation Commission (LURC) directly for information about widths of buffers that apply in unorganized areas.

Construction of Grassed Filter Strips

Grassed filter strips can be built below areas where sedimentation can be expected during construction. They should be built and stabilized very early in the construction sequence to be sure they are functional.

A critical factor to determine for an effective buffer strip is the required width. Effective buffer strip widths may vary from only a few feet in relatively well drained flat areas to as much as several hundred feet in steeper areas with more impermeable soils.

Amount and rate of runoff that will pass through the strip is determined by:

- Land use and treatment above the strip.
- Slope of land above the strip.
- Length of slope above the strip.
- Erodibility of soil above the strip.

Physical properties of the filter strip itself are determined by:

- Slope of the land in the strip.
- Type of vegetation.
- Degree of maintenance the buffer will receive.

Installation Requirements

The minimum width of the buffer strip shall be 25 feet **or** in accordance with local CEO or DEP regulations.

The width of the buffer shall be increased proportionately for slopes longer than 150 feet or for higher sediment concentrations. When using filter strips at inlets to storm sewers, as large an area as possible should be provided to ensure it will function as intended. Buffers should be placed along the contours whenever possible. No construction shall be allowed within buffer strip areas.

Vegetation must be adapted to sediment-producing areas. Both existing and established vegetation must be healthy and have a vigorous growth habit. Establishing vegetation by seed shall be done in accordance with the measures for PERMANENT VEGETATION BMPs.

Using Natural Vegetated Filter Strips

Trees, shrubs, natural forest litter, debris, and the organic duff layer must be protected for this function. Ideally, vegetation should be well developed, preferably composed of a suitable density of woody shrubs and tree stems of a range of sizes, age classes and species, and an intact forest floor. Naturally occurring coarse woody debris adds surface roughness, increasing water residence time and infiltration, and should not be removed or otherwise disturbed.

Forest Management: Any timber harvesting in a Natural Vegetated Filter Strip in the past ten years should have retained a healthy stand of trees and shrubs, regenerated new seedlings of native species, and minimized disturbance of the forest floor. Active forest management of Natural Vegetated Filter Strips may occur without impairing their function as long as Forestry Best Management Practices developed by the Maine Forest Service in 2003 are observed. Consult Maine Forest Service for additional information.

Natural Resources Protection Act

DEP regulations require that an undisturbed strip of vegetation be maintained adjacent to wetlands and waterbodies (including both intermittent and perennial streams). For more information about this law, contact the DEP Bureau of Land and Water Quality.

Phosphorus Control in Lake Watersheds

Refer to the DEP publication "Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development" for information about this subject.

Wildlife Buffers

The Department of Inland Fisheries and Wildlife recommends the following natural vegetated buffers for wildlife protection along streams and wetlands:

- **Minimum width of undisturbed vegetation:** 100 feet on either side of stream/wetland (200-foot corridor total width).
- **Width of zone of minimum disturbance:** 150 feet additional on either side of stream/wetland (500-foot corridor total width).

The zone of minimum disturbance can be managed for forestry production with IF&W guidelines. The recommended width will vary with the value of the stream or wetland. Consult IF&W to determine the appropriate width and refer to the IF&W publication and maps "Significant Fish and Wildlife Resources of Maine."

Plant Selection

There are many plants that may be used for buffers; however native species of plants should be selected as they are best adapted to Maine climate, they are fairly easy to grow, and are commonly available from commercial nurseries. Information on such plants can be obtained from nurserymen, landscape architects, the Natural Resources Conservation Service (NRCS) and the University of Maine Cooperative Extension Service. Ideally, emphasis should not be merely on selection of a single appropriate species, but on re-establishing native forest vegetation assemblages and structures, including a natural forest floor. Further assistance on plant selection, planting, health and care is available from the Maine Forest Service.

Trees: Selection of trees depends on the desired function of the tree, whether it is shade, privacy screening, noise screening, appearance, and enhancement of wildlife habitat. The following characteristics of the tree should be considered when making choices:

- "Hardiness Zones" are based on average annual minimum temperature.
- The eventual height of a tree must be considered in relation to its planting location to avoid future problems with power lines and buildings.
- Some trees attain mature height at an early age, others take many years. If "instant shade" is desired, rapid growth is needed. Slow-growing trees are usually less brittle and live longer.
- Some trees obstruct underground pipelines with fibrous roots.
- Maintenance problems can be avoided by not selecting trees that drop seedpods, flowers, or twigs in large amounts. On the other hand, these same species may provide exceptional sources of food for wildlife.
- If good soil and drainage are not available, trees tolerant of poor growing conditions must be planted.
- If a tree is unusually attractive in appearance, some other shortcomings may be overlooked.
- Evergreens are useful for privacy screens and noise screens. Deciduous trees are preferable for shade trees in the summer and allow light to filter through in the winter.
- Some trees provide excellent food and nesting areas for wildlife. Tall shade trees on the southern side of streambanks provide shading necessary for Maine fisheries.
- Consider the prior use of the land; adverse soil conditions, such as poor drainage or acidity; exposure to wind; temperature extremes; location of utilities, paved areas, and security lighting; and traffic patterns.
- Spring is the preferred planting season for deciduous trees (hardwoods) and early fall (August-September) for evergreens. Trees to be planted as bare-rooted seedlings should be handled only while dormant in the spring, or after leaf fall in autumn.
- Dig generous sized planting holes with perpendicular sides. Loosen the soil at the bottom of the hole. Set trees and shrubs at the same level as they were at the nursery. Spread the roots out and work soil over and around them. Alternate the soil with layers of peat or compost until the hole is nearly full, compacting the soil firmly with your foot around the roots. Fill the hole with water. Finally, fill the hole with loose dirt, shaping a shallow basin to retain water. Support newly planted trees as needed to prevent excessive swaying. Stakes or guy wires may be used
- Wait until the second year when feeder roots are established to fertilize bare rootstock.
- Soil around the tree should be thoroughly watered after the tree is set in place and when the soil becomes dry. Mulching around the base of the tree (use bark mulch since straw or hay may attract mice) is helpful in preventing roots from drying out.

Shrubs: Much of what has been said about trees also applies to shrubs. A shrub is an erect woody plant less than 15 feet tall, usually with several trunks rising from a common base. Some have the appearance of small trees, and some lie close to the ground.

Vines and Ground Covers

Low growing plants that sprawl, trail, spread, or send out runners. Some are suitable only as part of a maintained landscape, and some can stabilize large areas with little care.

Forest Protection

Often it is necessary to protect desirable wooded areas and individual trees from injury during construction. The purpose is to ensure the survival of desirable trees where they will be effective for erosion and sediment control, watershed protection, landscape beautification, dust and pollution control, noise reduction, shade and other environmental benefits while the land is being developed

Selecting Trees to be Retained: The proper development of a wooded site requires completion of a plan for tree preservation before clearing and construction begins. Trees should be identified by species and located on a topographical map, either as stands or as individuals, depending on the density and value of the trees.

Life expectancy and present age: Preference should be given to long-lived tree species, such as white pine, red or white oak, beech, sugar maple and other species. Older trees that may be excessively stressed by construction should be assessed by a qualified arborist or forester. Retaining such trees while allowing natural regeneration of younger individuals is preferable, since older trees may provide greater environmental and aesthetic benefits. However, if preservation of individual trees is likely to cause unsafe conditions during or after construction, replacement with new trees may be considered.

Health: Individual trees and groups of trees should be evaluated by a qualified arborist or forester for signs of stress, disease, loss of vigor or structural defect. Safety or environmental risks should be evaluated in relation to the setting and present or potential environmental or aesthetic benefits. Indicators of potentially hazardous conditions may include fire or lightning scars, insect or disease damage, obvious rot or damage, overhanging limbs and crown vigor. Species considerations may include crown shape, size at maturity, shade or moisture tolerance and rooting habit. Land use history of the site may influence tree characteristics. Maintenance of tree/forest vigor may require thinning, pruning or other treatments. Contact the Maine Forest Service for additional assistance.

Wildlife: Preference should be given to trees that provide food, cover, and nesting sites for birds and game.

Survival needs of the tree: Chosen trees must have enough room to develop naturally. They will be subject to injury from increased exposure to sunlight, heat radiated from buildings and pavement, and wind. It is best to retain groups of trees rather than individuals. As trees mature, they can be thinned gradually.

Relationship to other trees: Individual species should be evaluated in relation to other species on the site. Species diversity of wooded areas should be maintained. Individual species should be retained unless warranted by natural stand development patterns (e.g. elimination of gray birch, popple or similar early successional species). Trees standing alone generally have higher landscape value than those in a wooded situation. However, tree groups are much more effective in preventing erosion and excess stormwater runoff.

Protection During Construction

If lot size allows, select trees to be saved before siting the building. No tree should be destroyed or altered until the design of buildings and utility systems is final.

Critical areas, such as flood plains, streambanks, lake and pond shore, steep slopes, and wetlands, should be left in their natural condition or only partially developed as open space.

Locate roadways to cause the least damage to valuable stands. Follow original contours, where feasible, to minimize cuts and fills.

Plan Identification: Groups of trees and individual trees selected for retention should be accurately located on the plan and designated as "tree(s) to be saved." Individual specimens that are not part of a tree group should also have their species and diameter noted on the plan.

Clearing Limits: The limits of clearing should be located outside the drip line of any tree to be retained, preferably at a minimum of 15 ft from the trunk, and in no case closer than five feet to the trunk of such a tree.

Tree Marking: Marking individual trees and stands of trees to be retained within the limits of clearing should be visibly marked with a bright-colored surveyor's ribbon or flagging applied in a band circling the tree at a height visible to equipment operators.

