Stormwater Design Standards Manual

City of Bismarck, ND

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1.0 INTRODUCTION

1.1 PREFACE

The City of Bismarck (City) originally adopted a Stormwater Design Standards Manual in 2000 as a guide to engineers and developers for the implementation of infrastructure related to the collection, conveyance and discharge of stormwater. Since 2000, the City has completed numerous Watershed Stormwater Master Plans (Master Plans), experienced continuous growth, and has been designated as a Municipal Separate Storm Sewer System (MS4) under the North Dakota Pollutant Discharge Elimination System (NDPDES), necessitating a revision to the Stormwater Design Standards Manual.

1.2 PURPOSE

This Stormwater Design Standards Manual (SWDSM) has the primary purpose of providing uniform requirements for obtaining mandatory stormwater permits (construction-time and post-construction stormwater management) for development activities within the City and its extraterritorial jurisdiction. This SWDSM is developed to:

1. Provide uniform requirements to demonstrate compliance with Title 14.1 of the City Code of Ordinances (Stormwater Management) and the MS4 General Permit.
2. Reduce the number of mandatory stormwater permit application resubmittals and decrease delays in project approvals.
3. Clearly define submittal requirements and timing to obtain mandatory stormwater permits for plat and site plan applications.
4. Define the materials required for a stormwater permit application package to be deemed complete and ready for review.
5. Define City review timelines for mandatory stormwater permit applications to provide applicants with a greater level of certainty for planning their projects.
6. Clearly and concisely define the Performance Requirements for stormwater management.
7. Summarize the Design Standards for commonly used construction and post-construction stormwater best management practices.
8. Clearly and concisely define acceptable analysis methodologies.

Content included in this SWDSM is based on the following general assumptions:

1. The Design Engineer and reviewer are experienced Professional Engineers with a working knowledge of stormwater management, hydrologic analysis and hydraulic design applicable to the subject project.
2. Primary users of the manual will consist of Design Engineers preparing applications for mandatory stormwater permits in support of plat and site plan land use approvals.
3. The SWDSM requirements and standards are intended to apply to the majority of development situations. It is anticipated that not every situation can be

contemplated in a design manual and that engineering judgement will need to be applied to some projects.

4. Large flood protection projects, floodplain management, regulated dams, roadway bridge hydraulics and other large scale regional drainage projects will have additional performance requirements and design standards that are outside the scope of this SWDSM.
5. Watershed Stormwater Master Plans adopted by the City Commission contain additional performance and design requirements for stormwater management and are considered complementary to the requirements of this SWDSM. Conflicts will be resolved by the City Engineer on a per project basis.

This revised SWDSM is focused on clarifying the requirements for the application and approval of mandatory stormwater permits with an emphasis on the Design Engineer having a strong working knowledge of the theory behind stormwater management.

1.3 USE OF THE MANUAL IN THE ETA

This SWDSM is intended to be utilized for all development and redevelopment projects inside of the corporate limits of the City of Bismarck.

For development and redevelopment projects that occur within the City of Bismarck extraterritorial zoning jurisdiction (ETA), a PCSMP will be issued by the City Engineer with consultation with the County Engineer. Design Standards for projects in the ETA and Burleigh County shall meet the requirements of the County Engineer and will generally be noted on the Mandatory Stormwater Scoping Sheet.

A CSMP will not be issued by the City for projects located in the ETA or Burleigh County. Construction activities in the ETA shall obtain coverage under the ND Construction General Permit and comply with the requirements of the County Engineer.

1.4 ACRONYMS

The following acronyms and corresponding terms may be referenced in this SWDSM by use of the acronym.

Acronym	Term
BMP	Best Management Practice
CMP	Corrugated Metal Pipe
CSMP	Construction Stormwater Management Permit
EGL	Energy Grade Line
EPA	Environmental Protection Agency
ETA	Extraterritorial Area
FEMA	Federal Emergency Management Administration

Acronym	Term
HDPE	High-Density Polyethylene Pipe
HGL	Hydraulic Grade Line
MS4	Municipal Separate Storm Sewer System
NDDoH	North Dakota Department of Health
NDDOT	North Dakota Department of Transportation
NDPDES	North Dakota Pollutant Discharge Elimination System
NOI	Notice of Intent
NOT	Notice of Termination
PCSMP	Post-Construction Stormwater Management Permit
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
SWDSM	Stormwater Design Standards Manual
SWMP	Stormwater Management Plan
USACE	United States Army Corps of Engineers

1.5 DEFINITIONS

The following terms, phrases, and words, or their derivatives, are applicable to stormwater management in the City. A number of the entries have been reproduced from Title 14.1 of the City Code of Ordinances and the MS4 General Permit as a reference for use in this SWDSM. All terms listed below shall have the meanings as stated in this section. When inconsistent with the context, words used in the present tense include the future tense. Words in plural number include the singular number, and words in the singular number include the plural number. The word "shall" is always mandatory and never permissive.

Term	Definition
Applicant	Any person wishing to obtain a building permit, special use permit, zoning change, or subdivision approval, that requires a mandatory stormwater management permit.
Approval	Recognition that the project has addressed the applicable requirements to be issued a mandatory stormwater management permit.
Basis of Design Report	A refinement report required to document conformance with an approved Stormwater Management Plan. A Basis of Design Report is a required submittal for a Post-Construction Stormwater Management Permit.

Term	Definition
Best Management Practices or "BMPs"	A schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce increases in runoff rates and/or the pollution of downstream waters.
Catchment	The area of a development or redevelopment project that collects stormwater to a discrete Point of Discharge or Point of Analysis.
Certification Report	The required analysis documenting that the facilities identified in an approved Stormwater Management Plan have been constructed and function as intended. A Certification Report is a required submittal for a Post-Construction Stormwater Management Permit.
Common plan of development or sale	A contiguous area where multiple separate and distinct construction activities are planned to occur at different times on different schedules under one plan, e.g., a housing development of five ¼ - acre lots (40 CFR 122.26(b)(15)(i)).
Conditional Approval	The issuance of a mandatory stormwater permit on the stipulation that additional materials and/or actions occur in the future to document and confirm the submitted and reviewed application materials.
Construction Plans	Engineered drawings detailing the size and character of post-construction stormwater management facilities and site development. Construction Plans are a required submittal for a Post-Construction Stormwater Management Permit.
Construction Stormwater Management	The implementation of appropriate temporary BMPs to minimize soil sediment or pollutants carried in runoff from construction activities. Also included is the management of run-on and runoff of stormwater from the construction activities.
Construction Stormwater Management Permit (CSMP)	A mandatory stormwater permit required for construction activities in the City of Bismarck as defined by Title 14.1 of the City Code of Ordinances.
Development	Means any of the following activities: a. Structural development, including construction of a new building or other structure; b. Expansion or alteration of an existing structure that results in an increase in the ground surface dimensions of the building or structure; c. Land disturbing activities; or d. Creation or expansion of impervious surfaces.
Excavation	Any act by which organic matter, earth, sand, gravel, rock or any other similar material is cut into, dug, quarried, uncovered, removed, displaced, relocated or spread and shall include the resulting conditions.
Fill	Any act by which earth, sand, gravel, rock or any other material is deposited, placed, replaced, pushed, dumped, pulled, transported, or moved to a new location and shall include the resulting conditions.

Term	Definition
Hydric Soils	Soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. (Reference: USDA, NRCS. 2010. Field Indicators of Hydric Soils in the United States. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050723.pdf)
Illicit Discharge	Any discharge to, or seepage into the City's MS4 that is not composed entirely of stormwater or uncontaminated groundwater except discharges pursuant to an NPDES permit. Examples include, and are not limited to, construction material discharges, discharging of sanitary sewers and runoff of spilled chemicals, fuels or lubricants. Exceptions to illicit discharges are included in the City's current MS4 General Permit.
Impervious Surface	Any land cover that prevents rain, or melting snow, from soaking into the ground, such as roofs (including overhangs), streets, sidewalks, patios, driveways, and parking lots. For the purposes of this SWDSM, all road, driveway or parking surfaces, including gravel surfaces, shall be considered impervious.
Land Disturbing Activities	Any land alterations or disturbances that may result in soil erosion, sedimentation, or change in runoff including, but not limited to, removal of ground cover, grading, excavating, and filling of land, but not including agricultural land uses such as planting, growing, cultivating and harvesting of crops, growing and tending of gardens, and harvesting trees.
Municipal separate storm sewer system or "MS4"	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management Agency under section 208 of the CWA that discharges to waters of the United States; Designed or used for collecting or conveying stormwater; Which is not a combined sewer; and Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.
Notice of Termination (NOT)	Notification to the City and/or NDDoH that all construction activities for a project have been completed and exposed soils have achieved final stabilization.
On-Site Post-Construction Facility or BMP	A permeant stormwater facility provided to serve only the project area and no significant areas outside of the project boundaries. On-site facilities shall be sized to include the existing condition runoff flows from areas up gradient of the development boundary that flow onto the development under the existing condition.

Term	Definition
Outfall	The point where a municipal separate storm sewer system discharges from a pipe, ditch, or other discrete conveyance to receiving waters, or other municipal separate storm sewer systems. It does not include diffuse runoff or conveyances, which connect segments of the same stream or other water systems
Pervious Surface	Any land cover that permits absorption of stormwater or snow melt into the ground.
Point of Analysis	The location where runoff from development or redevelopment will be evaluated for compliance with the requirements of Title 14.1 of the City Code of Ordinances and this SWDSM. In general, this will be the location where post developed flow rates must meet the existing conditions rates and water quality BMPs have been provided. The Point of Analysis may be located downstream of the Point of Discharge(s). The Point of Analysis will be determined by the City Engineer. In practicality, there may be more than one Point of Analysis for a project.
Point of Discharge	A location where stormwater discharges from development or redevelopment areas into the Public Storm Sewer System or other receiving waters. In practicality, there may be more than one Point of Discharge on a site or for a project.
Post-Construction Facilities or Post-Construction BMP	Permanent structural and non-structural best management practices to mitigate adverse impacts to stormwater quality and water quantity which are part of any natural or constructed stormwater system that require periodic or minimal maintenance to retain their operational capabilities. This includes, and is not limited to, storm sewers, infiltration areas, detention areas, channels, streets, etc.
Post-Construction Stormwater Management	The implementation of appropriate permanent BMPs to address the stormwater quantity, quality, and conveyance for new and redevelopment projects.
Post-Construction Stormwater Management Permit (PCSMP)	A mandatory stormwater permit required to address stormwater quantity, quality, and conveyance for projects in the City of Bismarck as defined by Title 14.1 of the City Code of Ordinances.
Private Storm Sewer System	A system of conveyances designed or used for collecting or conveying stormwater on privately-owned land or easements which eventually discharges into the Public Storm Sewer System. The Private Storm Sewer System consists of both open and enclosed drainage systems (including roads with drainage systems, parking lots, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that are owned and operated by private entities.
Public Storm Sewer System	A system of conveyances designed or used for collecting or conveying stormwater, owned or operated by the City and included in the City's municipal separate storm sewer system (MS4). The Public Storm Sewer System consists of both open and enclosed drainage systems (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that are owned or operated by the City and are designed to collect and convey stormwater; and discharge, either directly to an MS4 owned or operated by another public body, or to other receiving waters.

Term	Definition
Redevelopment	Any construction, alteration or improvement on a previously developed site that creates new impervious surfaces.
Regional Post-Construction BMPs	Stormwater best management practices that have been analyzed, constructed and installed per an adopted Stormwater Master Plan. Regional BMPs are provided to mitigate stormwater impacts from multiple developments contained within a larger watershed boundary. A regional BMP generally receives runoff from multiple stormwater sources and is part of the Public Storm Sewer System. Examples can include regional detention basins or water quality features.
Stabilized	Means the exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, or other material that prevents erosion from occurring. Grass seeding alone is not stabilization. Snow covered and frozen ground conditions are not considered stabilized.
Standard Specifications	Refers to the current edition of the "Construction Specifications for Municipal Public Works Improvements Bismarck, North Dakota" available from the office of the City Engineer.
Stormwater Management Plan (SWMP)	A written document detailing stormwater runoff characteristics for a defined area and the management of that runoff to mitigate adverse impact to stormwater quality and quantity. A Stormwater Management Plan is a required submittal for a Post-Construction Stormwater Management Permit.
Stormwater Permit	A permit allowing land development and land disturbing activities so as to protect the Public Storm Sewer System such that development or redevelopment activities are in conformance with the MS4 General Permit and Title 14.1 of the City Code of Ordinances. Mandatory permits are described in ***Section 3.0.***
Stormwater Pollution Prevention Plan (SWPPP)	A site specific plan required for Construction Stormwater Permits that addresses all pollutants and their sources, including sources of sediment associated with construction, construction site erosion, and all other activities associated with construction activity and controlled through the implementation of Best Management Practices (BMPs).
Sub-catchment	A smaller area of the hierarchical pattern of drainage from a Catchment. For Mandatory Stormwater Permits, sub-catchments are used to define unique drainage areas inside of the project Catchment.
Sub-watershed	A smaller area of the hierarchical pattern of drainage from a Watershed. An area of land where all surface water is tributary to a larger drainage system. For example in Bismarck, the Hay Creek Watershed has a number of unique areas that tributary to the main creek channel.
Watershed	An area of land where all surface water from rain, melting snow, or ice converges to a single point at a lower elevation where the waters join another body of water, such as a river or lake. Examples in Bismarck include Hay Creek upstream of Apple Creek, Tyler Coulee upstream of Pioneer Park, and South Bismarck upstream of the Tavis Road crossing.

Term	Definition
Watershed Stormwater Master Plan	A stormwater management plan that characterizes and address runoff from a defined drainage area and makes recommendations for the implementation of regional facilities, or BMPs, to address peak flow and water quality compliance and/or regional drainage and conveyance systems. Watershed Stormwater Master Plans that are adopted by the City Commission are planning documents that provide drainage area specific refinements to stormwater management performance requirements and design standards.
Waters of the State	Any and all surface waters that are contained in or flow in or through the state of North Dakota as defined in NDCC 61-28-02. This definition includes all water courses, even if they are usually dry.
Wetlands	Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (Reference: Definition of wetlands as used by the USACE and EPA since the 1970s for regulatory purposes: https://www.epa.gov/cwa-404/section-404-clean-water-act-how-wetlands-are-defined-and-identified)

General Requirements
Development and redevelopment projects within the City of Bismarck shall control or collect stormwater runoff consistent with the performance requirements, design standards and analysis methods described in this SWDSM. Failure to do so may result in the denial of a mandatory stormwater management permit applied for in accordance with Title 14.1 of the City Code of Ordinances (Stormwater Management).

Stormwater management is not a one size fits all process and the City has selected a BMP approach to meet the requirements of the MS4 General Permit and Title 14.1 of the City Code of Ordinances. Mandatory stormwater management permits are to include a summary of the site specific stormwater management BMPs for the following categories:

1. Post-Construction Peak Flow Compliance (***Section 4.0***);
2. Post-Construction Water Quality Compliance (***Section 5.0***);
3. Post-Construction Drainage & Conveyance Compliance (***Section 6.0***); and
4. Construction Stormwater Management (***Section 7.0***).

1.6 DESIGN EXCEPTIONS AND DEVIATIONS

This SWDSM is not intended to limit innovation or creativity, particularly when such efforts result in more efficient solutions. Departure from the required standards shall be determined by the City Engineer on a per project basis.

The City Engineer's decision to grant, deny, or modify the proposed deviation shall be based upon evidence that the deviation request meets all of the following criteria:

1. The change will meet the applicable performance requirement.
2. The change will achieve the intended result in a comparable or superior design.
3. The change will not adversely affect safety and/or operation of the Public Storm Sewer System.
4. The change will not adversely affect maintainability of the Public Storm Sewer System.

A non-standard system may take longer to review and the deviation shall be requested during the Mandatory Stormwater Scoping Sheet described in ***Section 3.0***.

1.7 ERRORS & OMISSIONS

Any errors or omissions in the approved plans or information used as a basis for the approval of mandatory stormwater management permits may constitute grounds for withdrawal of approvals and/or stoppage of any or all of the permitted work, as determined by the City. It shall be the responsibility of the Applicant and assigned agents to demonstrate why such work should continue, and to make changes to the plans as may be required by the City before approval of the plans is reinstated.

1.8 REFERENCES

Reference 1-1 – *Stormwater Design Standards Manual Revision Log*

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2.0 STORMWATER MANAGEMENT PROGRAM

2.1 STORMWATER PROGRAM OVERVIEW

The City's stormwater program has been established with the goals of increasing public safety, providing protection of public and private property, and meeting the Municipal Separate Storm Sewer System (MS4) requirements per State and Federal water regulations. The City is a designated MS4 under the EPA's Stormwater Phase II Final Rule published on December 8, 1999 and is regulated under the North Dakota Pollutant Discharge Elimination System (NDPDES) by the NDDoH. The City's MS4 system includes open and closed drainage systems that:

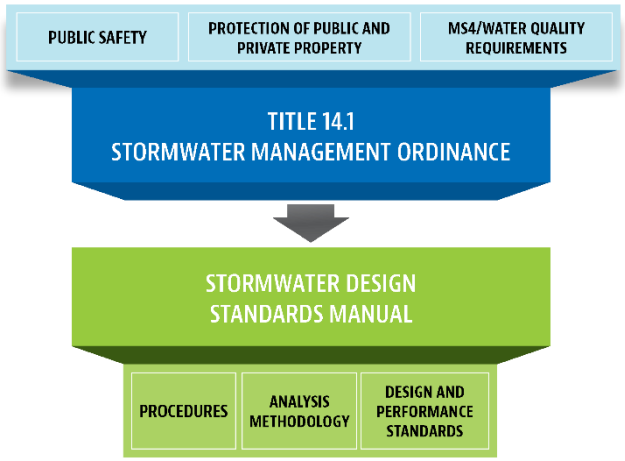

Figure 2-1 – *Stormwater Program Overview*

1. Are owned or operated by the City and are designed to collect and convey stormwater; and
2. Discharge, either directly or indirectly, to an MS4 owned or operated by another public body or to other receiving waters.

The MS4 General Permit requires that the City adopt by ordinance requirements that all new development and redevelopment activities provide post-construction stormwater quality BMPs.

To meet these goals and requirements, the City has adopted and enforced Title 14.1 of the City Code of Ordinances (Stormwater Management), which sets forth uniform requirements for the stormwater management systems within the City and its extraterritorial jurisdiction. Refer to ***Section 1.3*** for additional information on use of the SWDSM in the extraterritorial areas.

2.2 MANDATORY STORMWATER MANAGEMENT PERMITS

To demonstrate compliance with the requirements of the MS4 General Permit and Title 14.1 of the City Code of Ordinances, all development activities are required to:

1. Obtain the necessary mandatory stormwater permits;
2. Provide an acceptable method of mitigating increased stormwater flows from new impervious surfaces;
3. Provide an acceptable method of mitigating stormwater quality impacts from development and redevelopment activities;
4. Safely and efficiently convey stormwater flows to the City's Public Storm Sewer System; and
5. Provide management of stormwater runoff during construction disturbance activities.

Title 14.1 of the City Code of Ordinances requires mandatory stormwater permits for development inside of the City's zoning jurisdiction. These permits consist of a Construction Stormwater

Management Permit (CSMP) and Post-Construction Stormwater Management Permit (PCSMP) and are further detailed in ***Section 3.0***. This SWDSM is a refinement of the requirements of Title 14.1 of the City Code of Ordinances and provides detailed procedures, performance requirements, design standards and analysis methodologies for the application and approval of mandatory stormwater permits.

2.3 CONFORMANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS

The purpose of this SWDSM is to provide requirements for the application for, and approval of, mandatory stormwater permits for developments within the City of Bismarck's zoning jurisdiction. Approval of a City CSMP or PCSMP does not constitute project approval for all required local, State and Federal regulations and permits.

It is the responsibility of the Owner, or Applicant, to obtain all necessary approvals from local, State and Federal agencies for the proposed project. Agencies that may require consultation include, but are not limited to, other City of Bismarck departments (i.e. flood plain development) Burleigh County, Burleigh County Water Resource District, NDDOT, State Water Commission, NDDoH, USACE, FEMA and the EPA.

2.4 REFERENCES

Reference 2-1 – *City of Bismarck Title 14.1 of the City Code of Ordinances*
Reference 2-2 – *North Dakota MS4 General Permit*

3.0 SUBMITTAL AND REVIEW PROCEDURES

The goal of this section is to provide a framework for uniformity in permit and plan preparation. Such uniformity will promote predictability within the City and development community and help secure prompt review and approval of mandatory stormwater management permits. Properly drafted submittals will also facilitate the operation and maintenance of the proposed system long after its review and approval. Approval of mandatory stormwater permits by the City does not relieve applicants from the responsibility of ensuring system performance, safety, and compliance with other local, State, and Federal regulations.