Equipment Operation and Storage: Heavy equipment travel, storage or stockpiles of any construction materials including topsoil should not be permitted within the drip line of any tree to be retained (or a minimum of 15 ft from the trunk of the tree). Heavy equipment operating over tree roots will probably kill a tree (even though it may take a few years to die). A five-foot minimum should only be used in the case of protecting an existing or recently cut tree line near the edge of the construction zone where equipment will be limited to only one side of the trees which will dramatically increase the survival rate.

Storage and Disposal of Toxic Materials: No toxic materials should be stored within 100 feet of the drip line of any trees to be retained. All construction debris, including paint, acid, nails, gypsum board, wire, chemicals, fuels and lubricants, must be properly disposed of.

Fencing: Any device may be used which will effectively protect the roots, trunk and tips of trees retained on the site. However, trees to be retained within 40 feet of a proposed building or earth moving activities should be protected by fencing. Fencing should be highly visible, of sturdy construction and at least 3 feet high. Fences may be snow fence, board fencing, synthetic fabric fence, plastic fence or similar materials. Additional trees may be left standing as protection between the trunks to be retained and the limits of clearing. To be effective, the trunks of the trees in the buffer must be no more than six feet apart to prevent passage of equipment and material through the buffer. These additional trees should be re-examined prior to the completion of construction and either given sufficient treatment to ensure survival or removed.

Trunk Armoring: As a last resort, a tree trunk can be armored with burlap wrapping and 2-inch studs wired vertically no more than two inches apart to a height of five feet encircling the trunk. The root zone within the drip line will still require protection with this alternative. Nothing should ever be nailed to a tree. Fencing and armoring devices should be in place before any earthwork activity is begun, kept in good repair for the duration of construction activities, and be the last items removed during the final cleanup, upon the project's completion.

Raising the Grade: When the ground level must be raised around an existing tree or tree group, a well should be created slightly beyond the drip line of the tree(s) to retain the natural soil in the area of the feeder roots. In the case of an individual tree, when the above alternative is not practical or desirable, a dry well can be constructed around the trunk with space to allow for trunk growth. Drainage within the well and around the root system inside the drip line should be provided.

Lowering the Grade: Trees should be protected from harmful grade cuts by the construction of a tree wall. Tree walls should be located outside the drip line of any tree to be retained and in no case, closer than 5 feet to the tree trunk. Following excavation, all tree roots that are exposed and/or damaged should be trimmed cleanly, painted with tree wound dressing (if desirable) and covered with moist peat moss, burlap or other suitable material to keep them from drying out. The wall should be constructed of large stones, brick, building tile, concrete block, or cinder block. If drainage through the wall is necessary, install tile drains or perforated PVC pipes.

Trenching and Tunneling: To reduce the amount of root area damaged or killed by trenching activities, excavate as far away as possible from the crown drip line. The ends of damaged and cut roots should be cut off smoothly and may be protected by painting with a tree wound dressing.

Cleanup: The time that follows completion of a construction project can be critical for trees. Trees protected throughout the development operation are often destroyed by carelessness during the final cleanup and landscaping. Fences and barriers should be removed after everything else is cleaned up and carried away.

MAINTENANCE

Buffers: Inspect buffers regularly for signs of erosion and channelization of water. Repair them as needed to promote sheet flow conditions.

During Construction: Even with precautions, some damage to protected trees may occur. In such cases, the following maintenance guidelines should be followed.

Mulching: Disturbed soil between trees and shrubs must be mulched or planted with permanent vegetation to prevent erosion. Refer to the MULCHING BMP or the PERMANENT VEGETATION BMP to select a method for stabilizing these areas.

Soil Aeration: If the soil has become compacted over the root zone of any tree, the ground should be aerated by punching small holes in it with suitable aerating equipment.

Repair of Damage: Any damage to the crown, trunk or root system of any tree retained on the site should be repaired immediately. Damaged roots should immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces may be allowed to air dry.

All tree limbs damaged during construction or removed for any other reason should be cut off above the collar at the preceding branch junction. Larger limbs will require 3 cuts to safely remove the damaged limb without damaging the trunk.

Maintenance of Trees: Like all plants, trees require water and fertilizer to grow. Ideally, young trees should receive an inch of water each week for the first two years after planting. When rain does not supply this need, the tree should be watered deeply but not more often than once per week.

Transplanted trees should be fertilized one year or so after planting. There are many sophisticated ways to supply fertilizer to trees, but some simple methods are adequate. The best material for small trees is well-rotted stable manure, if it can be obtained. Add it as a 2-inch layer of mulch around the tree annually.

Maintenance of Shrubs: Proper pruning, water, and application of fertilizer every three years or so will keep shrubs healthy. Maintain the mulch cover or turf cover surrounding the shrubs. A heavy layer of mulch reduces weeds and retains moisture.

Maintenance of Vines: Trim old growth as needed to improve the appearance of ground covers. Most covers need once-a-year trimming to promote growth. Maintain mulch cover with additions of mulch where needed. Fertilize as described above every 3-4 years.

D-1 GEOTEXTILES

PURPOSE AND APPLICATIONS

Geotextiles (often called "filter fabrics") are any permeable, synthetic, textile material used with foundation, soil, rock, earth, or any other geotechnical engineering-related material as an integral part of a man-made project, structure or system. The purpose of geotextiles is:

In separation, layers of different sizes of solid particles are separated from one another by the geotextile. Geotextiles are often placed underneath riprap to prevent underlying soil from eroding away.

In drainage, the geotextile allows water to pass and in the special case of drainage "transmission," the geotextile itself acts as a drain to transmit water through soils of low permeability. Geotextiles can be wrapped around perforated drainpipes to filter out fines that can clog them.

For reinforcement, the geotextile is used as a reinforcing element in the earth through either stress distribution or increase in soil modulus.

In filtration, the fabric acts similar to a two-dimensional sand filter, allowing water to move from the soil while retaining the soil.

CONSIDERATION

Proper material selection and installation is the key to success. Some products may look similar, but have very different characteristics. It is important to call the manufacturer or consult their literature when you have questions about which material to use or how to use it as there are many different types, grades of both woven and non-woven geotextiles.

Woven Geotextiles

The opening size of the fabric is critical when the geotextile serves as a filter for piping or if seepage gradients are significant. It provides a means of evaluating the retention characteristics of a geotextile and adequate resistance to clogging. To use a woven geotextile, the soil gradation must be known and ask the manufacturer for guidance concerning their fabric and proper selection.

Nonwoven Geotextiles

The size opening is not a critical property with nonwoven geotextiles as these geotextiles have a wide range of size openings. In general, nonwoven geotextiles retain more soil fines than do woven geotextiles. The structure of the mechanically bonded needle-punched fabric helps to decrease the internal fabric clogging potential. The nonwoven geotextiles have very good permeability characteristics and should be strongly considered where seepage flows are a concern. Nonwoven geotextiles have a rougher surface than wovens. Therefore, the bond between the soil and the geotextiles offer more resistance to sliding along the plane of contact.

SPECIFICATIONS

Design Criteria

The design for filtration requires retention of the soil while allowing sufficient flow through the textile and the prevention of clogging. Woven geotextiles require more critical evaluation and analysis than nonwovens in most applications.

Installation Specifications

Satisfactory performance of the selected geotextile is greatly dependent on the installation procedures and field preparation of the surface to be protected. When geotextiles are used adjacent to fill or backfill, the fill soils placement is critical in preventing conditions subject to plugging of the geotextile. The following techniques all minimize the movement of soil particles towards the geotextile surface and provide more area for flow through the geotextile.

- Prepare soil surfaces adjacent to geotextiles so that all flow channels or voids larger than the openings in the geotextile are eliminated.
- Utilize soil compaction and placement techniques to ensure that intimate contact between the geotextile and the soil is maintained.
- Provide a surface area as large as possible for the filter (i.e., it is better to place the geotextile around the periphery of the drain trench with gravel and pipe inside than to place the geotextile around the pipe where the surface area is smallest).

Slope Protection

Geotextile material is often used to prevent soil erosion beneath riprap armoring. Erosion can occur under and around ripped ditches, particularly if the side slopes are steep. Water flowing over the riprap can actually lift soil out from underneath the stones. This undercutting can be curtailed by using a geotextile layer between the riprap and the native soil. The geotextile covers the soil surface and protects it from erosion.

The method of placement of rock or other material on the geotextile may have to be specified. Placement should be accomplished by equipment capable of controlling the drop. Pushing or rolling rock over the geotextile should not be allowed. The maximum drop is 3 feet for protected (6-inch sand or soil cushion for bedding) or unprotected geotextile. Where conditions require a larger drop, the strength of the geotextile and/or thickness of cushioning material needs to be increased.

To prevent movement of surface soil, where groundwater and seepage pressures are a factor, the geotextile must be kept in intimate contact with the soil. This is especially true on sloping surfaces where flow may occur beneath the geotextile. A sand layer bedding material may have to be specified to insure this contact in some cases. Gravel placed on the geotextile will hold it in place and minimize voids under the riprap. Embedment of the geotextile in a trench to form a cutoff at regular intervals down the slope will also help prevent riling beneath the geotextile. Cutoffs may have to be placed more closely spaced in highly erodible soils and spaced wider apart in more stable soils.

When a geotextile is used as a filter material replacement for the purpose of preventing particle migration, it is recommended that laps of adjacent geotextile panels require matching sewing or other positive joining methods. The method of joining laps should be specified on the drawings or in the construction details.