The City will conduct a limited review of the CSMP and PCSMP application materials for compliance with requirements set forth in this SWDSM. Content and scope of the CSMP and PCSMP application materials will vary based upon development type, location, and site characteristics. The Applicant acknowledges the following:

1. The Applicant is exclusively responsible for certifying that the design, construction drawings, completed construction, and record drawings comply with acceptable engineering practices, State requirements, and this SWDSM.
2. The City's issuance of a CSMP or PCSMP is not an endorsement of the application materials (including the SWMP and SWPPP) nor is it approval or verification of the engineering data and plans.
3. Neither the Applicant nor any third party may rely upon the City's limited review or approval.
4. The Applicant and Design Engineer are responsible for rectifying any errors or omission discovered in plans utilized in the approval of CSMP or PCSMP applications.

Submittal requirements for the City's mandatory stormwater management permits are provided below. See ***Figure 3-1*** for a graphic representation of the City's mandatory stormwater permit process.

3.1 STORMWATER PERMIT APPLICABILITY REQUIREMENTS

3.1.1 CSMP APPLICABILITY REQUIREMENTS

Implementation of appropriate BMPs during construction helps to reduce pollutants in stormwater runoff from construction activities. A CSMP is required in order to facilitate the implementation of appropriate BMPs and protect water quality during development and redevelopment construction activities. Submittal and review requirements for a CSMP are dependent on the size and scope of the project.

Small Site CSMP

A Small Site CSMP is required for activities constructed after January 1, 2018 that meet one or more of the following criteria:

1. Land disturbance greater than or equal to 3,000 square feet and less than 10,000 square feet, occurring on land with slopes of less than 12 percent; or

2. Construction of a one- or two-family residential home if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

Large Site CSMP

A Large Site CSMP is required for activities constructed after January 1, 2018, except for the construction of a one- or two-family residential home, that meet one or more of the following criteria:

1. Land disturbance greater than or equal to 10,000 square feet;
2. Construction activity disturbing any amount of land, except for the construction of one- and two-family residential homes, if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more;
3. Land disturbance greater than or equal to 3,000 square feet **and** disturbance of any size occurring on land with slopes of 12-percent or more;
4. Land disturbance activities that involves the excavation or filling in excess of 400 cubic yards of material regardless of surface area;
5. Land disturbing activity that disturbs more than 200 feet of road ditch, grassed waterway, or other land area where surface drainage flows in a defined open channel. This includes the replacement, repair, or removal of any underground pipe, utility, or other facility within the cross-section of the channel, regardless of surface area;
6. Land disturbing activity as a result of any new public or private road(s) or access drive(s) longer than 150 feet, regardless of surface area;
7. When discharges from a construction site violate illicit discharge requirements documented in Title 14.1 of the City Code of Ordinances of the City Code of Ordinances, regardless of surface area; or
8. Any other activity, including the construction of a one- or two-family residential home, that the City Engineer determines to have a high risk of soil erosion or water pollution, or that may significantly impact an open waterway, stream, or wetland area.

City Contracted Projects

Projects contracted by the City of Bismarck shall meet the submittal and approval requirements of a Large Site CSMP.

NDDoH Construction General Permit

All projects that result in land disturbance activity that meets the minimum threshold outlined in the North Dakota Department of Health Construction General Permit are required to obtain a CSMP from the City and coverage from the North Dakota Department of Health under the Construction General Permit.

Exclusions

The following activities are excluded from obtaining a mandatory CSMP:

1. Plowing or tilling for agricultural purposes;
2. Emergency activity that is immediately necessary for the protection of life, property, or natural resources;

3. Construction of a one- or two-family dwelling within the City's extraterritorial area, with the understanding that erosion control measures are implemented on-site during construction by the builder;
4. Construction of any project in the City's extraterritorial area, other than a one- or two-family dwelling, that does not contribute to the City's MS4, with the understanding that erosion control measures are implemented on-site during construction by the builder; or
5. Other construction activities that are determined by the City Engineer to not have potential for adverse impact on stormwater quality.

3.1.2 PCSMP APPLICABILITY CRITERIA

A Post-Construction Stormwater Management Permit addresses the long-term, or permanent, function of drainage facilities for development and redevelopment projects. Factors which must be considered include functionality and maintenance, mitigation of increased runoff, clearly identified runoff conveyance routes, and water quality treatment. The PCSMP application is intended to deal with these considerations and will be used to evaluate a proposed new development or redevelopment project for compliance with the stormwater management requirements of this SWDSM and Title 14.1 of the City Code of Ordinances.

Development Activities

A PCSMP is required for activities in areas within either the corporate limits or the extraterritorial area that meet one or more of the following criteria:

1. Development projects resulting in a cumulative addition of 20,000 square feet or more of impervious surface;
2. Any development project that results in construction activity disturbing any amount of land if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more;
3. Land disturbing activity that involves excavating and/or filling in excess of 400 cubic yards of material, regardless of surface area;
4. Any development activity that requires approval of a subdivision under Title 14 of the City Code of Ordinances or any development project that requires approval of a site plan; or
5. Any other activity that the City Engineer determines to have a high risk for water quality or quantity impacts to the public storm sewer system or adjoining property.

City Contracted Projects

Projects commissioned by the City of Bismarck shall meet the submittal and approval requirements for PCSMP as described in this SWDSM. The application fee will be waived for City contracted projects.

Exclusions

A PCSMP will not be required for maintenance work within the public right-of-way. Exclusions from these stormwater permitting requirements do not relieve the development of other required permits and submittals. Common activities which this includes are:

1. Potholing, overlaying, and chip sealing;
2. Replacement of existing utilities and utility patching;
3. Resurfacing of an existing parking lot, including reconstruction of base rock, if resurfaced grades of the parking lot have not altered drainage patterns; and
4. City of Bismarck maintenance projects.

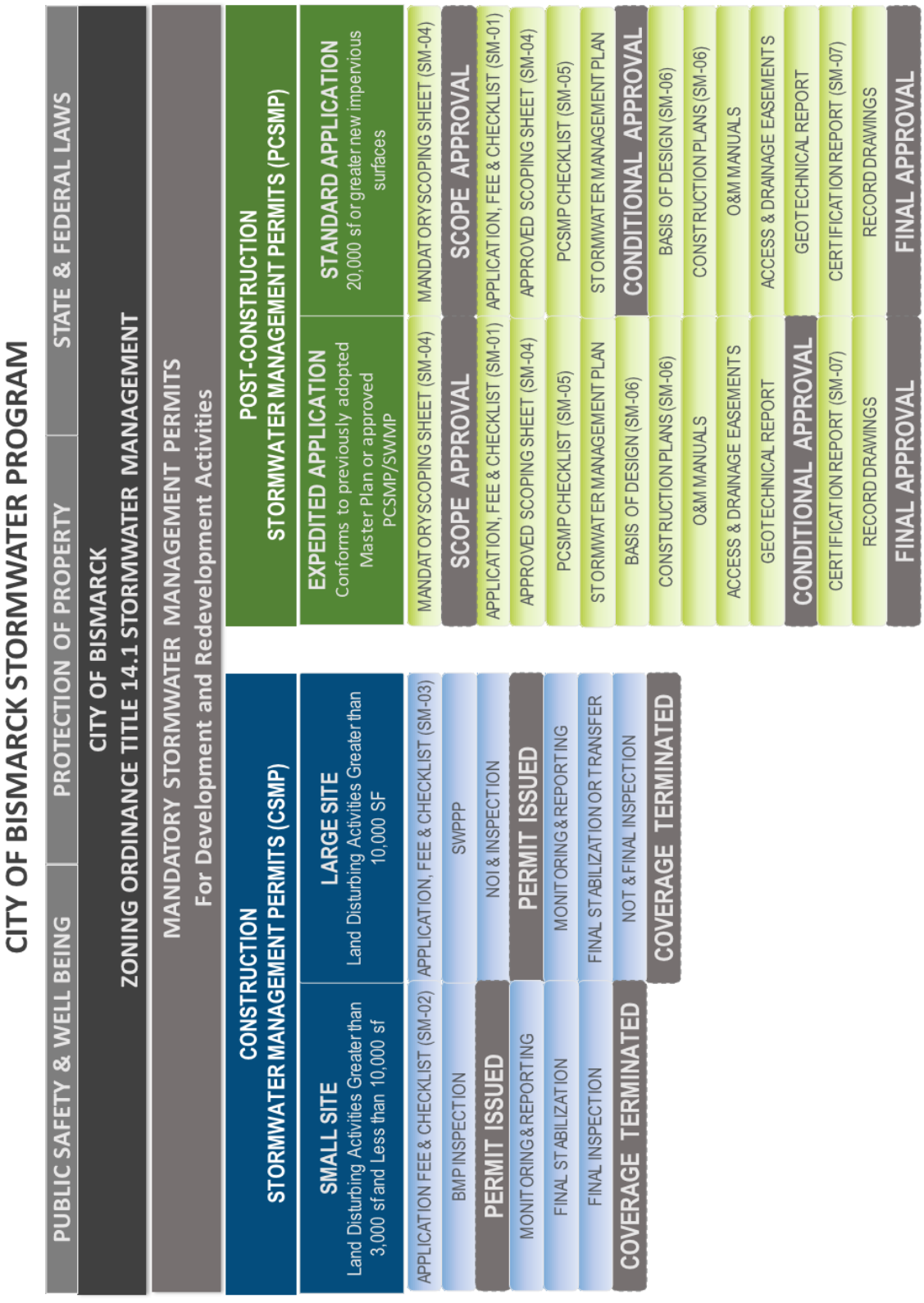

Figure 3-1 – *Mandatory Stormwater Permits*

3.2 SMALL SITE CSMP SUBMITTAL AND REVIEW PROCEDURES

The Small Site CSMP shall be issued concurrent with the building permit for one- and two-family construction or any other project that meets the thresholds described above.

3.2.1 SMALL SITE CSMP SUBMITTAL REQUIREMENTS

The Small Site CSMP application (SM-02) consists of completing the current application checklist and implementing the applicable temporary construction stormwater management BMPs.

3.2.2 SMALL SITE CSMP REVIEW AND APPROVAL PROCEDURES

The Small Site CSMP application review is completed concurrent with the building permit for one and two-family construction or any other project that meets the thresholds described above.

3.2.3 SMALL SITE CSMP REQUIREMENTS FOLLOWING APPROVAL

Coverage Termination

The process to terminate coverage under the Small Site CSMP may begin when the site has achieved final stabilization as defined in ***Section 7.1.4*** of this SWDSM.

When the permittee believes the above conditions have been met, submit a NOT form (available from the office of the City Engineer). When the City Engineer agrees that the Small Site CSMP coverage termination conditions have been achieved, the permittee will be notified that the authorization has been terminated.

Coverage Transfer

Small Site CSMP cannot be transferred to the homeowner or occupant.

3.3 LARGE SITE CSMP SUBMITTAL AND REVIEW PROCEDURES

The Large Site CSMP application shall be submitted at the time construction drawings are submitted for review, or if review of construction drawings is not required, the Large Site CSMP application shall be submitted a minimum of 30 days prior to commencement of construction.

3.3.1 LARGE SITE CSMP SUBMITTAL REQUIREMENTS

The following sections provide a general description of the materials required for a Large Site CSMP application, which include:

1. Stormwater Management Permit Application Form & Fee (SM-01);
2. Large Site CSMP Permit Application Checklist (SM-03);
3. Construction Stormwater Pollution Prevention Plan (SWPPP); and
4. Construction Stormwater Management Site Plan meeting the requirements of the ND Construction General Permit.

The submittal package shall be prepared and sealed by a Professional Engineer registered in the State of North Dakota, or other qualified individual who is knowledgeable of construction stormwater management practices and procedures, as deemed acceptable by the City Engineer.

Stormwater Management Permit Application

Complete the Stormwater Management Permit Application (SM-01) that is available from the office of the City Engineer. Submit the applicable permit fee with the completed application. The Stormwater Permit Application must be signed by the landowner or include a notarized statement signed by the landowner authorizing the Applicant to act as the landowner's agent and bind the landowner to the terms of the Title 14.1 of the City Code of Ordinances and the Large Site CSMP conditions.

Large Site Construction Stormwater Management Permit Checklist

The Large Site Construction Stormwater Management Permit Checklist (SM-03) shall be completed and submitted with the permit application. The current checklist is available from the office of the City Engineer.

Respond to every item on the checklist by indicating that the item has been addressed in the application and note the page number where the item can be located. In the event that specific items are not applicable to the application, indicate in the comments section why the item is not required.

Construction Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP which addresses erosion and sediment controls, soil stabilization, dewatering, pollution prevention measures, prohibited discharges, and surface water discharges shall be submitted with the CSMP application. The SWPPP requirements are provided within the CSMP checklist. If the NDDoH SWPPP forms are used as templates, only the applicable sections identified in the City's CSMP checklist requirements are required to be addressed.

All projects that result in land disturbance greater than or equal to one-acre are required to obtain a CSMP from the City and coverage from the NDDoH under the Construction General Permit. Projects that require an NDDoH Construction General Permit shall submit a SWPPP which meets the requirements presented within this SWDSM and requirements of the NDDoH Construction General Permit along with a completed Notice of Intent (NOI).

Construction Stormwater Management Site Plan

A map of the construction site showing the locations of the construction stormwater management BMPs, the implementation schedule, and a description of illicit discharge controls shall be submitted with the Large Site CSMP application. The required content is shown in the Large Site CSMP checklist. The site plan format shall be consistent with the following:

1. The page size shall not exceed 24" by 36";
2. When multiple sheets are necessary, a cover sheet with an index shall be included;
3. The plan shall be legible and show all of the required information; and
4. The plan shall be prepared at an appropriate scale to show the required information. For sites smaller than one acre, a scale of 1" = 20' is generally appropriate and for projects larger than one acre, a scale of 1" = 50' is generally appropriate.

Plan sheets are preferred to be 11" by 17" in size and should match the construction plan sheet sizes not to exceed 24" by 36".

Design Waivers or Deviations (if Applicable)

A description, justification, and copy of design waivers or deviations that are requested and have been granted for the Project shall be submitted with the Large Site CSMP application.

3.3.2 LARGE SITE CSMP REVIEW AND APPROVAL PROCEDURES

Review of a Large Site CSMP is a two-step process:

1. Perform a completeness review to verify that all necessary materials have been submitted to allow a comprehensive review; and
2. Perform a comprehensive review of the submitted materials to determine compliance with the requirements of this SWDSM and Title 14.1 of the City Code of Ordinances.

Completeness Review

Only complete submittals will be reviewed by the City. Within seven (7) days of receiving the submittal, the City Engineer will review the application package and determine if the required materials have been submitted and the application is sufficient for review. The Applicant will be informed that the application materials constitute a complete submittal and the application is being reviewed for approval. Determination of a complete application does not guarantee approval of the application.

In the event that the application does not contain the materials required for review, the Applicant will be informed, in writing (electronic or otherwise), of the deficiencies that need to be addressed.

Approval Review

Within 21 days of the application being deemed complete, the City Engineer will approve the application or provide the Applicant with a list of deficiencies to be addressed by a revised application submittal. Following an approval decision, the City Engineer will mail the Applicant the original (signed) copy of the permit.

In the event that a list of deficiencies is provided to the Applicant, the Applicant shall submit a revised application package within 30 days. The revised application shall include a summary letter or memo indicating how each deficiency noted in the original application has been revised and remedied in the revised application package.

Land disturbance activities shall not begin until an approved CSMP and PCSMP, if applicable, has been obtained.

Re-Application Criteria

A new application, including fees, shall be required if either of the following conditions is met:

1. A revised application package is not submitted within 60 days of the Applicant being notified of deficiencies; or
2. The revised application package does not address all deficiencies noted in the review.

3.3.3 LARGE SITE CSMP REQUIREMENTS FOLLOWING PERMIT APPROVAL

Large Site CSMP Coverage Transfer

When the owner of the property covered by a Large Site CSMP project changes, the original permittee must submit a written request for permit transfer/modification to the City Engineer within 14 days of the legal transfer, sale, or closing on the property. Late submittals will not be rejected; however, the City reserves the right to use enforcement for any unpermitted discharges or permit noncompliance. For stormwater discharges from construction activities where the owner or operator changes, the new owner or operator can implement the original SWPPP created for the project or develop and implement their own SWPPP. Permittee(s) shall ensure either directly, or through coordination with other operators, that their SWPPP meets all terms and conditions of the Large Site CSMP and that their activities do not interfere with another party's erosion and sediment control practices.

A permit transfer/modification request is not required for the legal transfer, sale or closing on a property between permittees covered by a separate CSMP. Examples include the sale of a property parcel from a developer to a builder, or the transfer of an easement from a developer to a local government authority. If the new party is not covered by a CSMP at the time of transfer or sale, then the new owner/operator must submit a CSMP application within 14 days of assuming control of the site.

Large Site CSMP Coverage Termination

The process to terminate coverage under the Large Site CSMP may begin once all of the following has been achieved:

1. The site has achieved final stabilization as defined in ***Section 7.1.4*** of this SWDSM;
2. Temporary stormwater conveyances/channels and other temporary stormwater control measures and/or BMPs have been removed;
3. Construction equipment and vehicles have been removed; and
4. Cessation of any potential pollutant-generating activities caused by construction activity.

When the permittee believes the above conditions have been met, submit a completed NOT form, available from the office of the City Engineer. When the City Engineer is in agreement that the Large Site CSMP coverage termination conditions have been achieved, the permittee will be notified that the authorization is terminated.

For residential construction activities that are part of a larger common plan of development or sale (subdivision plat), a NOT is not required for each lot that is sold, transferred, or has achieved final stabilization. The permittee must modify the approved SWPPP to indicate that permit coverage is no longer required for that lot. The SWPPP shall indicate the reason why coverage is no longer needed and the date the lot was sold, transferred, or achieved final stabilization. In order to terminate coverage of the Large Site CSMP, all lots under the control of the owner, developer, or operator must be sold, transferred, or achieve final stabilization.

3.4 PCSMP SUBMITTAL AND REVIEW PROCEDURES

PCSMP submittal, review and approval is a multi-step process that is intended to present the relevant information and the applicable time allow for efficient review and approval of plat, site plan and other development and redevelopment projects. Refer to ***Figure 3-2*** for a flow chart depicting the PCSMP submittal and review procedures. All PCSMP applications and approvals will consist of:

1. Mandatory Stormwater Scoping Sheet;
2. Application, Review and Conditional Approval;
3. Review and Implementation of the Post-Construction BMPs;
4. Certification of the Post-Construction BMPs; and
5. PCSMP Completion.

Note, PCSMP submittals that meet the requirements of ***Section 3.4.5*** may be eligible for an expedited review process. Refer to ***Section 3.4.5*** and ***Figure 3-3*** for a description and applicability requirements for an Expedited PCSMP application and review process.

3.4.1 MANDATORY STORMWATER SCOPING SHEET (SM-04)

A mandatory Stormwater Scoping Sheet is required for all development applications (site plans and plats) and must be completed prior to submitting an application for a PCSMP. This document will define or identify the following for the City and Applicant:

1. Applicable Watershed or Master Plan Criteria;
2. Site Specific Analysis Requirements;
3. Known Areas of Deficiencies in the Public Storm Sewer System;
4. Point(s) of Analysis for the SWMP; and
5. Any other pertinent information that would assist in the preparation of the permit application package, as well as the submittal review and approval processes.

PCSMP applications will be required to include the approved Mandatory Stormwater Scoping Sheet in the application package. The process for using the Mandatory Stormwater Scoping Sheet is as follows:

1. Obtain the scoping sheet from the office of the City Engineer;
2. Fill out the project information;
3. Submit the scoping sheet and any applicable attachments to the City Engineer;
4. The City Engineer will return the completed scoping sheet indicating the minimum requirements for a complete PCSMP application as well as the SWMP analysis requirements;
5. Include the completed scoping sheet with the future PCSMP submittal package; and
6. Projects in the ETA will require that the City and County approve the Mandatory Scoping Sheet.

3.4.2 PCSMP APPLICATION MATERIALS FOR CONDITIONAL APPROVAL

The PCSMP application shall be submitted at the time plat or site plan applications are submitted for review; or, if the project does not require plat or site plan approval, the PCSMP application shall be submitted a minimum of 30 days prior to commencement of construction.