- Use non-woven geotextiles for this type of application because they are more permeable and they conform to the soil surface better.
- Anchor the upper ends of geotextile in a small trench to prevent it from slipping when the riprap is laid in the ditch.
- Overlap multiple sheets of geotextile by 1-2 feet (upslope fabric should overlap the downslope fabric, just like shingles on a roof).
- The soil surface should be relatively smooth and free of protruding rocks and debris that can puncture and tear the fabric.

Subsurface Drainage

Geotextiles can be used to improve subsurface drainage by removing groundwater from chronically soft, muddy sections of a road, a landscaped area or an embankment. Typically, this type of drain consists of a trench filled with gravel and/or perforated plastic pipe. The trench is designed to intercept the groundwater and drain it to a lower spot. Lining the trench with a geotextile prevents the pipe from clogging and extends the life of the drain. The geotextile also acts as a barrier between the gravel and surrounding soil, thereby preserving the permeability of the gravel.

- Lay the geotextile in the trench with the ends extending up over both sides of the trench. Once the trench has been filled with gravel, the ends can be folded over the top and then covered with soil.
- Overlap multiple sheets of geotextile by at least 1-2 feet.

- Make sure the drain has a continual downhill pitch and discharges into a stable area.
- See that the soil surface is free from rocks or other protrusions to ensure good contact between the soil and the geotextile.

Use manufacturers recommended normal condition non-woven geotextiles where material will not be dropped more than five (5) feet onto the geotextile, where trench depths will be no deeper than ten (10) feet from the normal ground surface and sharp, angular aggregates are not used.

Heavier geotextiles are recommended when trench depths of greater than ten (10) feet or sharp, angular aggregates are used. The tensile strength should be no less than 150 pounds and burst strength no less than 300 psi.

To prevent rock movement to surface soil, where groundwater and seepage pressures are a factor, the geotextile must be in intimate contact with the subgrade soil. Voids between the geotextile and the base soil need to be minimized to prevent the collecting of fines behind the geotextile and subsequent clogging. The geotextile should be pulled flat during installation to eliminate wrinkles and folds that create voids.

If flow in the plane of the geotextile is a concern in the drain installation, the thickness of the geotextile becomes an important criterion. A heavier weight nonwoven needle punched fabric should be used.

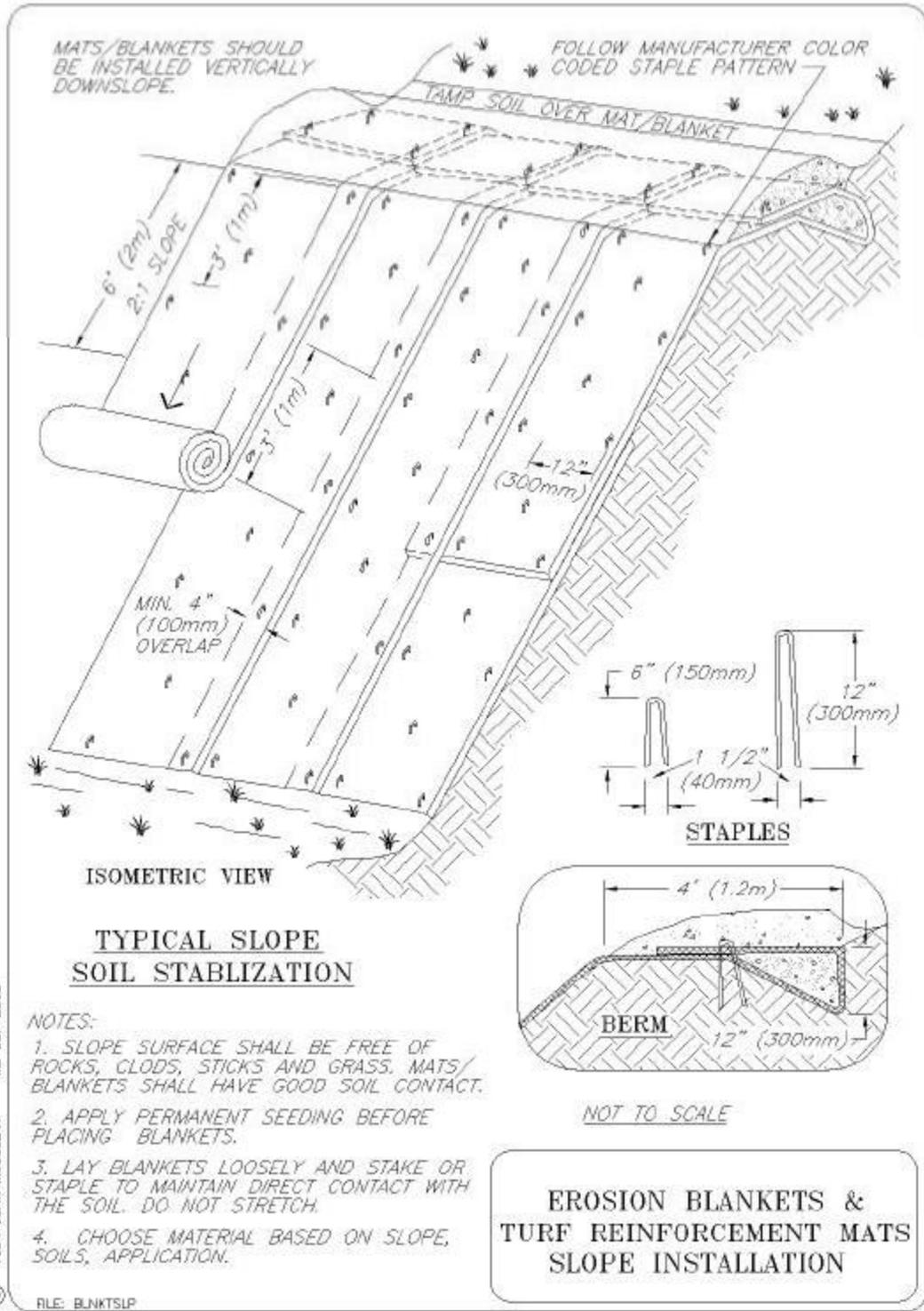
Road Stabilization

Stabilization is a way to firm up soft roads that are prone to tire rutting. This situation results from a road base or subgrade that is poorly drained. The first step is to grade and crown the existing road surface. Then, roll out the geotextile fabric over the full road width, covering the entire problem area. The final step is to cover the geotextile with at least 10-12 inches of good road gravel. Using geotextile will enhance the road stability by dispersing the vehicle weight over a broader area preserving the integrity of the good gravel over the poor soils beneath it.

- Use woven geotextiles for stabilization because of their superior strength. Some heavier weight, non-woven types may suffice. Check with the product manufacturer for their recommendations for light to medium loading in both weight and frequency or traffic.
- Always overlap sheets of geotextile by as much as 2-3 feet. If the subgrade is soft and it is determined that the potential for rutting is high, the overlap should be increased
- Remove protruding rocks and other debris from the road before putting down geotextile to prevent punctures and tears.

MAINTENANCE

If any sign of damage is apparent, geotextiles must be repaired or replaced as needed to maintain their performance.



G-3 CONSTRUCTION DEWATERING**PURPOSE & APPLICATIONS**

Construction dewatering is a necessary operation on most construction sites in the Northeast. Excavations that do not result in a daylight drain, or have insufficient slope onsite to easily provide daylight drains, trap either rainwater or groundwater within the excavation. Similarly, cofferdams collect rain, ground or seepage water within the work area. For construction projects, this water needs to be removed before certain operations can be performed or to keep work conditions safe. It is typical for contractors to use ditch pumps to dewater these enclosed areas, but pay little attention to the location of the outlet and where the pumped water goes. Often, the pumped water finds its way to a downgradient natural resources like a lake, wetland, or a stream that is sensitive and needs to be protected. This practice examines the best ways to deal with this discharge of collected water and is designed to:

- Prevent the discharged water from eroding soil on the site.
- Choose the best location for discharge.
- Remove sediment from the collected water.
- Preserve downgradient natural resources and property.

CONSIDERATIONS

- The discharge areas should be chosen with careful consideration to the downgradient water resources and the landscape ability to treat water flows from the dewatering process. A wooded buffer is best. All buffer requirements are found in the VEGETATED BUFFER BMP section. The discharge should be stopped immediately if the receiving area is showing any sign of instability or erosion.
- If the collected runoff is contaminated with oil, grease, or other petroleum products, oil/water separator or a filtration mechanism may be necessary prior to the discharge. Another method of disposal such as containment and trucking away by a Maine DEP licensed transporter will need to be implemented if the water has been contaminated by toxic and hazardous materials.
- All requirements of state law and permit requirements of local, state, and federal agencies must be met.

SPECIFICATIONS

Dewatering excavated areas must be in two distinct phases. The removal of the collected water within the excavation and the treatment of the collected water.

Physical Dewatering

The removal of water from the excavated area can be accomplished by numerous methods. The most common of these are: gravity drain through daylight channels, mechanical pumping, siphoning, and using the bucket of construction equipment to scoop and dump water from the excavation.

- Channels dug for discharging water from the excavated area need to be stable. If flow velocities cause erosion within the channel then a ditch lining should be used.
- Bucketed water should be discharged in a stable manner to the sediment removal area. A splash pad of riprap underlain with geotextile may be necessary to prevent scouring of the soil in the basin.
- Dewatering in periods of intense, heavy rain, when the infiltrative capacity of the soil is exceeded, should be avoided.

Sediment Removal

Many methods of settling or filtering sediment are available for the contractor to consider.