The following materials are required for a complete PCSMP application package to allow for review and conditional approval:

1. Stormwater Management Permit Application Form (SM-01) & Fee;
2. Approved Mandatory Stormwater Scoping Sheet (SM-04);
3. PCSMP Permit Application Checklist (SM-05);
4. Stormwater Management Plan (SWMP); and
5. Stormwater Management Plan Exhibits (Maps and Figures).

The following sections provide a general description of the materials required for the initial PCSMP application. All submitted materials shall be prepared and sealed by a registered Professional Engineer or other qualified individual as deemed acceptable by the City Engineer.

Stormwater Management Permit Application (SM-01)

Complete the Stormwater Management Permit Application (SM-01) that is available from the office of the City Engineer. Submit the applicable permit fee with the completed application. The Stormwater Permit Application must be signed by the landowner or include a notarized statement signed by the landowner authorizing the Applicant to act as the landowner's agent and bind the landowner to the terms of Title 14.1 of the City Code of Ordinances and the PCSMP conditions.

Post-Construction Stormwater Management Permit Checklist (SM-05)

The Post-Construction Stormwater Management Permit Checklist shall be completed and submitted with the permit application. The current checklist is available from the office of the City Engineer.

Respond to every item on the checklist by indicating that the item has been addressed in the application and note the page number where the item can be located. In the event that specific items are not applicable, indicate in the comments section why the item is not required.

Stormwater Management Plan (SWMP)

The purpose of the SWMP is twofold:

1. To provide a narrative and analysis describing how the proposed project will meet the post-construction stormwater quantity and quality requirements of this SWDSM and Title 14.1 of the City Code of Ordinances; and
2. To provide documentation of the analysis and assumptions used in sufficient detail so the results can be duplicated.

The SWMP shall be prepared using the mandatory outline and include the required exhibits detailed on the PCSMP checklist available from the office of the City Engineer. In general, the SWMP will need to include:

1. Site & Applicant Information;
2. Recommendations for the Project Area;
3. Project Stormwater Management Summary;
4. Hydrologic Analysis Summary;
5. Post-Construction Stormwater BMP Summary;
6. Construction Schedule and Phasing;
7. Engineer's Statement of Compliance and Seal; and
8. Attachments & Additional Information.

Design Waivers or Deviations (If Applicable)

A description, justification, and copy of design waivers or deviations that are requested and have been granted for the project shall be submitted with the PCSMP application.

3.4.3 PCSMP APPLICATION MATERIALS AFTER CONDITIONAL APPROVAL

PCSMP conditional approval can be granted requiring future submittals in compliance with the requirements of this SWDSM and Title 14.1 of the City Code of Ordinances. The following materials can be submitted by the Applicant with the initial PCSMP application package; however, doing so may require additional revisions by the Applicant. Additional submittal material requested after conditional approval may include:

1. Construction Plans and Basis of Design Report (SM-06);
2. Operation and Maintenance Manuals;
3. Access and Drainage Easements (if required); and
4. Geotechnical or Hydrogeological Reports (if required).

Construction Plans and Specifications for Private Facilities within the Corporate Limits

Construction Plans and Specifications for Private Facilities within the Corporate Limits shall be submitted to the City for review and approval. Submittal of the construction plans shall utilize the PCSMP Construction Plan Submittal Checklist available from the office of the City Engineer. The construction plans and specifications prepared for the construction of private stormwater management facilities within the corporate limits or on land that will be annexed prior to development must:

1. Include a Basis of Design Report demonstrating consistency with the approved SWMP;
2. Be sealed and signed by a Professional Engineer registered in the State of North Dakota;
3. Be submitted to the City Engineer for approval; and
4. Be submitted concurrently for the approval of a Large Site CSMP.

No construction may commence until the construction plans and specifications have been approved by the City Engineer and all other applicable permits and approvals are received from outside agencies.

Construction Plans and Specifications for Facilities within the Extraterritorial Area

Construction of post-construction facilities within the City's extraterritorial jurisdiction requires coordination and approval by the Burleigh County Engineer. The performance requirements and design standards outlined in ***Sections 4.0 - 7.0*** will be modified as noted on the Mandatory Stormwater Scoping Sheet.

Construction Plans and Specifications for Public Facilities

Construction Plans and Specifications for Public Facilities within the Corporate Limits shall be submitted to the City for review and approval. Submittals of the construction plans shall utilize the PCSMP Construction Plan Submittal Checklist available from the office of the City Engineer. The construction plans and specifications prepared for the construction of public stormwater management facilities within the corporate limits or on land that will be annexed prior to development must:

1. Include a Basis of Design Report demonstrating consistency with the approved SWMP;
2. Be in conformance with the requirements of the City Standard Specifications, current special provisions, and any other necessary permits issued by other governmental agencies;
3. Be prepared and sealed by a Professional Engineer registered in the State of North Dakota; and
4. Be submitted concurrently for the approval of a Large Site CSMP.

No construction may commence until the construction plans and specification have been approved by the City Engineer and all other applicable permits and approvals are received from outside agencies.

Operations and Maintenance Manual

An Operation and Maintenance (O&M) Manual shall be included for each post-construction stormwater management control. The O&M Manual shall identify specific maintenance techniques and schedules for each type of system used on the project. At a minimum, the O&M Manual shall include the following:

1. The post-construction stormwater management control owner;
2. The party responsible for long-term O&M as well as their contact information;
3. An inspection checklist to be used for routine inspections;
4. A schedule of inspection and maintenance for routine and non-routine inspections and maintenance tasks to be conducted;
5. System performance criteria; and
6. A copy of the recorded Operation and Maintenance Agreement with the City.

The permittee shall provide copies of the approved O&M Manual to the parties responsible for O&M of each post-construction stormwater control. In addition, the responsible party must also provide the City with access to the facility for inspections and review during construction.

For above ground infiltration facilities (e.g., swales, basins) the O&M Manual shall identify maximum allowable trapped sediment depth as well as methods for testing and disposing of accumulated sediments.

Access and Drainage Easements

The SWMP and O&M Manual shall include provisions to allow access to post-construction BMPs to allow for continued operations and ongoing maintenance of the facilities. As a condition of approval of the PCSMP, the City Engineer can require that an easement be recorded to allow for continued access to post-construction BMPs, cross parcel drainage easements, and other elements that are deemed necessary.

All easements not otherwise included on a plat shall be prepared by a Professional Land Surveyor and recorded against the property at the Burleigh County Recorder's office. A copy of all recorded easements, including the document number, shall be submitted to the City Engineer for inclusion in the PCSMP files and incorporated into the O&M Manual.

Geotechnical and/or Hydrogeological Reports

The permittee shall provide a detailed geotechnical and/or hydrogeological report for all projects proposing the use of stormwater infiltration BMPs as a method of mitigating the stormwater quantity or quality impacts due to development or redevelopment activities.

The purpose of the Geotechnical/Hydrogeology Report is to provide sufficient information demonstrating an understanding of the underlying soils and critical hydrogeological properties that will govern the overall performance, maintenance requirements, and potential impacts to adjacent property or facilities from the use of infiltration BMPs.

3.4.4 PCSMP REVIEW AND APPROVAL PROCEDURES

Mandatory Stormwater Scoping Sheet (SM-04)

SITE PLAN APPLICATION

An application for a Mandatory Stormwater Scoping Sheet shall be submitted prior to the Site Plan application and required PCSMP application.

Within seven (7) days of submittal, the approved Mandatory Stormwater Scoping Sheet will be returned to the Applicant. The completed and approved Mandatory Stormwater Scoping Sheet must be attached to the application for a Site Plan and PCSMP.

PLAT APPLICATION

An application for a Mandatory Stormwater Scoping Sheet shall be submitted seven (7) days prior to the required subdivision pre-application meeting. The approved Mandatory Stormwater Scoping Sheet will be returned to the Applicant at the pre-submittal meeting.

OTHER PROJECTS REQUIRING PCSMP

An application for a Mandatory Stormwater Scoping Sheet shall be submitted and approved prior to application for a PCSMP for projects that do not require Site Plan or Plat approval.

Within seven (7) days of submittal, the approved Mandatory Stormwater Scoping Sheet will be returned to the Applicant.

PCSMP Conditional Approval Materials

Review of the PCSMP application is a two-step process:

1. Perform a completeness review to determine that all necessary materials have been submitted to allow a comprehensive review; and
2. Perform a limited review of the submitted materials to determine compliance with the requirements of this SWDSM, Title 14.1 of the City Code of Ordinances and applicable State and Federal Law.

Completeness Review

Only complete submittals will be reviewed by the City. Within seven (7) days of receiving the submittal, the City Engineer will review the application package and determine if the required materials have been submitted and the application is sufficient for review. The Applicant will be informed that the application materials constitute a complete submittal and the application is being reviewed for approval. Determination of a complete application does not guarantee approval of the application.

In the event that the application does not contain the required materials for review, the Applicant will be informed, in writing, of the deficiencies that need to be addressed.

Approval Review

Within 21 days of the application being deemed complete, the City Engineer will approve the application or provide the Applicant with a list of deficiencies to be addressed by a revised application submittal. Following an approval decision, the City Engineer will mail the Applicant the original (signed) copy of the conditional permit. Conditions of final approval will be summarized in the approval letter.

In the event that a list of deficiencies is provided to the Applicant, the Applicant shall submit a revised application package within 60 days. The revised application shall include a summary letter or memo indicating how each deficiency noted in the original application has been revised and remedied in the revised application package.

Land disturbance activities shall not begin until an approved CSMP and the applicable conditions of PCSMP have been met.

Re-Application Criteria

A new application, including fees, shall be required if either of the following conditions is met:

1. A revised application package is not submitted within 30 days of the Applicant being notified of deficiencies; or
2. The revised application package does not address all deficiencies noted in the review.

Materials Submitted After PCSMP Conditional Approval

Construction Plans, Geotechnical Reports, Operations & Maintenance Plans, and easement documents are required to be submitted to the City Engineer for review and approval. Submittals shall utilize the applicable checklist available from the office of the City Engineer. There are no review fees for submittals or resubmittals.

APPROVAL REVIEW

Within 21 days of the additional materials being submitted, the City Engineer will approve the materials or provide the Applicant with a list of deficiencies to be addressed by a revised application submittal. Following an approval decision, the City Engineer will mail the Applicant the original (signed) copy of the final permit. Conditions of approval and the items necessary for closure of the permit will be summarized in the approval letter.

In the event that deficiencies are provided to the Applicant, within 60 days of being notified in writing of the deficiencies, the Applicant shall submit revised materials, including an updated checklist.

RE-SUBMITTAL CRITERIA

Resubmitted materials shall include:

1. A revised submittal package including an updated checklist; and
2. A letter or memo describing how and where each of the deficiencies noted has been address by the revised submittal.

3.4.5 EXPEDITED PCSMP APPLICATION AND REVIEW

PCSMP applications for projects that are contained in an area with a Watershed Master Plan or previously approved SWMP with specific requirements for future development may be eligible to complete the PCSMP permitting via an expedited process. An example of a project eligible for the expedited process would be a Site Plan application inside of a development that had a PCSMP issued during platting. The Expedited PCSMP submittal material requirements are noted on the PCSMP checklist. See ***Figure 3-3*** for a graphical representation of the Expedited PCSMP submittal and review process.

3.4.6 PCSMP REQUIREMENTS FOLLOWING PERMIT APPROVAL

This section includes the requirement to modify a PCSMP after conditional approval and how to obtain final approval.

PCSMP Modifications or Changes

If the permittee wishes to make changes or revisions to the originally approved PCSMP, the proposed revisions should be submitted to and approved by the City prior to construction of changes. If changes are made after construction has commenced, work may be suspended until revisions are approved. Resubmittals shall include the following:

1. Revised checklist(s) identifying which portions of the project have been modified;
2. Brief narrative description of the change and the purpose/reason for the change;

3. Substitute pages of the originally approved materials that include the proposed changes;
4. Revised drawings showing all changes; and
5. Other supporting information that explains and supports the reason for the change.

The revisions shall be submitted to the City Engineer, who, within 30 days, will issue a revised conditional approval letter or a justification for rejecting the proposed modification(s).

PCSMP Completion

Completion of the PCSMP consists of meeting all of the conditions of approval, installation of all required post-construction BMPs and submitting a Certification Report to the City Engineer for review and approval. During the review and approval of the Certification Report, the City Engineer will make a final inspection of the site to confirm improvements have been completed consistent with the approved SWMP.

CERTIFICATION REPORT (SM-07)

The purpose of the Certification Report is to provide documentation that the installed post-construction BMP will function as described in the approved SWMP. The Certification Report shall be prepared using the mandatory outline and include the required information as detailed in the Certification Report Checklist (SM-06) available from the office of the City Engineer. In general, the Certification Report shall include:

1. A narrative, and, if necessary, revised analysis summarizing the performance of the implemented post-construction BMPs;
2. A statement that the implemented post-construction BMPs are functioning as intended by the SWMP or not functioning as intended;
3. Results of all required construction quality assurance testing; and
4. Record Drawings of conveyance systems or flow control facilities discharging to the City's Public Storm Water System.

If the project included construction of post-construction peak flow mitigation, water quality, and/or drainage and conveyance BMPs, the Applicant shall submit a final corrected plan (Record Drawings) to the City within 45 days of substantial completion. The City requires Record Drawings to be in hard copy and PDF format. The formatting of engineering drawings shall be consistent with the following:

1. The page size shall not exceed 24" by 36";
2. Where multiple sheets are necessary, a cover sheet with an index shall be included;
3. The plan shall be legible and show all of the required information; and
4. The plan shall be prepared at an appropriate scale to show the required information. For sites smaller than one acre, a scale of 1" = 20' is generally appropriate and for projects larger than one acre, a scale of 1" = 50' is generally appropriate.

   Plan sheets are preferred to be 11" by 17" in size and should match the construction plan sheet sizes not to exceed 24" by 36".

The Certification Report shall be prepared and sealed by a registered professional engineer or other qualified individual as deemed acceptable by the City Engineer.

FINAL INSPECTION

After submittal of the Certification Report the City Engineer will schedule a final inspection of the site with the permittee to review the installed post-construction stormwater BMPs.

FAILURE TO COMPLETE PCSMP

Failure to comply with the conditions of the PCSMP may result in enforcement activities by the City as described in Title 14.1 of the City Code of Ordinances.

3.5 REFERENCES (FOUND IN APPENDIX 3)

Reference 3-1 – Stormwater Management Permit Application(SM-01)
Reference 3-2 – Small Site CSMP Application Checklist (SM-02)
Reference 3-3 – Large Site CSMP Application Checklist (SM-03)
Reference 3-4 – Mandatory Stormwater Scoping Sheet (SM-04)
Reference 3-5 – PCSMP Application Checklist (SM-05)
Reference 3-6 – Basis of Design & Construction Plan Submittal Checklist (SM-06)
Reference 3-7 – Certification Report Submittal Checklist (SM-07)
Reference 3-8 – Stormwater Management Plan Template (SM-08)

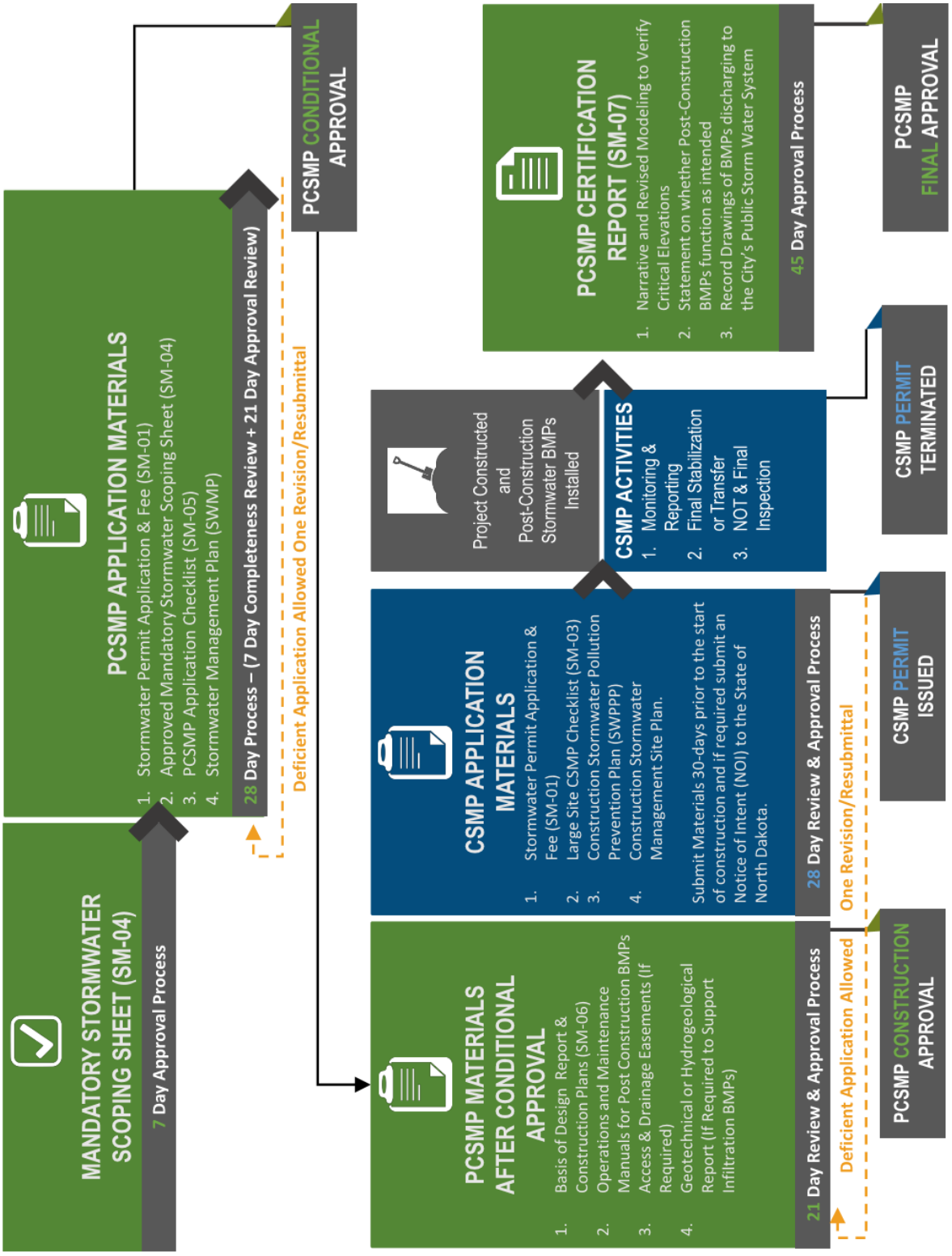

Figure 3-2 – *Standard PCSMP Application & Review Process*

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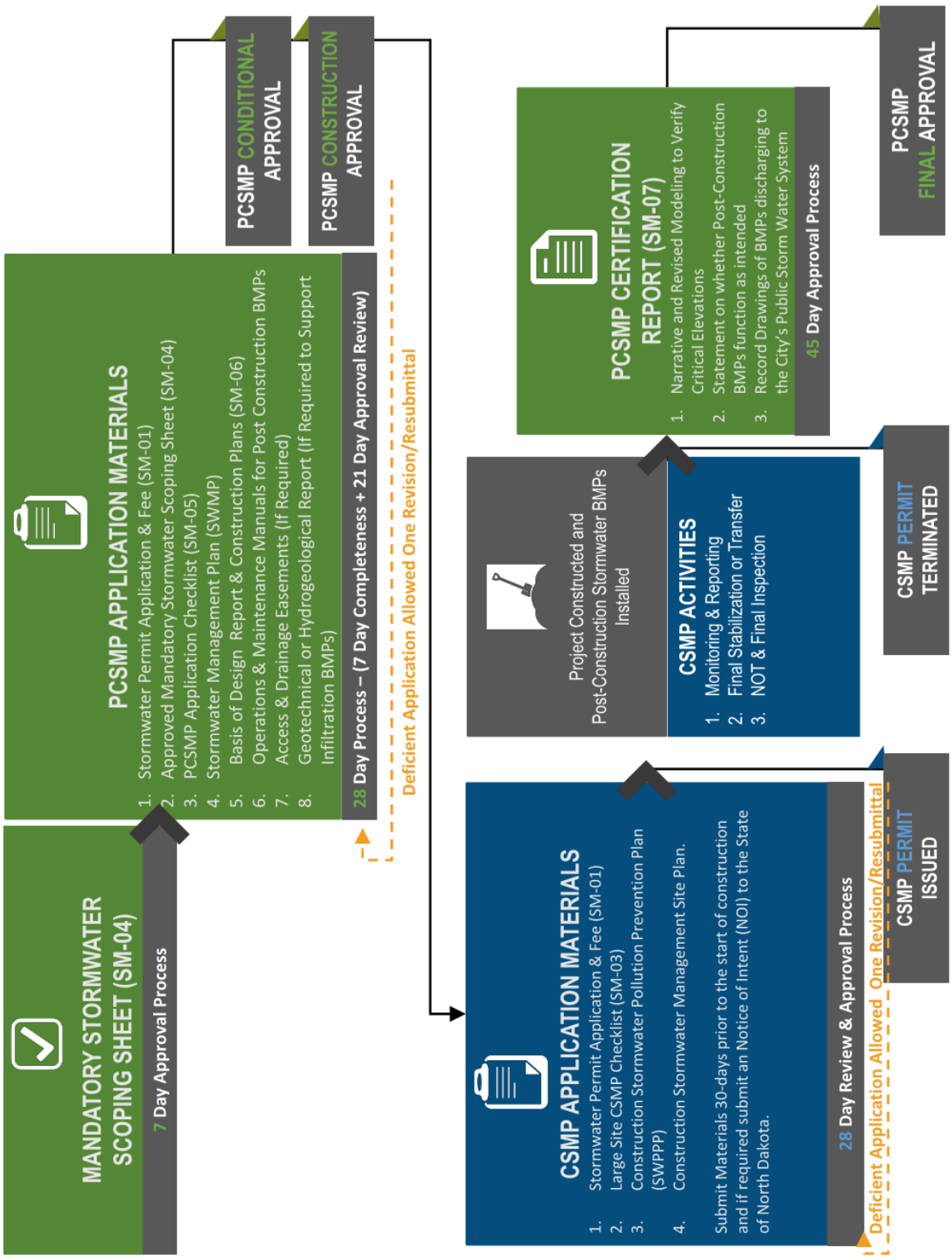