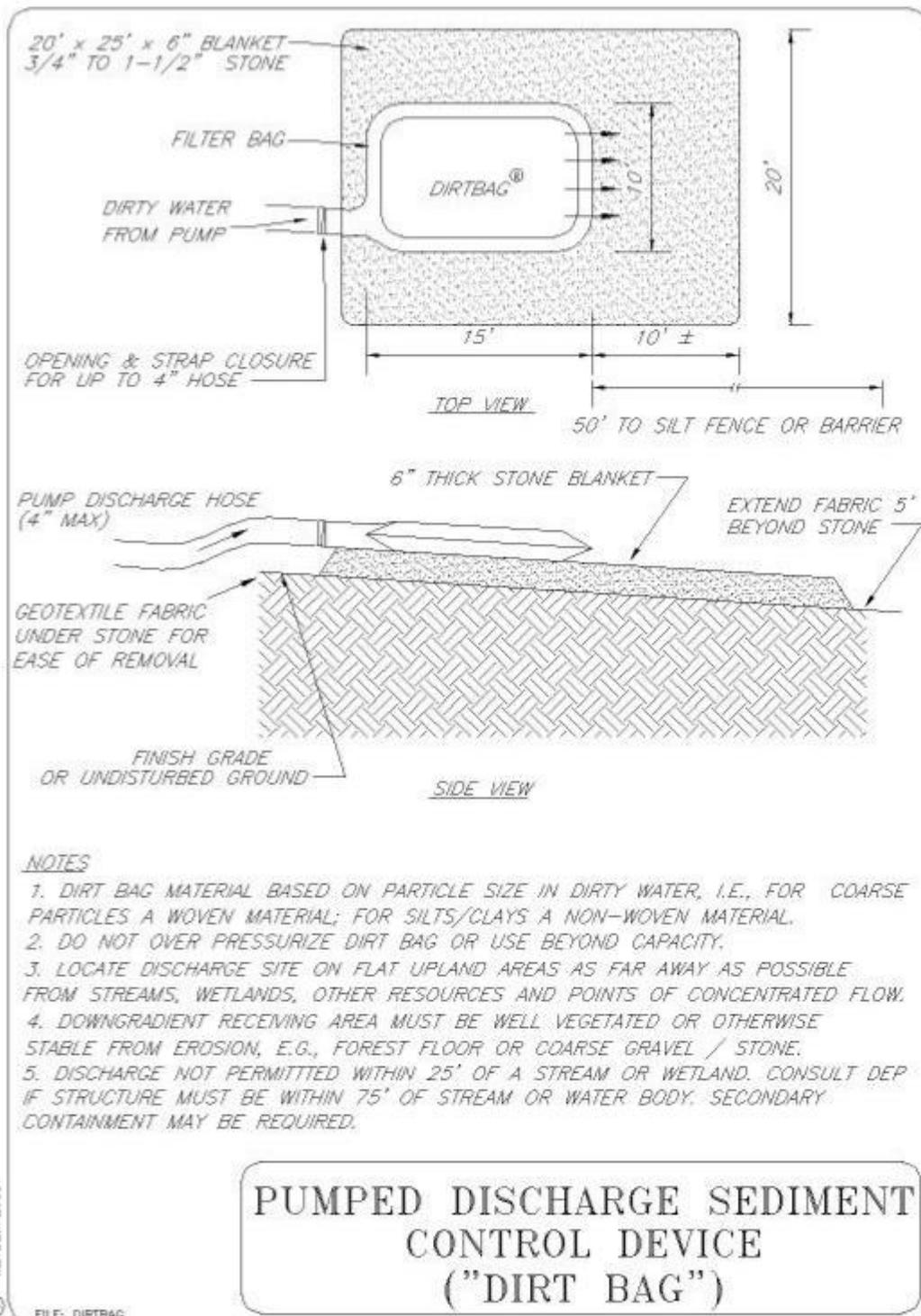
- Flow to the sediment removal structure may not exceed the sediment removal structure's capacity to settle and filter flow or the structure's volume capacity.
- Sediment Removal Basins should discharge wherever possible to a well-vegetated buffer through sheet flow and should maximize the distance to the nearest water resources and minimizing the slope of the buffer area.
- Various basin designs have been proposed in past projects.
 - An enclosure of Jersey Barriers lined with a large piece of slit tape geotextile.
 - A temporary enclosure constructed with hay bales, silt fence, or both. Erosion control mix also may be incorporated with silt fence or hay bales.
 - Direct discharge of lightly sediment bearing water may be able to go directly into well-buffered areas with 0-2% slope as long as a method of spreading flow into sheet flow is available.
 - Discharge to a manufactured / pre-made structure specifically designed for sediment removal, like a Silt Sak, Silt Bag, or other similar product.
 - Concrete or steel settling chambered systems for sediment removal.
 - Excavated or bermed sedimentation ponds or structures. Side slopes no greater than 2 to 1, or with a combined interior and exterior slope of no greater than 5 to 1. See the SEDIMENT TRAP BMP section.
 - A stormwater detention pond may be used as a stilling basin during construction. However, a sediment barrier needs to be installed to the outlet structure to prevent the discharge of sediment. See the SEDIMENT POND CONSTRUCTION BMP section.