Figure 3-3 – *Expedited PCSMP Application & Review Process*

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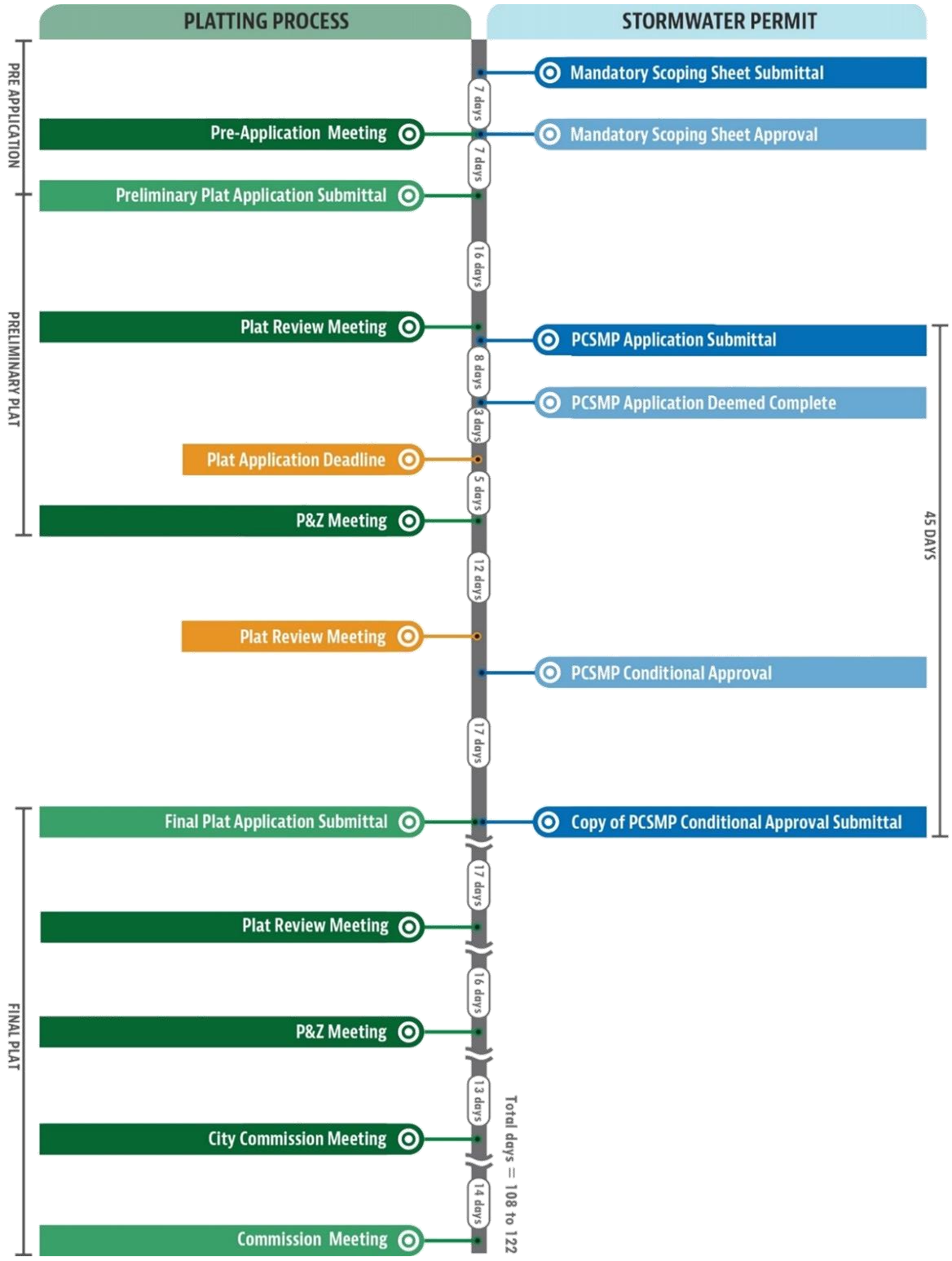

Figure 3-4 – *Plat & PCSMP Application & Conditional Approval Process*

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4.0 POST-CONSTRUCTION PEAK DISCHARGE COMPLIANCE

The goal of this section is to provide guidance on the design, performance, and analysis requirements of the City of Bismarck regarding Post-Construction Peak Discharge Compliance.

4.1 POST-CONSTRUCTION BMP PERFORMANCE REQUIREMENTS

Projects that require a PCSMP are subject to Peak Discharge Control requirements and shall include peak discharge post-construction structural or non-structural BMPs to conform to the requirements of ***Table 4-1*** and ***Section 4.1.1*** of this SWDSM. Note that these are underlying basic requirements and additional analysis and design requirements for specific components of the City's Public Storm Sewer System are provided within the following sections of this SWDSM.

Table 4-1 *– Point of Discharge Peak Flow Compliance*

Point of Discharge Location	***Peak Discharge Control Requirement***
Public Storm Sewer System and new Outfalls to surface waters	Post-Construction runoff resulting from the 2-, 5-, 10-, and 100-year 24-hour rainfall events shall not exceed the runoff rate of the existing conditions.

4.1.1 HYDROLOGIC REQUIREMENTS FOR PROJECTS

Projects that require a PCSMP and are not located in a Stormwater Master Plan or previously approved PCSMP\SWMP are required to provide on-site post-construction BMPs to address peak discharge compliance performance requirements of ***Table 4-1.***

Projects that require a PCSMP and are located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP shall provide documentation that the project meets the requirements for Peak Discharge Compliance by utilizing one of the scenarios described below and summarized in ***Figure 4-1***.

Scenario 1 - Master Plan Based on Current Rainfall and NRCS HSG

Scenario: The project is located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP.

1. Master Plan or PCSMP\SWMP utilized the Rainfall and Hydrologic Soil Groups required by ***Section 4.4.1*** of this SWDSM;
2. Master Plan or PCSMP\SWMP included regional or local post-construction peak discharge BMPs that have been constructed; and
3. Proposed project includes less than or equal to the impervious percentage and maintains overall drainage boundaries that were assumed in the Master Plan or PCSMP\SWMP.

Requirement: Document the project percent impervious and drainage boundaries in the PCSMP application.

Scenario 2 - Master Plan Based on Current Rainfall and NRCS HSG

Scenario The project is located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP and the following conditions are met:

1. Master Plan or PCSMP\SWMP utilized the Rainfall and Hydrologic Soil Groups required by ***Section 4.4.1*** of this SWDSM;
2. Master Plan or PCSMP\SWMP included regional or local post-construction peak discharge BMPs that have been constructed; and
3. Proposed project includes ***greater than the impervious percentage and/or alters overall drainage boundaries*** that were assumed in the Master Plan or PCSMP\SWMP.

Requirement:

1. Analyze the peak to each Point of Analysis utilizing the modeling parameters assumed in the Master Plan or previously approved PCSMP\SWMP. Parameters include impervious cover, CN, rainfall, HSG, and drainage boundaries;
2. Analyze the peak flow to each Point of Analysis utilizing the proposed project impervious coverage and drainage boundaries; and
3. Provide an on-site post-construction BMP to mitigate the difference between the peak flow rate calculated in Steps 1 & 2.

Scenario 3 - Master Plan Based on TP 40 Rainfall and Outdated NRCS HSG

Scenario: The project is located in an area that has an adopted Master Plan or previously approved PCSMP\SWMP that utilized:

1. TP 40 rainfall depths; and\or
2. Outdated NRCS HSG.

Requirement:

1. Analyze the peak flow to each Point of Analysis utilizing the impervious cover, CN, rainfall, HSG, and drainage boundaries assumed in the Master Plan or PCSMP\SWMP;
2. Analyze the peak flow to each Point of Analysis utilizing the proposed project impervious coverage, drainage boundaries, and the model parameters required by ***Section 4.4.1*** of this SWDSM; and
3. Provide an on-site post-construction peak flow BMP to mitigate the difference between the peak flow rate calculated in Steps 1 & 2.

Scenario 4 - Master Planned Regional Facilities Not Yet Constructed

Scenario: The project is located in an area that has an adopted Master Plan or previously approved PCSMP\SWMP that included regional or local post-construction peak flow mitigation that has not yet been constructed.

Requirement:

1. Construct the regional or local post-construction peak flow BMP(s) required by the Master Plan or PCSMP\SWMP; or
2. Provide an on-site post-construction peak flow BMP that meets the requirements of ***Section 4.1.1*** of this SWDSM, until such time that master planned facilities are constructed to accommodate the site.

Scenario 5 - Projects Outside of Master Planned Areas

Scenario: The project is located in an area that has not been included in an adopted Master Plan or previously approved PCSMP\SWMP.

Requirement:

1. Analyze the existing condition peak flow to each Point of Analysis utilizing the existing condition impervious coverage, drainage boundaries and the model parameters required by ***Section 4.4.1*** of this SWDSM;
2. Analyze the post-construction peak flow to each Point of Analysis utilizing the proposed project impervious coverage, drainage boundaries, and the model parameters required by ***Section 4.4.1*** of this SWDSM; and
3. Provide an on-site post-construction BMP to mitigate the difference between the peak flow rate calculated in Steps 1 & 2.

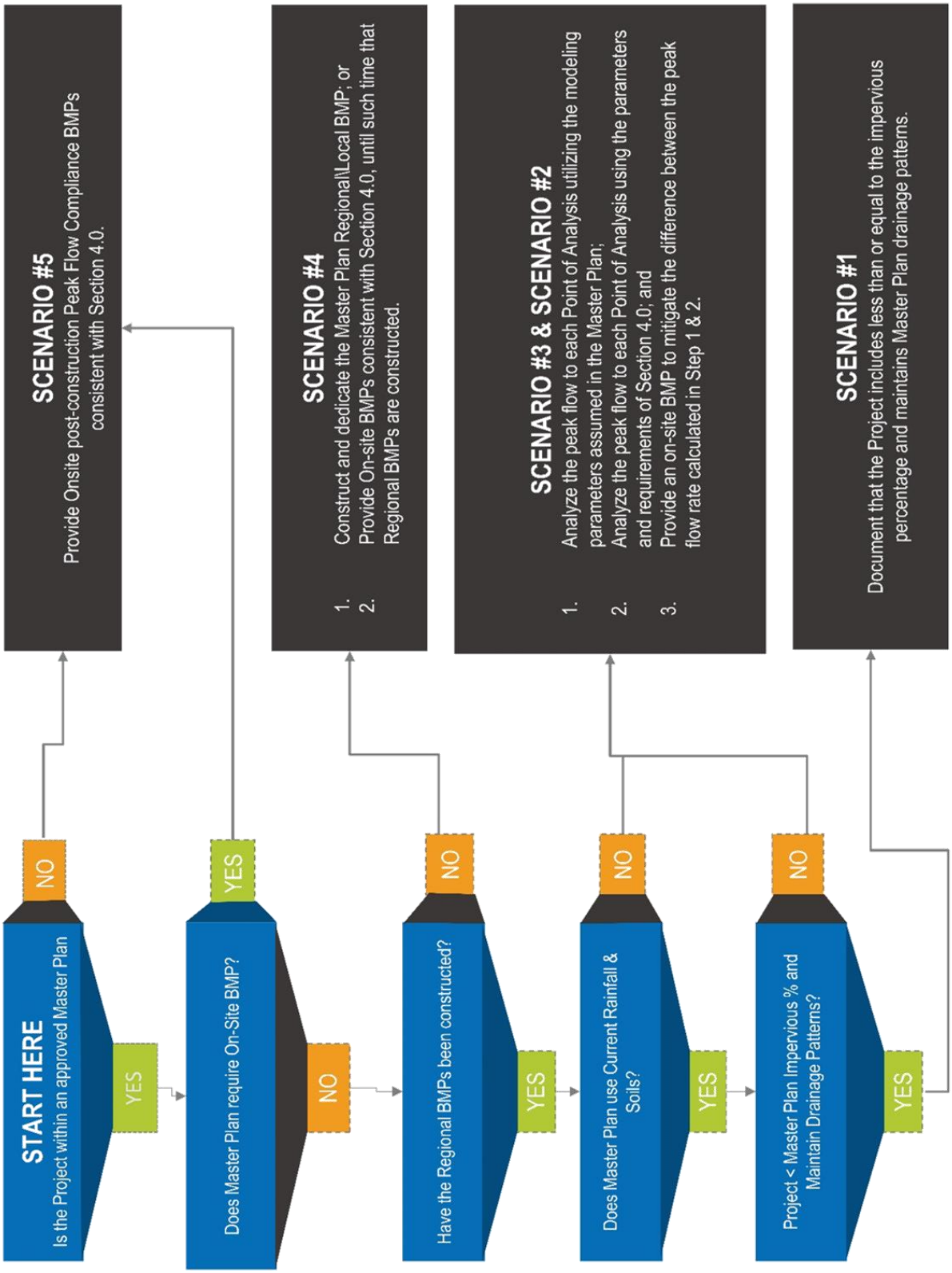

Figure 4-1 – Flow Chart for Determining Compliance with Peak Discharge Performance Requirements

4.2 POST-CONSTRUCTION BMP ANALYSIS & REQUIREMENTS

4.2.1 HYDROLOGIC ANALYSIS & REPORTING

All Projects that require the analysis and sizing of post-construction BMPs shall document the following minimum information for the hydrologic analysis in the PCSMP application.

1. The SWMP shall clearly documents the PCSMP application meets the Performance Requirements for Peak Flow Compliance; and
2. Hydrologic analysis and reporting requirements are included on the PCSMP Checklist available in ***Reference 3-5***.

4.2.2 DETENTION BASINS ANALYSIS & REPORTING

When detention basins are proposed as a post-construction BMP to mitigate for peak discharge compliance, the following minimum performance standards shall be documented in the PCSMP application.

Engineered Outlets

All proposed detention basins shall include an outflow structure to limit the post-construction peak flow discharge less than or equal to the existing condition peak flow discharge for the events required by ***Table 4-1***.

Engineered outlet analysis and reporting requirements are included on the PCSMP Checklist available in ***Reference 3-5***.

Infiltration as an Engineered Outlet

When infiltration is used as an engineered outlet:

1. The Applicant shall note on the Mandatory Stormwater Scoping Sheet the proposed use of infiltration as a peak discharge compliance post-construction BMP;
2. The Design Engineer shall obtain City approval on approach, analysis methods, and field investigation requirements as part of the Mandatory Stormwater Scoping Sheet; and
3. The City Engineer shall provide Project specific analysis and reporting requirements.

Emergency Spillway and\or Overflow Requirement

All proposed detention basins shall have an emergency spillway or overflow path that will route overflow without causing a failure of the detention basin berm or embankment.

Emergency Spillway analysis and reporting requirements are included on the PCSMP Checklist available in ***Reference 3-5***.

When approved by the City Engineer, small basins may utilize an oversized riser structure and outlet culvert for the emergency overflow path.

4.3 POST-CONSTRUCTION BMP MINIMUM DESIGN STANDARDS

The following sections include minimum standards that stormwater structures and BMPs shall meet within the City of Bismarck jurisdiction. The standards below do not replace judgement or standard of care for the Design Engineer.

4.3.1 DETENTION BASINS

The following minimum design standards are provided as a general guide for small detention basins associated with local and on-site post-construction BMPs. Design of large regional basins and dams requires engineering experience and knowledge outside of the scope of this SWDSM.

Detention basins proposed as post-construction peak discharge BMPs shall meet the following minimum design requirements:

Regulatory Permit Required:

Detention basins shall be designed such that the facility does not meet the requirement of a regulated dam per the applicable ND Administrative Code and State Statutes.

1. Regulated dams and water rights are administered by the State Water Commission and the office of the State Engineer.
2. In the event of a design variation allowing a State regulated facility, it is the Applicants responsibility to coordinate all required permits with the office of the State Engineer.

Design and Construction Standards:

Public and private basins shall meet the requirements of the current edition of the City of Bismarck Construction Specifications and the following minimum construction standards:

1. **Side Slopes and Slope Stability**: Slopes of detention basins shall meet the following minimum requirements:
    a. **Maximum Side Slopes**: 3H:1V
    b. **Minimum Bottom Grade**: 0.5 percent
    c. **Maximum Bottom Grade**: 5 percent
2. **Seepage Control**: A seepage control system should be provided for all embankments where a reservoir pool will be maintained for more than 72 hours, regardless of the depth of pond, height of embankment, or foundation materials.
3. **Material and Compaction Requirements**: Fill material shall meet the following minimum standards:
    a. **Material Type**: Embankments shall consist of cohesive material consisting of Silts and Clays (CL and MH). Other materials may be approved by the City Engineer.
    b. **Maximum Lift Depth**: 9-inch loose lift.
    c. **Compaction Equipment**: All compaction shall be completed with a sheeps foot or pneumatic roller.
    d. **Compaction Requirement**: 95% of Maximum as determined by ASTM D698 (Standard Proctor)

e. **Moisture Requirement**: 0 to +3% of optimum as determined by ASTM D698

4. **Freeboard**: Per ***Table 4-2***.

Table 4-2 *– Detention Basin Minimum Freeboard Requirements*

BMP Catchment Area	*Minimum Freeboard Requirement(1)*
One (1) Acre or Less	0.5 foot
Greater than One (1) Acre	1.0 foot

(1) Calculated from 100-year 24-hour water surface elevation to the lowest uncontrolled overflow structure

5. **Embankment & Pool Protection:** All exposed soil shall be stabilized by an appropriate method. The preferred stabilization method is vegetation. All vegetated slopes and pool areas shall include the installation of a layer of suitable plant growth material prior to seeding. Large detention basins shall include protection from wind and wave action for the normal pool surface.
    a. **Minimum Topsoil Depth:** 6 inches
    b. **Seeding:** Per City Standard Specification
    c. **Rip-Rap Stabilization:** Per City Standard Specification and ***Table 6-12***
6. **Engineered Outlets:** All basins shall have an engineered outlet that conforms to the following minimum standards:
    a. Minimum orifice size of 4 inches (note that water quality outlets have a smaller allowable orifice size);
    b. Trash protection for all orifices and\or structural overflows; and
    c. A direct connection to the Public Storm Sewer System.
        i. It is the responsibility of the Applicant to obtain all necessary offsite easements to allow connection of proposed basin outlets to the Public Storm Sewer System at the Point of Discharge identified in the Mandatory Stormwater Scoping Sheet approval process.
        ii. Direct Connection can include pipe or open channel conveyance.
7. **Infiltration as an Engineered Outlet**: Basins that utilize infiltration as an engineered outlet require an underdrain that, at a minimum, satisfies the following criteria:
    a. Consists of a 12-inch layer of drain rock underlying the calculated maximum pool area.
    b. Drainage layer shall be located under the growing medium and shall not hinder the facilities ability to suitably vegetate.
    c. Drainage layer shall include properly sized underdrain perforated pipes to collect water that does not infiltrate to the groundwater system.
    d. Underdrain pipes shall have a direct connection to the Public Storm Sewer System.

8. **Outlet Protection**: Design of outlet culverts shall include:
    a. Culverts shall have flared end sections.
    b. Energy dissipation and armoring shall be provided that is appropriate for the calculated shear stress and velocities from the 100-year 24-hour event.
    c. Rip-rap sizing shall meet the recommendations of ***Table 6-12.***
9. **Emergency Overflow**: Basins shall include an emergency spillway or overflow.
    a. The overflow shall be designed to convey the design flows around the berm structure for discharge into the downstream conveyance system.
    b. The overflow shall be designed, stabilized, and sited to protect the structural integrity of the berm.
    c. When possible, the overflow should be constructed in existing soils and not in the berm structure.
10. **Easements Required**: Basins shall include drainage easements or be platted as an undevelopable lot to fully contain the detention basin maximum pool, embankment, outlet protection and other elements as required by the City Engineer.
    a. Easements shall be noted as "Public" (maintained by the City of Bismarck or other approved public entity) or "Private" (maintained by the Applicant).
    b. Public Easements must be approved by the City.
    c. Private Easements must have a provision to allow access by the City to allow for maintenance of derelict BMPs.
    d. Post-Construction BMPs constructed on undevelopable lots will only be allowed when platted as Common Interest Lots that are attached to benefiting parcels. Use of Common Interest Lots must be approved by the City.
11. **Operation and Maintenance**: When utilizing detention basins, the PCSMP application shall include:
    a. Identification of the entity responsible for long-term maintenance of all drainage facilities.
    b. All privately maintained post-construction BMPs shall include the submittal and approval of Operations and Maintenance Plan as part of the PCSMP application.

4.3.2 GEOTECHNICAL\HYDROGEOLOGIC REPORT REQUIREMENTS

Geotechnical reports are required for sites where an infiltration system is proposed. Site specific geotechnical requirements will be determined during the Mandatory Stormwater Scoping Sheet process. In general, geotechnical reports are to include the information required by ***Reference 4-1.***

4.4 ANALYSIS METHODOLOGIES

The goal of this section is to provide detailed requirements for the analysis of Peak Discharge Control Compliance. This section is not intended to provide instruction on how to use the various methodologies or software packages as it is assumed that a sufficient understanding of hydrologic and hydraulic analyses as they apply to urban stormwater management and drainage is a prerequisite to the use of this SWDSM.

4.4.1 HYDROLOGY (COMPUTING RUNOFF)

Requirements necessary for computing runoff within the City of Bismarck's jurisdiction are listed below:

Acceptable Methods:

1. NRCS (SCS) Curve Number (CN) Method, NRCS Unit Hydrograph Methods & Time of Concentration Methods.
2. The Rational Method is not an accepted methodology for Peak Discharge Control Compliance.

Separation of Impervious/Pervious:

1. Impervious and pervious cover must be separated in the analysis on a per sub-catchment basis. Use of composite CN numbers that include the impervious area will not be allowed.
2. If the hydrology modeling software selected by the Design Engineer does not allow for direct entry of the sub-catchment percent impervious, the sub-catchment will need to be modeled as two individual sub-catchments, each having the same time of concentration but with the areas of each appropriately reflecting the pervious and impervious cover. This method is demonstrated in ***Example 4-1***.
3. Pervious and Impervious area within the project site must be manually measured to reflect the actual site design.
4. Modeling of offsite watersheds that are routed through a project site may utilize typical impervious percentages as provided in ***Table 4-3***.

Example 4-1 *Separation of Impervious and Pervious Areas*

If a 10-acre site is 25 percent impervious with the pervious portion having a CN of 74, the site:

1. Shall not be assumed to have a single, composite CN of 80; and
2. The runoff shall be computed using:
    a. A 2.5-acre sub-catchment with a CN of 98 for the impervious area;
    b. A 7.5-acre sub-catchment with a CN of 74 for the pervious area; and
    c. Both sub-catchments shall be assigned the same Tc, calculated based on the longest flow path within the 10-acre site.

Table 4-3 *– Typical Impervious Coverage for Offsite Drainage*

Land Use Type		Impervious Cover
Residential Developments	1/8 Acre Lots	65%
	1/4 Acre Lots	38%
	1/3 Acre Lots	30%
	1/2 Acre Lots	25%
	1 Acre Lots	20%
	2 Acre Lots	12%
Commercial		85%
Industrial		90%
Street ROW(1)		85%

(1) Street ROW includes the street, landscape boulevard, sidewalk and driveway aprons included in the public street right-of-way. Highway and/or arterial street sections may require higher impervious percentage.

Minimum Impervious Coverage:

The minimum impervious coverage values provided in ***Table 4-4*** are intended to guide the planning of stormwater facilities in the platting phase by providing a minimum impervious cover to be used for each zoning type. Impervious coverages exceeding the values in ***Table 4-4*** may be used when planning stormwater facilities. Site plans shall use the actual measured impervious cover. Additional explanation is provided below:

1. **Plats**:
    a. Development in the platting phase shall not assume a minimum impervious coverage value less than those provided in ***Table 4-4.***
    b. Higher assumed impervious amounts may be recommended or used by the Design Engineer.
    c. The approved plat SWMP will set the maximum impervious coverage for the development.
    d. Development of parcels inside of an approved plat PCSMP\SWMP to higher than planned impervious percentages will require a modification to existing facilities or construction of new facilities.
2. **Site Plans**:
    a. Shall use the actual impervious cover for the proposed project.

Table 4-4 *– Minimum Impervious Coverage*

Zoning Type		*Minimum Impervious Cover*
Residential Developments	RR	12%
	RR5	12%
	R5	35%
	RMH	50%
	R10	50%
	RM	75%
	RT	75%
Commercial		85%
Industrial		90%
Street ROW(1)		85%

(1) Street ROW include the street, landscape boulevard, sideway and driveway aprons included in the public street right-of-way. Highway and/or arterial street sections may require higher impervious percentage.

Hydrologic Soil Group (HSG):

1. Shall be obtained from the NRCS Web Soil Survey;
2. Complex soil groups shall be set to the Aggregation Method of "Dominant Condition" within the Advanced Options of the NRCS Web Soil Survey (See ***Reference 4-2***);
3. "Urban Land" shall be assigned a HSG of "C"; and
4. Dual HSG classifications shall be assigned the HSG with the higher runoff potential (i.e. HSG B/D shall be assumed to be HSG D).

CN Values

CN values shall be obtained from ***Table 4-5***. Values different from those provided in ***Table 4-5*** must be approved by the City Engineer.

Table 4-5 *– Runoff Curve Numbers*

Cover Type	Curve Numbers for HSG Soil Groups			
	HSG A	HSG B	HSG C	HSG D
Impervious	98	98	98	98
Gravel Surface	96	96	96	96
Grass (Lawn)	39	61	74	80
Brush	30	48	65	73
Pasture/Rangeland	39	61	74	80
Cropland	62	73	80	84
Meadow (not grazed)	30	58	71	78

(1) The CN values are the maximum allowable for existing conditions analyses.

(2) The CN values Table 4-5are the minimum allowable for post-construction conditions analyses.

Time of Concentration (Tc):

1. **Minimum Tc:** 5 minutes
2. **Sheet Flow:** Maximum length of 100 feet.
3. Refer to Part 630 Chapter 15 of the National Engineering Handbook for additional guidance and information.

Rainfall Depths: See *Reference 4-3*

1. **Rainfall Distribution**: SCS Unit Hydrograph Type II
2. **Rainfall Event**: 24-Hour Storm, unless otherwise master planned or platted.

Maximum Rainfall Hyetograph Time Increment:

10 minutes

Gravel Roadways and Gravel Parking Lots:

Shall be considered as part of the impervious area when separating and analyzing pervious and impervious area within a catchment.

4.4.2 HYDRAULIC ROUTING

The following list is intended to provide the Design Engineer with City of Bismarck requirements for Hydraulic Routing.

Routing Method:

1. Storage Indication Method (also known as hydrologic routing) may be utilized for projects with unconnected basins and free discharges.
2. Dynamic Routing Methods (also known as hydraulic routing) shall be incorporated for all projects that include interconnected basins, pump stations, tail water or backwater conditions, and other complex conditions that require a dynamic routing method.
3. Rational routing methods shall not be allowed.
4. Routing method requirements will generally be noted in the Mandatory Stormwater Scoping Sheet.

Starting Water Surface Elevation:

1. For proposed basins the starting Water Surface Elevation (WSE) in a detention facility shall be assumed to be equal to the invert of the lowest engineered outlet.
2. Known tail water or backwater conditions may require that the starting WSE be higher.

Outlet Protection:

1. **Shear Stress:** Shall be calculated using the following equation:

$$\tau = \gamma D S$$

Where:

τ = Shear Stress (lb/ft^2)

γ = Weight of Water (lb/ft^3)

D = Average Depth of Water (ft)

S = Surface Water Slope (Energy Grade Line)

4.4.3 ACCEPTABLE SOFTWARE

Acceptable software for the analysis of peak discharge is provided by ***Reference 4-4***.

4.5 REFERENCES (FOUND IN APPENDIX 4)

Reference 4-1 – Geotechnical Investigation and Report Requirements
Reference 4-2 – Advanced Options of the NRCS Web Soil Survey
Reference 4-3 – Rainfall Depths
Reference 4-4 – Acceptable Software

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5.0 POST-CONSTRUCTION WATER QUALITY COMPLIANCE

The goal of this section is to provide guidance on the design, performance, and analysis for Post-Construction Water Quality BMPs to meet the requirements as outlined in the City's MS4 permit (***Reference 2-2***).

5.1 POST-CONSTRUCTION BMP PERFORMANCE REQUIREMENTS

Projects that require a PCSMP are subject to Post-Construction Water Quality requirements and shall propose permanent structural or non-structure BMPs that conform to the requirements of ***Table 5-1.*** Note that these are underlying basic requirements and additional analysis and design requirements for specific components of the City's Public Storm Sewer System are provided within the following sections of this SWDSM.

Table 5-1 *– Water Quality Performance Requirement*

Situation	*Water Quality Requirement*
New Development & Impervious Areas	Prescriptive BMP sizing requirements per ***Reference 5-1***.
Redevelopment & Retrofit	Design BMPs to treat the first 0.5 inches of runoff from impervious areas.
Alternative BMP Method[1]	80% Total Suspended Solids (TSS) removal on an average annual basis shall be achieved.

(1) Requires approval from the City Engineer during the Mandatory Scoping Sheet process.

5.1.1 REQUIREMENTS FOR PROJECTS

Projects that require a PCSMP and are not located in a Stormwater Master Plan or previously approved PCSMP\SWMP are required to provide on-site, post-construction BMPs to address post-construction water quality compliance performance requirements of ***Table 5-1***.

Projects that require a PCSMP and are located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP shall provide documentation that the project meets the requirements for Water Quality Compliance by utilizing one of the scenarios described below and summarized in ***Figure 5-1***.

Scenario 1 – Master Plans with Water Quality Post-Construction BMPs

Scenario: The project is located in an area that has an adopted Stormwater Master Plan and the following conditions are met:

1. Master Plan or PCSMP\SWMP included regional or local post-construction water quality BMPs that have been constructed; and
2. Proposed project includes less than or equal to the impervious percentage and maintains overall drainage boundaries that were assumed in the Master Plan or PCSMP\SWMP; then

Requirement: Document that proposed project impervious percentage is less than or equal to that assumed in the Master Plan.

Scenario 2 – Master Plans with Water Quality Post-Construction BMPs

Scenario: The project is located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP and the following conditions are met:

1. Master Plan or PCSMP\SWMP included regional or local post-construction water quality BMPs that have been constructed; and
2. Proposed project includes ***greater than the impervious percentage and/or alters overall drainage boundaries*** that were assumed in the Master Plan or PCSMP\SWMP.

Requirement: Provide on-site post-construction water quality BMPs for the difference between the Master Planned and project proposed impervious percentage consistent with the requirements of ***Table 5-1***.

Scenario 3 – Master Planned or Local Post-Construction Water Quality BMPs Not Yet Constructed

Scenario: The project is located in an area that has an adopted Master Plan or previously approved PCSMP\SWMP that included regional or local post-construction water quality BMPs that have not yet been constructed.

Requirement:

1. Construct the Master Plan proposed regional or local post-construction water quality BMPs; or
2. Provide on-site post-construction water quality BMP consistent with the requirements of ***Table 5-1***.

Scenario 4 – Master Plans Require On-site Post-Construction Water Quality BMPs

Scenario: The project is located in an area that has an adopted Master Plan or previously approved PCSMP\SWMP that included recommendations that on-site post-construction water quality BMPs be utilized.

Requirement: Provide on-site post-construction water quality BMPs consistent with the requirements of ***Table 5-1***.

Scenario 5 – Master Plans without Post-Construction Water Quality BMPs

Scenario: The project is located in an area that has an adopted Stormwater Master Plan or previously approved PCSMP\SWMP that did not recommend or include regional or local post-construction water quality BMPs.

Requirement:

1. Retrofit the existing regional or local post-construction peak discharge BMP to function as a post-construction water quality BMP consistent with ***Table 5-1***; or
2. Provide on-site post-construction water quality BMPs consistent with the requirements of ***Table 5-1***.

Scenario 6 – Requirements Projects Outside of Master Planned Area

Scenario: The project is located in an area that has not been included in an adopted Master Plan or previously approved PCSMP\SWMP.

Requirement: Provide on-site post-construction water quality BMP consistent with the requirements of ***Table 5-1***.

5.2 POST-CONSTRUCTION BMP ANALYSIS & REPORTING REQUIREMENTS

5.2.1 PRESCRIPTIVE BMP ANALYSIS AND REPORTING

Post-construction water quality BMP SWMP analysis and reporting requirements are included on the PCSMP Checklist (SM-05) available in ***Reference 3-5***.

5.2.2 ALTERNATIVE BMP METHOD ANALYSIS AND REPORTING

Post-Construction water quality BMPs, other than the Prescriptive BMPs included in ***Reference 5-1,*** may be utilized when the analysis and sizing has been documented in the required PCSMP application materials. The following minimum information shall be provided:

1. Citation and reference to an accepted BMP Manual for the analysis requirements and design standards for the Alternative BMP;
2. Demonstration that the requirements of ***Table 5-1*** have been met; or
3. Demonstration that alternative performance requirements approved by the City Engineer have been met; and
4. The alternative performance requirements have been approved as a deviation prior to the submittal of the PCSMP application.

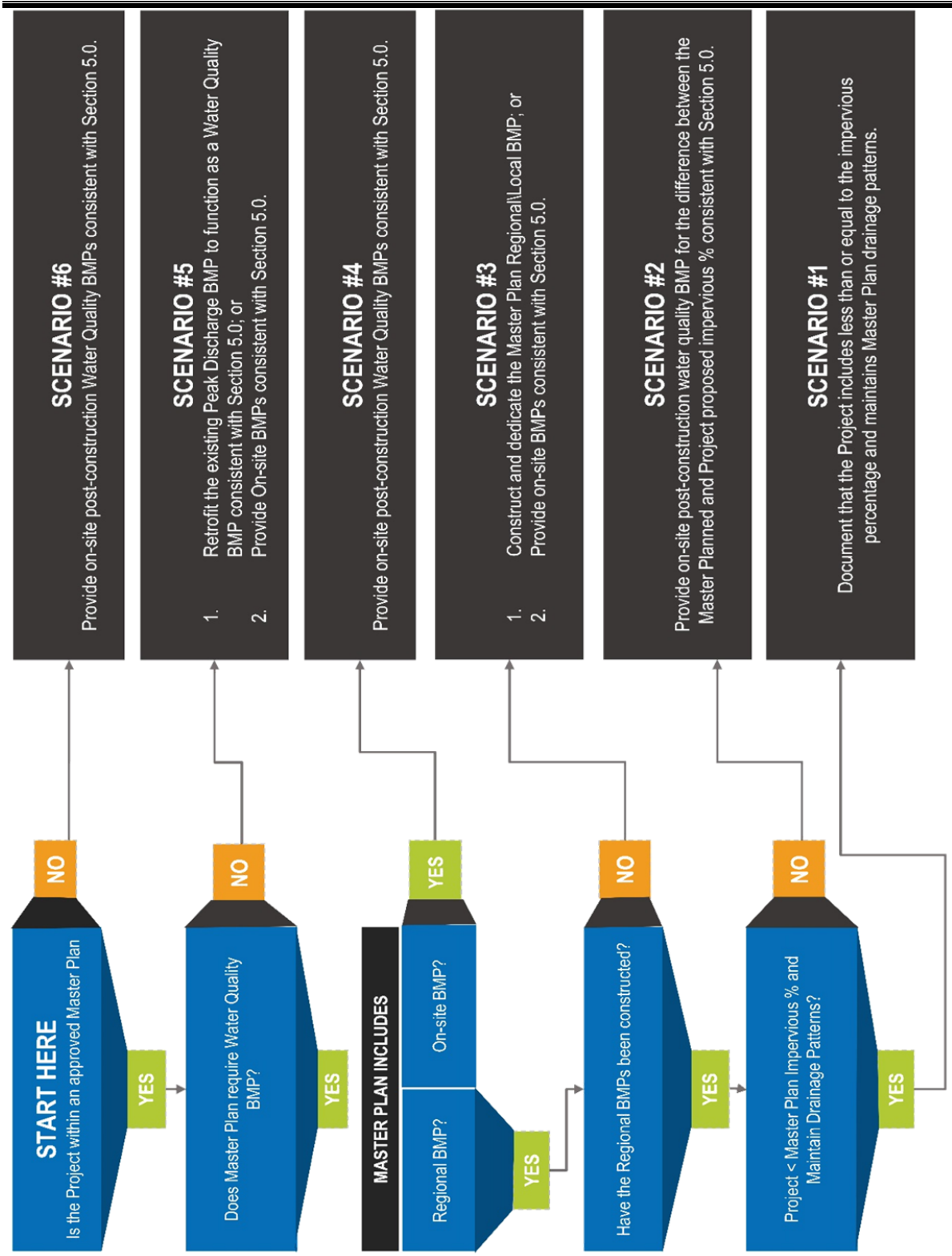

Figure 5-1 – *Flow Chart for Determining Compliance with Water Quality Performance Requirements*

5.3 POST-CONSTRUCTION WATER QUALITY BMP DESIGN STANDARDS

The following sections include minimum standards that stormwater structures and BMPs shall meet in the City of Bismarck. The standards below do not replace judgement or standard of care for the Design Engineer.

5.3.1 DETENTION BASINS

In addition to the minimum design standards presented in ***Section 4.3.1***, detention basins proposed for post-construction water quality BMPs shall meet the following minimum design standards:

Engineered Outlets:

All water quality basins shall have an engineered outlet that conforms to the following minimum standards:

1. Minimum orifice size of 2 inches.
2. The distance between inlets and the outlet shall be maximized to facilitate sedimentation and limit short-circuiting of the water quality BMP:
    a. Minimum length to width ratio is 3:1 as measured along the flow path from inlet to outlet; or
    b. If project area constraints make this ratio unobtainable, the Design Engineer shall incorporate baffles, islands or peninsulas to increase the flow path and limit short-circuiting.

Required Forebay:

All water quality basins shall include a forebay to aid in routine maintenance, limit the potential for short-circuiting, and reduce resuspension of accumulated sediments.

1. Dry Detention Basins shall be divided into a minimum of two cells.
    a. The first cell (forebay) shall contain, at a minimum, 10-percent of the design surface area as measured at the required water quality volume surface elevation; and
    b. The forebay shall provide a minimum of 1 foot of dead storage for sediment accumulation.
2. Wet Detention Basins shall be divided into a minimum of two cells with the forebay containing no less than 10-percent of the design surface area as measured at the required water quality volume surface elevation.

Embankment and Basin Protection:

All exposed soils shall be stabilized by an appropriate method. Stabilization of the active storage area will need to consider the type of protection, including vegetation species selection, given the anticipated frequency and depth of inundation.

1. Dry Detention Basins shall be stabilized with native vegetation suitable for frequent inundation or other vegetative plantings that will allow for 100% coverage of the basin area;

2. Wet Basins shall include:
    a. Appropriate stabilization at and below the normal pool elevation;
    b. Suitable native grass or other vegetative plantings above the normal pool elevation;
    c. Vegetation shall provide 100% coverage to the basin area over the normal pool elevation; and
    d. Vegetative stabilization shall be selected from species suitable to grow and survive during periods of inundation.
3. Topsoil shall be used in the top 4 to 6 inches of the finished grade; or
4. The top 12 inches of soil shall be amended to achieve a suitable plant growth medium.