Installation Requirements

- For trench excavation, limit the trench length to 500 feet and place the excavated material on the up gradient side of the trench.
- Install diversion ditches or berms to minimize the amount of clean stormwater runoff allowed into the excavated area.
- Never discharge to areas that are bare or newly vegetated.

MAINTENANCE

During the active dewatering process, inspection of the dewatering facility should be reviewed frequently. Special attention should be paid to the buffer area for any sign of erosion and concentration of flow that may compromise the buffer area. Observe where possible the visual quality of the effluent and determine if additional treatment can be provided.



APPENDIX F

**CONSTRUCTION SWPPP
AMENDMENT SUMMARY FORM**

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SWPPP Amendment Summary Form

Amendment Summary

Amendment Date

Affected SWPPP Sections

Approval

Name

Signature

Title

Date

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APPENDIX G

COMPLETED CONSTRUCTION SWPPP AMENDMENT SUMMARY FORMS

Photocopies of the completed field forms will be appended to the field copy of the SWPPP that will be maintained on-site. Original copies of the completed forms will be kept in the TtEC filing system.

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APPENDIX H

TRAINING DOCUMENTATION

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This Is To Certify That Pursuant
To The Provisions of Chapter 7, Division 3 of The Business and Professions Code

Sam Uzz Kin Ho

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PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

In The State of California and Is Entitled To All The Rights and
Privileges Conferred In Said Code

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Certificate No C 79939

This 29th day of June, 2012, at Sacramento, California.

BOARD FOR PROFESSIONAL ENGINEERS,
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Executive Officer

President

CISEC, Inc.

Board of Directors

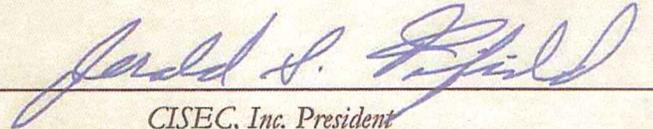
certifies that

Sam Ho

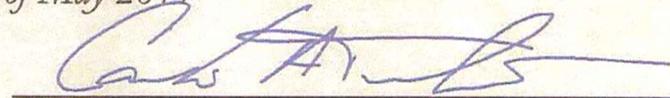
has demonstrated satisfactory evidence of sediment and erosion control inspection skills and successfully passed the certification examination and therefore, as required by CISEC, Inc., is authorized to use the title of

Certified Inspector of Sediment and Erosion Control

Given this 22nd day of May 2011



CISEC, Inc. President



CISEC, Inc. Board of Director

0680

Certification Number



BOARD FOR PROFESSIONAL ENGINEERS, LAND SURVEYORS, AND GEOLOGISTS



This Is To Certify That Pursuant
To The Provisions of Chapter 7, Division 3 of The Business and Professions Code

Luis Miguel Pena

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This 29th day of June, 2012, at Sacramento, California.

BOARD FOR PROFESSIONAL ENGINEERS,
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Executive Officer

President

CISEC, Inc.

Board of Directors

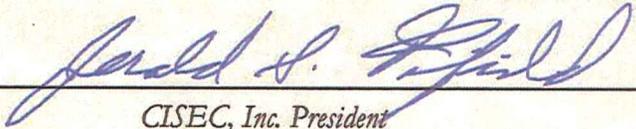
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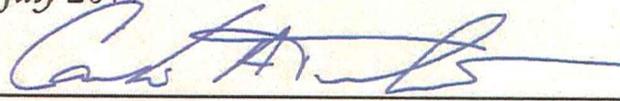
Luis M. Pena

has demonstrated satisfactory evidence of sediment and erosion control inspection skills and successfully passed the certification examination and therefore, as required by CISEC, Inc., is authorized to use the title of

Certified Inspector of Sediment and Erosion Control

Given this 26th day of July 2011


CISEC, Inc. President


CISEC, Inc. Board of Director

0774

Certification Number

CISEC, Inc.

Board of Directors

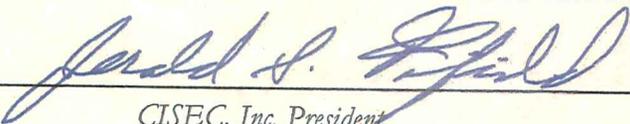
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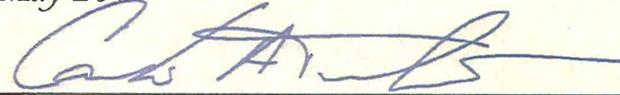
Christopher Hanif

has demonstrated satisfactory evidence of sediment and erosion control inspection skills and successfully passed the certification examination and therefore, as required by CISEC, Inc., is authorized to use the title of

Certified Inspector of Sediment and Erosion Control

Given this 22nd day of May 2011


CISEC, Inc. President


CISEC, Inc. Board of Director

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Certification Number

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