5.3.2 INFILTRATION BMPS

Use of infiltration and filtration BMPs requires approval by the City Engineer during the Mandatory Stormwater Scoping Sheet process.

When approved for use, infiltration and filtration BMPs shall meet the Geotechnical Report requirements of ***Section 4.3.2*** and the following design standards:

Infiltration BMPs:

1. Located on sites with soils that drain freely and infiltrate 1 inches per hour or greater;
2. Are separated from seasonal high groundwater levels by greater than 5 feet;
3. Include an overflow to an approved Point of Discharge; and
4. Meets the design requirements of a BMP manual approved by the City Engineer.

Filtration BMPs:

1. Located on sites that infiltrate less than 1 inches per hour and/or are located within 5 feet of seasonal groundwater elevations;
2. Include a gravel underdrain and collection pipe that conveys filtered stormwater to an approved Point of Discharge;
3. Include an overflow to an approved Point of Discharge; and
4. Meets the design requirements of a BMP manual approved by the City Engineer.

5.3.3 FLOW THROUGH BMPS

Flow Through BMPs are defined as proprietary mechanical treatment devices. Flow Through BMPs shall be:

1. Certified by the manufacturer to provide treatment that meets or exceeds the requirements of ***Table 5-1***; and
2. Designed to bypass peak flows in excess of the water quality volume.

5.4 ANALYSIS METHODOLOGIES

The goal of this section is to provide detailed requirements for the analysis of Water Quality performance.

5.4.1 WATER QUALITY VOLUME (V_{WQ})

The water quality volume shall be determined using the methods described in ***Reference 5-2***.

5.4.2 STANDARD METHODOLOGY

Standard Methodology analysis will be for the prescribed drawdown time of the selected BMP. For the purposes of determining compliance with the drawdown time requirements, the method presented in ***Reference 5-3*** shall be used.

Drawdown time refers to the amount of time it takes for the V_{wq} to drain down to within 3 inches of the lowest engineered outlet. Depths under 0.25 feet (3 inches) may take an extensive amount of time to drawdown to the point of zero volume due to minimal head.

5.4.3 ALTERNATE METHODOLOGY

In situations not clearly covered in ***Reference 5-1,*** such as multiple basins in series, alternate methodologies that explicitly model the build-up, wash-off, and trapping of Total Suspended Solids (TSS) may be used as determined acceptable by the City in the scoping letter.

1. When using alternate methodologies, utilize the performance requirements shown in ***Table 5-1***; and
2. Example alternate methodologies are provided in ***Reference 5-4.***

5.5 REFERENCES (FOUND IN APPENDIX 5)

Reference 5-1 – Prescriptive BMP Performance Requirements
Reference 5-2 – Water Quality Volume Analysis Procedure
Reference 5-3 – Standard Analysis Methodology
Reference 5-4 – Alternative Analysis Methodology

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6.0 POST-CONSTRUCTION DRAINAGE AND CONVEYANCE COMPLIANCE

The goal of this section is to provide guidance on the design, performance, and analysis requirements for Drainage and Conveyance within the City of Bismarck. Examples of drainage and conveyance facilities include storm sewer, drainage ditches, streets, open channels, culverts and other engineered systems intended to carry stormwater to a Point of Discharge.

6.1 PERFORMANCE REQUIREMENTS

6.1.1 STREET DRAINAGE PERFORMANCE REQUIREMENTS

The criteria and procedures found in this section establish the performance requirements for street drainage conveyance infrastructure including gutters, inlets, manholes, and storm sewers.

Hydrologic Requirements

The street drainage system shall be designed as an integral part of the Public Storm Sewer System. Performance standards for stormwater flows on City streets are separated into requirements for the 5-year 24-hour event and the 100-year 24-hour event:

1. The 5-year 24-hour event has been selected to minimize nuisance flooding, protect against recurring minor damages, and reduce maintenance costs for streets by removing frequent flows in an orderly and economic manner.
2. The 100-year 24-hour event has been selected to minimize the potential for substantial property damage and loss of life by providing a defined drainage pathway for large rainfall events.

Allowable Street Spread

Street spread performance requirements are applicable to runoff being conveyed longitudinal to (i.e. parallel to) the right-of-way.

In situations where runoff is conveyed perpendicular to the right-of-way, the stream crossing and culvert crossing performance standards described in ***Section 6.1.3*** are applicable.

For the 5-year 24-hour storm, the performance requirements are to limit the spread (encroachment into the travel lanes) and the depth (inundation) of stormwater conveyed longitudinally in the right-of-way to below acceptable limits during the design event.

For the 100-year 24-hour storm, the performance requirement is to contain the runoff inside of the public right-of-way.

The street spread performance requirements for the 5-year 24-hour and 100-year 24-hour storm events are provided in ***Table 6-1*** and ***Table 6-2.***

***Table 6-1** – 5-year 24-hour Storm Street Performance Requirements*

Street Classification[1]	***Max Depth***	***Max Encroachment[2]***
Local Residential	No curb overtopping.	Flow may spread to crown of the street.
Local Commercial	No curb overtopping.	Flow may spread to crown of the street.
Collector – (All Sections)	No curb overtopping.	Leave 12 feet on each side of centerline clear of encroachment.
Arterial (Principal & Minor) & Parkways [3]	No curb overtopping.	Flow spread shall be limited to 7.5 feet or less from the face of curb.
State Highways	Shall meet the requirements of the NDDOT.	

(1) Typical City urban street classification and geometry as defined by Title 14-09-05(1)(k) of the Zoning Ordinance.

(2) Where no curb exists, flow spread shall not extend past street right-of-ways.

(3) Maximum encroachment from interior raised median shall be less than 4-feet from the median curb.

(4) Performance Requirements for non-standard street sections and geometry shall be determined by the City Engineer during the Mandatory Stormwater Scoping Sheet.

***Table 6-2** – 100-year 24-hour Storm Street Performance Requirements*

Street Classification[1]	***Max Depth***	***Max Encroachment***
Local Residential	6 inches at the crown	The inundated area shall not exceed the street right-of-way.
Local Commercial	6 inches at the crown	The inundated area shall not exceed the street right-of-way.
Collector – (All Sections)	6 inches at the crown	The inundated area shall not exceed the street right-of-way.
Arterial (Principal & Minor) & Parkways	3 inches at the highest point of the driving lane.	The inundated area shall not exceed the street right-of-way.
State Highways	Shall meet the requirements of the NDDOT.	

(1) Typical City urban street classification and geometry as defined by Title 14-09-05(1)(k) of the Zoning Ordinance.

(2) Performance Requirements for non-standard street sections and geometry shall be determined by the City Engineer during the Mandatory Stormwater Scoping Sheet.

Allowable Cross-Street Flow

Cross-street flow occurs when runoff flowing longitudinally in a gutter is allowed to cross the travel lane due to a lowered crown in the street section or a valley gutter in an intersection. Cross-street flow is applicable to runoff contained in the street right-of-way and is not the same as allowable street overtopping for culverts crossing perpendicular to a street right-of-way.

Allowable cross-street flows for the 5-year 24-hour and 100-year 24-hour storm events are shown in ***Table 6-3***.

Table 6-3 *– Allowable Cross-Street Flow Requirements*

Street Classification(1)	***5-year 24-hour Criteria (1)***	***100-year 24-hour Criteria (1)***
Local	6 inch Depth at Crown or in Valley Gutter	9 inch Depth at Crown or in Valley Gutter
Collector	3 inch Depth in Valley Gutter	6 inch Depth at Crown or in Valley Gutter
Arterial	None	3 inch Depth or Less at Crown no allowable Valley Gutter Flow

(1) Typical City urban street classification and geometry as defined by Title 14-09-05(1)(k) of the Zoning Ordinance.

6.1.2 STORM SEWER SYSTEM PERFORMANCE REQUIREMENTS

The Storm Sewer System is a series of underground pipes designed to convey runoff to an outfall. This system includes inlets, pipes, manholes and other appurtenances necessary to efficiently collect and covey drainage from streets and surrounding properties. Design of the Storm Sewer System components shall be determined by a thorough analysis of the drainage area involved in accordance with the provisions of this SWDSM.

The following section generally describes the performance standards for the analysis and design of a Storm Sewer System associated with a transportation system. These standards also can be applied to Storm Sewer trunk mains or other drainage pipes not located under a road or street. Based on drainage area, the Design Engineer or City Engineer may determine that more stringent performance requirements may be necessary for specific projects.

Storm Sewer Inlets and Catch Basins

INLET CAPACITY AND SPACING

Storm sewer inlets are a structure that intercept and capture surface runoff and direct the flow into the mainline pipe. All storm sewer inlets shall meet the following minimum performance requirements:

1. Storm sewer inlets installed in public streets shall be designed with capacity and spacing such that the maximum street spread widths and cross flow requirements of ***Table 6-1***, ***Table 6-2*** and ***Table 6-3*** are not exceeded.
2. Storm sewer inlets shall be designed to intercept the 5-year 24-hour design flow with the allowable bypass as defined in ***Table 6-4.*** Storm sewer inlets located in sag locations shall include the consideration of conveying flows greater than the design event in a manner that limits the potential for damage to adjacent property or structures.
3. The theoretical capacity of inlets and grates in sags or on grade shall be determined from manufacturers' or industry design charts or procedures utilizing the 5-year 24-hour event street spread criteria.
4. The capacity of the inlet lateral pipe shall exceed that of the theoretical capacity of the inlet for the 5-year 24-hour event.

Table 6-4 *– Storm Sewer Inlet Bypass Flow Design Requirement*

Condition	***Allowable Bypass***
Sag Location	No bypass flows are allowed during the 5-year 24-hour event. Provide a 100-year 24-hour event overflow path that minimizes the potential for damage to adjacent property or structures.
Streets on Continuous Grade	The final downstream inlet or inlets shall be designed to intercept no less than 50% of the 5-year 24-hour storm.
Temporary Dead End Streets on Down Grade	Unless otherwise approved by the City Engineer, final downstream Storm Sewer Inlets shall not allow bypass flows during the 5-year 24-hour event.
Tee-Intersections on Down Grades and Low Points	No bypass flows are allowed during the 5-year 24-hour event design flow. Depending on downstream conditions, the City Engineer may require oversizing inlets at low points.
Sag or Low Point with a Storm Sewer Outfall	Storm Sewer Inlets and Outfall Pipe shall be designed to allow no bypass flows during the 25-year 24-hour event design flow.

INLETS LOCATED ON SAGS WITH A STORM SEWER OUTFALL

In situations where a street drainage inlet and storm sewer system intercepts street runoff and discharges perpendicular to the right-of-way, the final sag inlets shall be sized to allow no bypass flows during a **25-year 24-hour event** and a pipe shall convey this design flow to the Point of Discharge. Additionally, an open channel overflow path shall be provided to convey the 100-year 24-hour event from the street sump location to the Point of Discharge consistent with the requirements of ***Section 6.1.4 Open Channels***.

Storm Sewer Pipe

All storm sewer pipe shall meet the minimum performance requirements for the 5-year 24-hour and 100-year 24-hour design events as shown in ***Table 6-5***.

Table 6-5 *– Storm Sewer Pipe Capacity Requirements*

Storm Classification	***Requirement***
5-year 24-hour Storm	HGL less than 0.5 foot above the crown of pipe as measured at the structure inlet point.
100-year 24-hour Storm	Storm sewer may be designed to surcharge during the 100-year 24-hour events; however, surcharging shall not result in a HGL elevation higher than the criteria listed in ***Table 6-1*** or ***Table 6-2***.

All storm sewer pipe shall meet the velocity performance requirements listed in ***Table 6-6.***

Table 6-6 *– Storm Sewer Pipe Velocity Requirements for 5-year 24-hour Storm*

Parameter	***Requirement***
Minimum Velocity	2 feet per second
Maximum Velocity	15 feet per second

Storm Sewer Reporting Requirements

INLETS & CATCH BASINS

When storm sewer inlets are proposed for a project that requires a PCSMP application, the Basis of Design Report shall include the following information documenting the performance of the storm sewer system:

1. Location, type, size, rim elevation and depth of the proposed inlet;
2. 5-year 24-hour design flow to the inlet;
3. Theoretical inlet capacity;
4. Depth of water in the gutter at the inlet;
5. Flow intercepted and flow bypassed; and
6. Street drainage spread width.

STORM SEWER PIPE

When storm sewer is proposed for a project that requires a PCSMP application, the Basis of Design Report shall include the following information documenting the performance of the storm sewer system:

1. Pipe calculations that state the design peak flow rates and design information for each pipe run, such as size, slope, length, material type, and Manning's coefficient;
2. Velocities at design flow for each segment of proposed pipe;
3. HGL at each inlet, manhole, angle point, and outlet;
4. Depth from finish grade to pipe invert for each segment of proposed pipe; and
5. When there is a significant change in slope of the pipe through a manhole or other structure, the EGL at the structure assuming the velocity approaches zero.

6.1.3 CULVERT PERFORMANCE REQUIREMENTS

Requirements presented in this section shall be used in the analysis and reporting for design of culverts for public streets, roads and highways. Culverts are defined as a closed conduit for the passage of water under an embankment, such as a road or street. Water enters the culvert directly through the upstream opening in the conduit.

Calculations relating to design of culverts shall be submitted for approval with the PCSMP application, with criteria sections of this SWDSM being referenced. The following tables define the minimum performance requirements for the analysis and design of culverts.

Hydrologic analysis and capacity of culverts shall be determined using a combination of the design storm, the allowable headwater depth and allowable street overtopping. The headwater depth is measured from the invert of the culvert to the resulting inlet headwater elevation.

The proposed culvert size and/or slope shall be increased until the requirements of ***Table 6-7***, ***Table 6-8*** and ***Table 6-9*** have been met.

The allowable headwater requirements in ***Table 6-7*** are intended to apply to the majority of situations encountered in the City of Bismarck. All culvert crossing of the State Highway System shall also conform to the North Dakota Public Highway Stream Crossings as defined by NDAC 89-14.

Table 6-7 *– Culvert Headwater Requirements*

Storm	***Allowable Headwater***
25-year 24-hour Event	1.5 times the culvert diameter or culvert rise(1)
100-year 24-hour Event	***Table 6-8*** Overtopping Criteria shall not be exceeded

(1) Culvert Rise is the height of the culvert for shapes other than round.

Allowable street overtopping for culverts installed perpendicular to road right-of-ways shall meet the criteria shown in ***Table 6-8.*** The street overtopping criteria is applicable to situations where the culvert headwater rises to a level where the flow in the channel overtops the street embankment and flows over the street to the downstream outlet of the culvert. Culvert street overtopping is not the same as allowable cross-street flow.

Table 6-8 *– Culvert Allowable Street Overtopping Requirements*

Street Classification	***Storm***	***Requirement***
All Streets	25-year 24-hour Event	No Overtopping
Local	100-year 24-hour Event	6 inches measured to the highest point on the street section (1)
Collector & Arterial	100-year 24-hour Event	No Overtopping

(1) For local urban streets, the highest point is typically the ROW line and for local rural road the highest point is the centerline of the ROW.

Analysis of the culvert shall consider the minimum velocity for cleansing and the maximum velocity for outlet protection. ***Table 6-9*** presents the minimum required cleaning velocity and allowable outlet velocities for typical types of protection. Outlet velocities in excess of 11 feet per second require an engineered energy dissipation feature or outlet armor design and supporting calculations.

Table 6-9 *– Culvert Velocity Requirements*

Parameter	***Requirement***
Minimum Velocity	2.5 feet per second during the 5-year 24-hour Storm
Outlet Protection	Per ***Table 6-12***

Culvert Reporting Requirements

When culverts are proposed for a project that requires a PCSMP application, the Basis of Design Report shall include the following information documenting the performance of the culvert:

1. Complete culvert calculations that state the design peak flow rates, culvert size, slope, inverts, length, material type, wall thickness, and Manning's coefficient.
2. Type of end treatment.
3. Headwater depths and water surface elevations for the design storm events.
4. Velocities at the inlet and outlet for the design storm events.
5. Flow control type (inlet or outlet).
6. Roadway cross-section and roadway profile.

6.1.4 OPEN CHANNELS PERFORMANCE REQUIREMENTS

Open channels in the City of Bismarck consist of two types; engineered channels and natural channels. Engineered channels are generally constructed to uniform lines and grades with lining materials or established vegetation to protect the channel from erosive forces. Natural channels include all watercourses that have been established by nature. State, local, and federal laws shall be adhered to if modifications are proposed to natural channels.

Requirements presented in this section shall be used in the analysis and reporting for design of engineered open channels that convey runoff through and from developed areas. Analysis and impact to natural channels shall conform to FEMA floodplain management requirements and other applicable local, state and federal regulations. Channels should be located such that they will not adversely affect existing infrastructure.

Calculations relating to design of engineered channels shall be submitted with the PCSMP application for approval, with criteria sections of this SWDSM being referenced. The following tables define the minimum performance requirements for the analysis and design of engineered open channels.

Engineered channels shall meet the minimum freeboard requirements listed in ***Table 6-10*** for the 100-year 24-hour event. Excavated or incised channels are constructed below the existing grade and do not require berms to contain the 100-year 24-hour design flows and freeboard requirements.

When berms are used to contain the 100-year 24-hour design flows, a greater amount of freeboard is required to account for the increased risk of uncontrolled flows if the berms are breached.

Table 6-10 *– Engineered Channel Freeboard Requirement*

Channel Type	***100-year 24-hour Storm Minimum Freeboard***
Fully Excavated or Incised	1 foot below the easement or right-of way boundary.
Berms or Built-Up Channels[1]	2 feet below the easement or right-of way boundary

(1) City Engineer may require more stringent requirements for channels constructed with berms that could overtop and result in an uncontrolled discharge.

(2) Minimum top width of channel berms shall be 6-feet

Engineered open channels shall be designed to resist the erosive forces of both the 5-year 24-hour and 100-year 24-hour events. Each case will require the Design Engineer to select channel geometry and lining materials that meet the performance requirements of this section. Channel lining design requires analysis of both the design velocity and predicted shear stress to select the proper lining material for individual channels.

Channels should be designed to avoid flows near critical depth or supercritical flows.

Table 6-11 and ***Reference 6-1*** provide minimum performance requirements for the allowable velocity and shear stress for engineered channels.

***Table 6-11** – Engineered Channel Lining Requirements*

Condition	*Minimum Requirement*
5-year 24-hour Event V < 5 FPS	Grass Lined Channels
5-year 24-hour Event V > 5 FPS	Lining to Resist Calculated Shear Forces
100-year 24-hour Event V < 5 FPS	Grass Lined Channel
100-year 24-hour Event V > 5 FPS	Lining to Resist Calculated Shear Forces

V = Velocity

FPS = Feet per Second

Open Channel Reporting Requirements

When engineered open channels are proposed for a project, the submitted SWMP shall include the information outlined on the PCSMP Checklist (SM-05) available in ***Reference 3-5***.

6.1.5 OUTLET AND OUTFALL PROTECTION PERFORMANCE REQUIREMENTS

Outlet and\or outfall protection of culverts shall be designed to resist the erosive forces of events up to the 25-year 24-hour storm. For critical infrastructure, the City Engineer may require that culvert outfalls be designed for the 100-year 24-hour event.

Culvert outfalls shall be designed to resist the scour at the outlet and dissipate velocities to values that are appropriate for the downstream channel. For the majority of installations, utilization of properly sized rip-rap at the outlet will provide suitable protection against scour and sufficient energy dissipation.

***Table 6-12** – Maximum Allowable Design Velocities for Outlet Protection*

Parameter		*Velocity of Design Event*
Vegetation and/or Permanent Turf Reinforcement Mat		< 5 feet per second
Riprap Size Classification	VL	6.5 feet per second
	L	8.0 feet per second
	M	9.5 feet per second
	H	10.5 feet per second
	VH	11.0 feet per second
Energy Dissipater Required		> 11 feet per second

When velocities exceed 11 feet per second for the 25-year 24-hour event, or the City Engineer requires a higher design standard for critical infrastructure, the Design Engineer shall include an engineered energy dissipation structure. Accepted structures include:

1. Short Stilling Basin (USBR Type II).
2. Baffled Apron Stilling Basin (USBR Type IX).
3. Impact Stilling Basin (USBR Type VI).

Energy dissipation structures shall meet the design requirements of the current United States Bureau of Reclamation technical circular.

Other proprietary outlet protection measures may be proposed by the Design Engineer and approved at the City's discretion. **Articulated Concrete Block is not allowed as culvert outlet protection**.

6.2 MINIMUM DESIGN STANDARDS

All design and construction for the extension of the City's Public Storm Sewer System shall conform to the requirements of the current edition of the Standard Specifications. Requirements of the Standard Specifications are not reproduced or repeated in this SWDSM. It is the responsibility of the Design Engineer to cross-reference the requirements for this SWDSM and the Standard Specifications.

6.2.1 STREET DRAINAGE DESIGN STANDARDS

Street Layout

Street layout and design shall meet the requirements of Title 14-09-05 of the City Code of Ordinances.

Curb & Gutter

Curb & Gutter shall be included on all new public and private streets proposed for development activities in the City of Bismarck.

Curb and gutter grades shall meet the minimum design requirements of Title 14-09-05 of the City Code of Ordinances.

Public Streets shall have curb and gutter that conforms to Section 603 of the Standard Specifications.

Valley Gutters

Where storm sewer is not required by street spread requirements or otherwise not justified, valley gutters may be installed to convey runoff through Local Street intersections only. No valley gutters are allowed on Arterial or Collector streets unless approved by the City Engineer.

Design considerations for valley gutters include:

1. The minimum grade of the valley gutter shall be 0.5 percent at the flow line.

2. When valley gutters are used to redirect surface flow greater than 90-degrees (change direction), the Design Engineer shall include an analysis of the HGL and EGL to determine if a significant change in water surface elevation occurs due to a reduction in velocity.

6.2.2 STORM SEWER SYSTEM DESIGN STANDARDS

Storm Sewer Inlets

The primary purpose of storm sewer inlets is to intercept surface runoff and deposit it in a Public Storm Sewer System, thus reducing the potential for surface flooding. Storm sewer inlets can be located along street and\or in landscaped areas. The following design requirements generally apply to storm sewer inlets located within public streets and right-of-ways. These general concepts can be applied to private collection systems located in parking lots, parks, athletic fields and other areas that have storm sewer inlets and pipes to collect runoff.

The inlet capacity governs both the rate of water removed from the gutter and the amount of water that can enter the storm drain system. Inadequate inlet capacity or poor inlet location may cause flooding which creates a safety hazard and may interrupt traffic or damage adjacent property.

Storm sewer inlets located within public streets are classified into two major groups: Sag inlets and On-Grade inlets. In addition, inlet types vary as well. A brief description of the inlet types follows:

1. Curb-opening inlets: These inlets consist of a vertical opening in the curb through which the gutter flow passes.
2. Grate inlets: These inlets consist of an opening in the gutter covered by one or more grates.
3. Combination inlets: These units consist of both a curb-opening and a grate inlet acting as a single unit.
4. Catch Basin Inlets: These inlets consist of a flat grate opening intended to be installed in a parking lot or landscaped area.

Storm sewer inlets shall conform with the requirements of Section 1205 of the Standard Specifications and applicable current details.

The following are minimum design standards for inlet situations:

1. **Parking Lots and Private Property**: Catch basins installed in parking lots or private pervious areas shall meet the following minimum requirements:
    a. **Catch Basin Capacity**: Provide 150% of the 5-year 24-hour event at each catch basin assuming a 0.5 foot depth;
    b. **Max Ponding Depth**: 18 inches during the 100-year 24-hour event.
    c. **Minimum Freeboard**: 1 foot to finished floor elevations, or lowest openings, of adjacent buildings during the 100-year 24-hour event.
    d. **Overflows**: No uncontrolled (overflow) discharge to the public street right-of-way during the 100-year 24-hour event.

2. **Private Streets**: Meet the requirements of Public Streets.
3. **Public Street Right-of-Ways**: Inlets installed in public street right-of-ways shall meet the following minimum design standards:
    a. **On-Grade Inlets**:
        i. Inlet Capacity: Can use 100% of the computed inlet capacity (i.e. ignore clogging); and
        ii. Minimum Inlet Size: Type 36”
    b. **Sag Inlets**:
        i. Inlet Capacity:
            1. Sag without a Storm Sewer Outfall: Provide 150% of the 5-year 24-hour design flow at curb depth;
            2. Sag with a Storm Sewer Outfall: Provide 150% of the 25-year 24-hour design flow at a depth that does not allow overflow from right-of-way;
        ii. Minimum Inlet Size: Type 72”
        iii. See ***Reference 6-2*** for theoretical capacity of standard inlets in a sag. Design Engineer shall confirm capacities for actual location and products specified.

Storm Sewer Pipe Design Standards

Storm Sewer Pipe design, material and construction shall conform to the requirements of Section 802 and current Standard Drawings of the Standard Specifications.

All storm sewer pipe sizes shall conform to the requirements of ***Table 6-13*** unless approved by the City Engineer.

Table 6-13 *– Storm Sewer Pipe Size Requirements*

Pipe Type	***Minimum Size Requirement***
Public Lateral	15-inch diameter
Public Mainline	18-inch diameter or not decreasing in flow direction
Private Storm Sewer	12-inch diameter
Private Foundation or Building Drain	4-inch diameter

All storm sewer pipes shall be located consistent with the requirements ***Table 6-14*** unless approved by the City Engineer.

Table 6-14 *– Storm Sewer Pipe Location Standards*

Situation	***Design Location***
Street Right-of-Way	Storm sewer parallel to the street and in the right-of-way should be placed beneath the traveled lanes, to fit specific manhole or inlet connections. Storm sewers should be located in streets with 10 feet of horizontal separation from sanitary sewers and water mains. Storm sewer pipe changes in grade or direction shall be made at manholes that are accessible through a standard manhole casting.
Public Easements	Pipe centered in a 30-foot minimum easement width. Easements located outside of street right-of-ways shall include a 20 foot wide all-weather access and maintenance path.
Private Easements	Pipe centered in a 20-foot minimum easement width.

Notes:

(1) Easements shall be noted as "Public" (maintained by the City of Bismarck or other approved public entity) or "Private" (maintained by the Applicant).

(2) Public Easements must be approved by the City.

(3) Private Easements must have a provision to allow access by the City to allow for maintenance of derelict storm sewer pipes.

Pipes shall be designed to withstand anticipated loads in accordance with standard industry design procedures. AASHTO HS-20 loading may be assumed during design unless unique conditions of the site warrant a higher load capacity.

The Design Engineer shall confirm the minimum pipe cover for materials specified for individual projects.

Manholes

Manholes or other maintenance access ports (tee manhole sections on large diameter pipe) are required whenever there is a change in direction, elevation, grade or the junction of two runs of storm sewer.

Manhole design, material and construction shall conform to the requirements of Section 1205 and current Standard Drawings of the Standard Specifications.

Manholes shall be located such that the maximum spacing requirements of ***Table 6-15*** are not exceeded.

Table 6-15 *– Storm Sewer Manhole Spacing Standards*

Situation	***Maximum Manhole Spacing***
18" to 21" Storm Sewer Pipe	450 feet
24" to 30" Storm Sewer Pipe	500 feet
Over 30" Storm Sewer Pipe	600 feet

(1) All pipe sizes are in round diameters.

Manhole size (diameter) shall be sufficient for the size of pipe entering and exiting the structure. ***Table 6-16*** lists the design standards for typical reinforced concrete pipe and precast concrete manholes. The Design Engineer shall confirm that the minimum manhole size listed in ***Table 6-16*** is appropriate for the materials specified for individual projects and angles of pipe entering/exiting the manhole.

Table 6-16 *– Storm Sewer Manhole Typical Minimum Sizes*

Situation	***Minimum Manhole Size***
18" to 24" Storm Sewer Pipe	48-inch Diameter Manhole
27" to 36" Storm Sewer Pipe	60-inch Diameter Manhole
42" Storm Sewer Pipe	72-inch Diameter Manhole
48" and larger Storm Sewer Pipe	Junction Box or Tee Manhole as approved by the City Engineer

(1) Sizing based on recommendations by Forterra. Design engineer to confirm manhole sizing from actual supplier.

(2) All pipe sizes are in round diameters. Design engineer to confirm minimum manhole size to other pipe shapes.

(3) Inlets shall not be utilized as manholes for mainline storm sewer pipe.

Elevation drop shall be provided in manholes per the requirements of ***Table 6-17***.

Table 6-17 *– Storm Sewer Manhole Drop Standards*

Situation[1]	***Minimum Manhole Drop***
Increase in Storm Sewer Pipe Size	Match Crowns of Pipes[2]
Same Size Pipe with less the 45-degree Change in Direction	Carry the Pipe Slope Through the Manhole Structure
Same Size Pipe with 45-degree or greater Change in Direction	Minimum of 0.2 foot Drop Through the Manhole

(1) All pipe sizes are in round diameters. Design engineer to confirm minimum manhole size to other pipe shapes.

(2) In areas of flat topography, City Engineer may waive the requirement to match crowns.

Easements

Storm sewer pipes constructed outside of the street right-of-way shall include drainage meeting the requirements of ***Table 6-14***.

6.2.3 CULVERT DESIGN STANDARDS

Culverts shall conform with the requirements of Section 1205 of the Standard Specifications and applicable current details.

Minimum Size

Culverts shall meet the minimum design requirements of Title 14-09-05 of the City Code of Ordinances.

Table 6-18 *– Minimum Culvert Size Requirements*

Culvert Shape	***Minimum Size***
Round	18-inch Diameter
Arch	22-inch x 13-inch
Elliptical	23-inch x 13-inch
Box	3-foot x 5-foot

Design Considerations

Factors to be taken into consideration in culvert design include design flows, the culvert's hydraulic performance, the economy of alternative pipe materials and sizes, horizontal and vertical alignment, and environmental concerns. The following minimum design considerations shall be met when designing culverts:

1. The minimum size as listed by ***Table 6-18***.
2. The size, shape, and type of culvert crossings shall be based on flow quantities calculated using the hydrologic methods set forth in ***Section 6.1.3***.
3. The structural design of culverts shall conform to those methods and criteria recommended by the manufacturer for that culvert type and for the conditions found at the installation site. However, the minimum standards set forth in the current AASHTO standards shall be adhered to.
4. All culvert inlet structures shall be designed to minimize entrance losses. All culverts shall be fitted with flared end sections, headwalls, wing-walls or other approved methods of entrance loss minimization. Projecting ends are not permitted.
5. Culvert outlets shall be designed to resist the erosive forces from the design storm. All culvert outlets shall be fitted with a flared end section, headwalls, wing-walls or other approved outlet structure. Projecting ends are not permitted.
6. For large structures or where groundwater is a problem, the design shall include necessary provisions to resist hydrostatic uplift forces that could result in failure of the structure.
7. All culvert designs shall include an analysis that determines whether inlet or outlet control conditions govern.
8. Ponding above culvert inlets will not be allowed if such ponding will cause property or roadway damage, culvert clogging, saturation of fills, detrimental upstream deposits of debris, or inundate any other structure.
9. All culvert designs shall meet AASHTO HS-20 loading criteria.

Easements

Culverts extended outside of the street right-of-way shall include drainage easements of a width necessary to contain the 100-year 24-hour water surface elevation required freeboard and maintenance access.

1. Easements shall be noted as "Public" (maintained by the City of Bismarck or other approved public entity) or "Private" (maintained by the Applicant).
2. Public Easements must be approved by the City.
3. Private Easements must have a provision to allow access by the City to allow for maintenance of derelict open channels and culverts.
4. The minimum drainage easement width shall be 30 feet.

6.2.4 OPEN CHANNEL DESIGN STANDARDS

The use of open channels shall generally be limited to undeveloped areas that can conform to the requirements of the hydraulics, topography, and right-of-way limitations.

Minimum Geometry Requirements

Table 6-19 *– Engineered Channel Geometry Requirements*

Parameter	***Minimum Value***
Longitudinal Slope of Channel	0.25 Percent
Side-Slopes	3 Horizontal to 1 Vertical or flatter
Cross Section Shape	Trapezoidal
Minimum Bottom Width	4 feet

Restrictions on Inter-Lot Flow

Overland flow occurs when excess precipitation runs off in sheet fashion prior to accumulating in a drainage way. Overland flow generally occurs on private property and can also be described as inter-lot flows. Restrictions on inter-lot flows include:

1. Overland flow will only be permitted within individual private lots or land parcels, and in defined swales less than 2 feet deep.
2. Storm water runoff cannot be diverted, or channelized, from one private lot downstream though a separate lot unless appropriate easements are executed.
3. Private adjacent lots in common ownership are still required to dedicate easements.

Engineered Channels – Vegetated

In addition to the requirements stated in ***Section 6.1.4*** the following minimum design standards shall be met:

1. Drop structures may be used to control the grade in order to meet the velocity and shear stress requirements.
2. The design shall consider the channel material's ability to withstand projected channel velocities and shear stresses for the 100-year 24-hour event. Channel protection measures shall be designed where necessary.
3. Side slopes greater than 3H:1V may be permitted if approved stabilization is utilized.
4. All grass channels shall include the utilization of a biodegradable or photodegradable erosion control mat to resist the calculated shear stress until vegetation can be established.
5. The grass species selected for seeding shall conform to requirements set forth by the Standard Specifications.

Open Channels – Lined

Lined channels may only be utilized when the conditions for vegetated channels cannot be met and when approved by the City Engineer. Additional requirements for lined channels include:

1. Designs for lined channel with supercritical design flows shall consider the suitability of the lining material to resist calculated shear forces, velocities and hydraulic jumps.
2. Design of lined channels on bends or curves shall take into consideration the centrifugal and gravitational forces on the flow within the channel section.
3. Design and construction of lined channels shall consider the full range of expected climatic conditions including frost heave, expansive soils and other considerations identified by the City Engineer.
4. Lined channels shall be protected from hydrostatic uplift forces by the use of drain piping, weep holes, or appropriate footings.
5. Lined channels must have the bottom sloped so that the flow is channelized toward the center line.
6. When lined channels with high velocity flows enter unlined channels with subcritical flow, a structure for the purpose of reducing velocity and dissipating energy is required. Concrete, gabions, slope mattresses, riprap and other approved measures can be used.

Easements

Open channels shall include drainage easements of a width necessary to contain the 100-year 24-hour water surface elevation required freeboard and maintenance access.

1. Easements shall be noted as “Public” (maintained by the City of Bismarck or other approved public entity) or “Private” (maintained by the Applicant).
2. Public Easements must be approved by the City.
3. Private Easements must have a provision to allow access by the City to allow for maintenance of derelict open channels.
4. The minimum open channel drainage easement width shall be 30 feet regardless of the size of the channel.

6.3 ANALYSIS METHODOLOGIES

The goal of this section is to provide the detailed requirements for the analysis of drainage and conveyance facilities.

6.3.1 HYDROLOGIC ANALYSIS

1. **Unit Hydrograph:** NRCS (formerly SCS) Curve Number (CN) & Time of Concentration (Tc) Methods discussed in ***Section 4.0*** of this SWDSM.
2. **Rational Method**
    a. Intensity-Duration-Frequency (IDF) curves shall be from NOAA Atlas 14 using the Bismarck Municipal Airport station (***Reference 6-3)***.
    b. Intensity (I) shall be based on the Time of Concentration (Tc) to the inlet(s). Note that multiple intensities may be needed for a single system.
    c. Runoff Coefficient (C) shall be determined based on the site cover and obtained from accepted literature. The source used to obtain the Runoff Coefficient(s) shall be stated in the SWMP.

6.3.2 HYDRAULIC ANALYSIS

1. **Inlet Analysis:** Shall use the following methods:
    a. On-Grade:
        i. HEC-22 methodology.
    b. Sag (Low Point):
        i. HEC-22 methodology; or
        ii. Orifice/Weir Equation.

2. **Manning's n Coefficients:**
    a. Manning's n coefficients for commonly used materials and surfaces are provided in ***Table 6-20***.
    b. For surfaces not covered by ***Table 6-20***, values shall be obtained from literature approved by the City Engineer.
    c. The source(s) used to determine any coefficient(s) not provided in ***Table 6-20*** shall be stated in the SWMP.

Table 6-20 *– Manning's Coefficients*

Material/Surface	*Manning's n Coefficient*
RCP	0.013 – 0.014
CMP	0.022 – 0.024
HDPE (smooth)	0.010 – 0.012
HDPE (corrugated)	0.021 – 0.023
PVC	0.010 – 0.012
Vegetated Channel (not mowed)	0.035 – 0.050
Maintained Ditch/Channel (mowed)	0.030 – 0.040
Concrete Channel	0.015
Street (Asphalt)	0.014 – 0.016
Street (Concrete)	0.013 – 0.015
Urban Street Boulevards	0.045

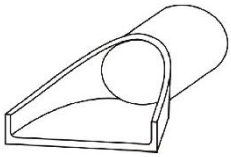
3. **Entrance and Exit Coefficients:**
    a. Entrance and Exit Coefficients for common configurations are provided in ***Table 6-21*** and ***Figure 6-1***.
    b. For situations not covered by ***Table 6-21***, values should be obtained from accepted literature approved by the City Engineer.
    c. The source(s) used to determine any coefficient(s) not provided in ***Table 6-21*** shall be stated in the SWMP.

Table 6-21 *– Entrance and Exit Coefficients*

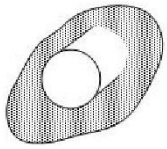
	Material	***Design Scenario***	***Entrance Coefficient***	***Exit Coefficient***
Pipe or Arch Culverts	RCP	Flared End Section	0.5	1.0
		Square Cut*	0.5	
		Socket or Rounded*	0.2	
	CMP or HDPE	Projecting	0.9	
		Mitered	0.7	
		Conforms to Fill	0.5	
Box Culverts RCP		No Wingwalls	0.5	1.0
		Wingwalls (30° - 75°)	0.4	
		Wingwalls (10° - 25°)	0.5	
		Wingwalls (Straight)	0.7	

*Applies to Headwall or Projecting

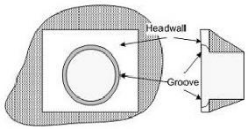
Figure 6-1 – *Entrance and Exit Configurations*



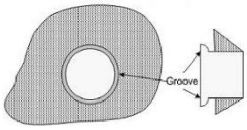
Flared-End Section
These are common end sections that function hydraulically equivalent in operation to a headwall in both inlet and outlet control.



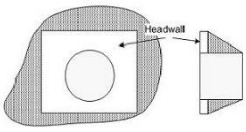
Projecting
This configuration results in the end of the culvert barrel projecting out of the embankment.



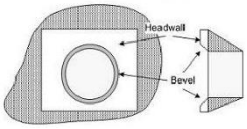
Grooved Pipe with Headwalls
The grooved pipe is for concrete culverts and decreases the loss through the culvert entrance.



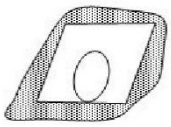
Grooved Pipe Projecting
This option is for concrete pipe culverts.



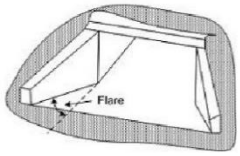
Square Edge with Headwalls
Square edge with headwalls is an entrance condition where the culvert entrance is flush with the headwall.



Beveled Edge with Headwalls
A beveled edge is a tapered inlet edge that decreases head loss as flow enters the culvert barrel.



Mitered
A mitered entrance is when the culvert barrel is cut so it is flush with the embankment slope.



Wingwall
Wingwalls are used when the culvert is shorter than the embankment and prevents embankment material from falling into the culvert.

Source: http://www.fhwa.dot.gov/

4. **Storm Sewer Junction Losses**
    a. Minimum storm sewer junction losses are provided in ***Table 6-22***.
    b. For situations not covered by ***Table 6-22*** values should be obtained from accepted literature approved by the City Engineer.
    c. The source(s) used to determine any coefficient(s) not provided in ***Table 6-22*** shall be stated in the SWMP.

Table 6-22 – *Storm Sewer Junction Losses*

Design Scenario	*Entrance Coefficient*	*Exit Coefficient*
Inlet Junction	0.2	0.5
Manhole Junction	0.1	0.3

5. **Inlet/Outlet Control:**
    a. Analysis method shall account for both the potential for inlet or outlet control conditions with the water surface based on the higher computed water surface elevation.
    b. Inlet/outlet control shall be computed at all surface entrances to storm sewer (e.g. ditch draining to a flared end section) and culverts.
6. **Inlet Analysis Clogging Factor:**
    a. Inlet clogging factors are not required.
    b. For situations that the Design Engineer determines inlet clogging factors are necessary or applicable, state the use of clogging factors in the SWMP.
7. **Shear Stress:** Shall be calculated using the following equation:

$$\tau = \gamma D S$$

Where:

τ = Shear Stress (lb/ft^2)

γ = Weight of Water (lb/ft^3)

D = Average Depth of Water (ft)

S = Surface Water Slope (Energy Grade Line)

6.3.3 ACCEPTABLE DRAINAGE AND CONVEYANCE MODELS

See ***Reference 6-4***.

6.4 REFERENCES

Reference 6-1 – Allowable Shear and Velocity of Selected Materials
Reference 6-2 – Capacity of Sag Inlets
Reference 6-3 – IDF Curves
Reference 6-4 – Acceptable Models

7.0 CONSTRUCTION STORMWATER CONTROL

The goal of this section is to provide guidance on the design, performance, and analysis of the Construction Stormwater Control requirements of the City of Bismarck. In general, the following sections describe the standards that are to be achieved to obtain Large Site CSMP for projects that meet the thresholds described in ***Section 3.***

Projects that meet the impact threshold requirements for a Small Site CSMP can utilize the Small Site CSMP Application and Checklist available from the office of the City Engineer. All design and performance requirements for Small Site CSMP projects are contained in the Small Site CSMP Application and Checklist.

Uncontrolled stormwater runoff from construction sites has the potential to impact natural drainages and adjacent property in an adverse manner. All projects that exceed the land disturbance thresholds defined in ***Section 3*** shall obtain the necessary Construction Stormwater Management Permit (CSMP) coverage from the City of Bismarck and, if necessary, the State of North Dakota (ND General Construction Permit).

This SWDSM does not generally require specific BMPs for all projects or sites because practices should be selected on a case-by-case basis depending on the particular physical characteristics of the site, types and methods of construction activities, and the duration and schedule of the activities.

7.1 PERFORMANCE REQUIREMENTS

All projects requiring a CSMP shall develop and implement a site specific SWPPP including appropriate BMPs to limit the discharge of sediment-laden or otherwise contaminated stormwater until all construction actives are completed and the site has achieved final stabilization.

The following sections define the minimum performance requirements for the SWPPP, Minimum Controls, Monitoring & Record Keeping, and Final Stabilization. All Large Site CSMP permit applications shall consist of the materials defined in ***Section 3*** meeting the performance requirements defined below.

7.1.1 STORMWATER POLLUTION PREVENTION PLAN

All construction projects that meet the disturbance thresholds listed in ***Section 3*** are required to prepare a site specific Stormwater Pollution Prevention Plan (SWPPP) to obtain a CSMP.

Small Site CSMP projects utilize a simplified application and checklist that constitutes the required site specific SWPPP.

Large Site CSMP applications shall include a site specific SWPPP that conforms with the requirements of the ND Construction General Permit.

7.1.2 SWPPP MINIMUM CONTROLS

The SWPPP shall, at a minimum, address the following items:

1. Construction Site Management Controls

2. Erosion Controls
3. Sediment Controls
4. Runoff Controls
5. Waste Management & Illicit Discharge Controls
6. Restoration & Final Stabilization Controls
7. Inspections and Record Keeping

Construction Site Management Controls

The SWPPP shall describe the Construction Site Management Controls with the minimum information:

1. **Project Description:** Each plan shall provide a description of the construction activity and potential sources of pollution as indicated below:
    a. Project type and construction activities;
    b. Total project area and total area of the site that is expected to be disturbed by construction activities;
    c. A description of the NRCS soil type and erosion potential for soils contained in the project area; and
    d. Location of the Point of Discharge to the Public Storm Sewer System for discharges leaving the site.
2. **Site Plan Map**: Meeting the requirements of the ND General Construction Permit
3. **Construction Site Management Narrative**: At a minimum describe:
    a. The person (by name and relationship) who is responsible for the implementation of the CSMP BMPs, inspection and maintenance of the CSMP BMPs until a NOT is filed or the permit is transferred;
    b. The installation, maintenance, and removal (if applicable) requirements of proposed Best Management Practices (BMPs) for each phase/stage of construction activity;
    c. The rationale for the selection of all BMPs (calculations should be included if appropriate); and
    d. Whether selected BMPs are temporary or permanent.
4. **Construction Operational BMPs:** The SWPPP shall describe the BMPs used in the day to day operation of the project site that reduce the concentration of pollutants in stormwater runoff by identifying:
    a. Good housekeeping practices used to maintain a clean and orderly site.
    b. Preventative maintenance practices used to ensure the proper operation of erosion and sediment control devices (e.g., fiber rolls, erosion control blankets and silt fences) and equipment used or stored on site.
    c. Spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other

chemicals shall have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

d. Site operation BMPs to limit the exposed soil including construction sequencing, construction schedule and preservation of natural vegetation.

Erosion Controls

The SWPPP shall identify the minimum erosion control BMPs that are to be implemented to minimize the potential for soil to become mobilized into stormwater runoff. Erosion Control BMPs are a preferred method for temporarily stabilizing exposed soils to limit sediment laden stormwater discharges.

Erosion control BMPs consist of:

- **Avoidance measures** intended to limit the amount of area disturbed at the same time; and
- **Erosion control measures** that temporarily stabilize exposed soils.

Stabilized means the exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, or other BMPs that prevents erosion from occurring. Grass seeding alone is not stabilization. Snow cover and frozen ground conditions are not considered stabilized.

The SWPPP shall address the following minimum requirements for Erosion Control BMPs:

1. **Construction Phasing and Protection of Vegetation**: The SWPPP shall address the following minimum construction practices and shall guide the scheduling and phasing of the construction activities for the purpose of limiting exposed soils:
    a. **Phased Grading & Stabilization**: The SWPPP shall consider phasing of the project to minimize the area of exposed soil during construction activities. Stabilization of the site shall occur as areas reach final lines and grades.
    b. **Protection of Existing Vegetation**: Areas not to be disturbed by grading activities shall be protected and utilized as natural buffers as allowed by the site conditions. The SWPPP shall strive to limit construction activities to active grading areas and locations to be disturbed.
    c. **Staging and Stockpile Areas**: Staging and Stockpile areas shall be noted on the SWPPP. When practical, staging and stockpiles areas shall be located in areas that require disturbance from grading or other construction activities.
2. **Minimum Stabilization Requirements**: The following minimum stabilization requirements shall guide the selection of erosion control BMPs for the project site:
    a. **Exposed Soils**: All exposed soil areas must be stabilized.
        i. Stabilization must be initiated immediately where activities have been permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding fourteen (14) calendar days.
        ii. Stabilization must be completed as soon as practicable, but no later than fourteen (14) calendar days after the initiation of soil stabilization.

iii. Temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) are exempt from this requirement.

b. **Exposed Soils on Steep Slopes**: For slopes with a grade of 3H:1V or greater, stabilization must be initiated immediately once activities have been completed or temporarily ceased. Stabilization must be completed as soon as practicable, but no later than seven (7) calendar days after the initiation of soil stabilization.

c. **Channels, Ditches and Swales**: The 2-year 24-hour normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized at least 200 linear feet from the property edge, or from the point of discharge to any surface water. Stabilization shall be completed prior to connection with a surface water. Any remaining portion of the temporary or permanent drainage ditch must be stabilized within fourteen (14) calendar days for portions which construction activities have temporarily or permanently ceased.

3. **Protection of Outlets:** Erosion control BMPs shall be installed at the inlet and outlet of all culverts, outfalls, roof drains and other sources of concentrated flow from a conduit.

Sediment Controls

The SWPPP shall identify the minimum sediment control BMPs that are to be implemented to limit sediment laden stormwater from discharging from the project area onto adjacent property or into the Pubic Storm Water System. Sediment Control BMPs are the last line of protection and should not be utilized as the primary method of construction site stormwater management.

The SWPPP shall meet the following minimum requirements for Sediment Control BMPs:

1. **Design Storm**: Sediment Control BMPs are expected to withstand and function properly during precipitation events of up to the 2-year 24-hour storm event. Visible erosion and/or off-site sediment deposition from such storm events should be minimal.
2. **Minimum Sediment Control BMPs**: Prior to the start of land disturbing activities, all projects shall have the following minimum sediment control BMPs in place and functioning:
    a. **Perimeter Control**: Consisting of silt fence, straw wattles, vegetative buffers or other applicable BMP at the down gradient perimeter of the project site;
    b. **Inlet Protection**: For all Public and Private Storm Sewer inlets or catch basins located within 600 feet (down-gradient) of the Point of Discharge(s) from the project site;
    c. Stabilized Construction Access: All construction egress points that exit the project site to paved public or private areas shall have appropriate tracking prevention BMPs (note that sweeping alone does not constitute tracking prevention); and
    d. Soil Stockpiles: All soil stockpiles shall include perimeter sediment control BMPs.

3. **Sediment Traps or Basins:** Temporary sediment basins or traps shall be utilized at all points of discharge from the project site where the tributary area to the point of discharge is equal to or greater than 10 acres.
4. **Natural Buffers:** A 50-foot natural buffer or equivalent erosion and sediment controls must be provided when a project is within 50 feet of a surface water and stormwater flows to the surface water. If equivalent erosion and sediment controls are used, rationale for using equivalent controls must be provided in the SWPPP.
5. **Soil Stockpiles:** Are both temporary and permanent collections of soil material that has been excavated or hauled to the site. Generally, soil stockpiles consist of material that will be utilized in subsequent phases of the project. All soil stockpile locations shall be noted on the SWPPP and utilize the following minimum BMPs.
    a. Perimeter sediment controls shall be installed at the base of all soil stockpiles;
    b. Temporary stabilization of all piles where no construction activities will occur for seven days or longer; and
    c. Final Stabilization is required of all stockpiles that are to be left on-site and not utilized as construction materials for future phases.

Runoff Control

The SWPPP shall identify the minimum construction stormwater Runoff Control BMPs that are to be implemented to minimize the potential for erosion of soils and impact to open water drainages or natural drainages on and adjacent to the project site.

The SWPPP shall address the following minimum requirements for the section of applicable Runoff Control BMPs:

1. **Design Storm**: Construction Drainage Management BMPs shall meet the following requirements for design storms:
    a. **Check Dams**: Are expected to withstand and function properly during precipitation events of up to the 2-year 24-hour storm event;
    b. **Temporary Stormwater Diversions**: Are expected to withstand and function properly during precipitation events of up to the 5-year 24-hour storm event; and
    c. **Permanent Stormwater Diversions**: Shall meet the requirements of ***Section 6*** for the Post-Construction stormwater management.
2. **Overflow Paths**: The SWPPP shall identify construction stormwater overflow paths for events greater than the design storm and shall include a description for how runoff ultimately gets to an established natural or artificial waterway. Construction scheduling and phasing shall consider conveyance of construction stormwater to the point of discharge that minimizes the potential for damage to adjacent property or structures.

Waste Management & Illicit Discharge Control

The SWPPP shall identify the minimum Waste Management & Illicit Discharge Control BMPs that are to be implemented to minimize the potential for a non-stormwater discharge from the project site.

The SWPPP shall address the following minimum requirements for the selection of applicable Waste Management & Illicit Discharge BMPs:

1. **Concrete Washout**: All projects shall have a designated concrete truck washout location to eliminate the potential for concrete or concrete wash water to be discharged from the project site. Maintenance and disposal of Concrete Washout Areas shall be the responsibility of the permittee.
2. **Vehicle Washing Areas**: All projects that will include on-site vehicle washing shall have designated vehicle and equipment wash areas with BMPs to eliminate the potential for wash water to discharge from the project site.
3. **Spill Prevention and Control Plan:** All projects shall have BMPs for chemical, fuel, lubricant and other non-stormwater spills and cleanup.
4. **Waste Disposal:** All projects shall provide designated waste management collection areas. All waste collected shall be disposed of at a facility licensed or approved for the material to be disposed.

Restoration and Final Stabilization

The SWPPP shall identify the schedule and type of final stabilization for all areas disturbed by construction activities.

7.1.3 MONITORING AND RECORD KEEPING

The permittee is responsible for self-monitoring and reporting. Copies of the CSMP, SWPPP, monitoring reports and maintenance records shall be kept on the project site during normal operating hours for review by City Staff.

All sites that require coverage under the ND Construction General Permit shall follow the monitoring and record keeping requirements of the required permit. These records shall be kept on-site for review by City staff consistent with the requirements for ND Construction General Permit.

Projects that require a Large Site CSMP and do not meet the threshold of the ND Construction General Permit shall meet the following monitoring and record keeping requires:

1. Inspections shall be performed by or under the direction of the permittee at least once every 14 calendar days and within 24 hours after any storm event of greater than 0.25 inches of rain per 24-hour period.
2. Inspections are only required during normal working hours. The permittee shall use a rain gauge on-site or utilize the nearest National Weather Service precipitation gauge station. Rain gauge locations or stations must be representative of the site.
3. "Within 24 hours after any storm event greater than 0.25 inches rain per 24-hour period" means that the permittee is required to conduct an inspection within 24 hours once a storm event has produced 0.25 inches, even if the storm event is still continuing. If there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more rain, you are required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

4. There may be times when a site inspection may not be practical at the specified time. Adverse climatic conditions, such as flooding, high winds, tornadoes, electrical storms, site access constraints, etc., may prohibit inspections. The permittee must include a description of why the inspection(s) could not be performed at the designated time in the next inspection record. If an inspection is delayed due to adverse weather conditions or rain events outside normal working hours, an inspection must be conducted during the next working day, or as conditions allow.
5. Some erosion and sediment control measures may require more frequent inspection based on location (e.g., sensitive areas or waters of the state) or as a result of recurring maintenance issues. Erosion or sediment control measures found in need of maintenance between inspections must be repaired or supplemented with appropriate measures as soon as practicable. Erosion and sediment control measures which require more frequent inspection based on location or as a result of recurring maintenance issues must be identified in the SWPPP.
6. Records of inspection activity shall include:
    a. Date and time of inspections;
    b. Name of person(s) conducting inspections;
    c. Findings of inspections, including recommendations and schedule for corrective actions;
    d. Date and amount of all rainfall events greater than 0.25 inches in 24 hours; and
    e. Documentation that the SWPPP has been amended when changes are made to BMPs in response to inspections.
7. Records for corrective action and maintenance activities shall include:
    a. BMP corrected;
    b. Date and time of corrective action;
    c. Name of person(s) performing corrective actions; and
    d. Description of corrective actions and maintenance activities.
8. Completed areas that have been stabilized but do not meet the criteria for final stabilization may be inspected once per month. Inspections may be suspended for parts of the construction site that meet final stabilization requirements. The SWPPP must be updated to identify any areas which meet this condition.

7.1.4 FINAL STABILIZATION

Termination of coverage for a CSMP requires that the project achieve final stabilization as described below:

Small Site Final Stabilization

The permittee(s) must ensure final stabilization of the site consistent with the requirements of the ND Construction General Permit. Final stabilization for small sites shall be considered achieved when one of the following scenarios has been met:

1. All soil disturbing activities for the project have been completed and all soils have been stabilized by a permanent surface covering. For "grass" vegetated areas, soils will be

considered stabilized when a uniform perennial vegetative cover with a density of 70 percent is achieved;

2. All of the following conditions are met: 1) all soil disturbing activities for the project have been completed and all soils have been stabilized.; 2) down gradient stormwater controls for individual lots has been implemented and the residence has been transferred to the homeowner; and 3) the permittee has distributed a "Stormwater Fact Sheet" to the homeowner to inform the homeowner of the lot specific need for drainage patterns and maintenance of the final stabilization; or
3. The control of the residential lot is transferred to a homeowner and the house becomes an occupiable residence. If the transfer and occupiable status occurs during the stabilization period (or scheduled stabilization period) the requirement to stabilize the site ends for the permittee.

Large Site Final stabilization

Final stabilization for large sites shall be considered achieved when:

1. All soil disturbing activities for the project have been completed and all soils have been stabilized by a permanent surface covering. For "grass" vegetated areas, soils will be considered stabilized when a uniform perennial vegetative cover with a density of 70 percent is achieved;
2. All drainage ditches, constructed to drain water from the site after construction is complete, have been stabilized to preclude erosion;
3. All temporary erosion prevention and sediment control BMPs (such as silt fence) have been removed and disposed of in a proper manner; and
4. All sediment has been removed from conveyances and temporary sedimentation basins that will be used as permanent water quality management basins. Sediment must be stabilized to prevent it from being washed into basins, conveyances or drainage ways discharging off-site, or to surface waters or adjacent properties. The cleanout of permanent basins must be sufficient to return the basin to design capacity.

7.2 BMP MINIMUM DESIGN STANDARDS

BMPs are a key component of the SWPPP required by this SWDSM and the ND Construction General Permit for construction activities that exceed the land disturbance thresholds that trigger permit coverage. BMPs are measures or controls that reduce the transport of pollutants, including sediment, from the project site. These practices can also be used to divert runoff away from areas of exposure to pollutants, or to treat stormwater runoff before discharge to receiving waters. BMPs are designed to address the quality of stormwater leaving the site, and to meet environmental water quality standards or benchmarks. BMPs are most effective when organized into a comprehensive SWPPP.

Selection of BMPs for a site specific SWPPP is outside of the scope for this SWDSM. There are numerous sources for construction stormwater BMP manuals that are acceptable sources of selection and design criteria. Examples include:

1. EPA National Menu of Best Management Practices (BMPs) for Stormwater

2. North Dakota Department of Transportation Erosion and Sediment Control Handbook
3. International Stormwater BMP Database
4. Minnesota Pollution Control Agency
5. Wisconsin Department of Natural Resources

The following sections provide basics BMP design standards that can be used to supplement the recommendations of accepted BMP manuals.

7.2.1 WORK IN THE PUBLIC RIGHT-OF-WAY

All work performed under City of Bismarck construction contracts or within the public right-of-way shall conform with the Standard Specifications.

7.2.2 CONSTRUCTION SITE MANAGEMENT CONTROLS

The following list includes key concepts to consider when selecting BMPs for the site specific SWPPP:

1. Minimize the open area by phasing or sequencing construction and preserving existing vegetation where possible.
2. Divert stormwater away from disturbed or exposed areas when possible.
3. Install BMPs to limit the potential for soil to become mobilized in stormwater runoff (erosion control).
4. Install BMPs to capture soil that becomes mobilized in stormwater runoff prior to discharging from the project site (sediment control).
5. Inspect the site regularly and properly maintain BMPs, especially after rainfall, high winds, and snowmelt events.
6. Revise the SWPPP as site and climatic conditions change during the construction and if BMPS are not effectively controlling erosion and sediment.
7. Keep the construction site clean by putting refuse in proper containers, keeping storage bins covered and preventing or removing excess sediment on roads or other impervious surfaces.

7.2.3 EROSION CONTROL

Erosion control BMPs identified in the SWPPP or utilized for the project site shall meet the following minimum design standards:

1. **Channel Erosion Control Mats:** When erosion control mats are utilized to stabilize proposed and existing stormwater channels, swales, or ditches during construction and final stabilization establishment, the following minimum design standards shall be met:
    a. Temporary Mat shall be selected to resist the calculated shear stress for the 2-year 24-hour design flow.
    b. Permanent mat shall be selected based on the calculated velocity and shear as described in ***Section 6***.
    c. Mat shall be installed after all top soiling, fertilizing and seeding has been completed, unless the manufacturer requires otherwise.

d. Mats shall extend to whichever is greater: upslope one-foot minimum vertically from the ditch bottom or 6 inches higher than the design flow depth.

e. The mat shall be in firm and continuous contact with the soil. It shall be anchored, overlapped, staked and entrenched per the manufacturer's recommendations.

f. Temporary Mats shall be selected so that they last long enough for the grass or other vegetation to become densely established.

g. It may be difficult to establish permanent vegetation and adequate erosion protection in a channel with continuous flow. The Design Engineer should consider riprap or other channel lining methods.

h. Once a gully has formed in a channel, it is difficult to stabilize due to loss of soil structure. Even when the gully is filled with topsoil and reseeded, the soil has a tendency to dislodge in the same pattern. If gully formation continues to be a problem the design should be reevaluated, including the use of other mat classes and/or energy dissipation such as ditch checks or riprap.

2. **Non-Channel Erosion Control Mats**: Erosion control mats utilized to stabilize exposed soils on slopes or other areas of high potential for erosion during the establishment of final stabilization shall meet the following minimum design requirements:

   a. The purpose of this practice is to protect the soil surface from the erosive effect of rainfall, prevent sheet erosion during the establishment of grass or other vegetation, and to reduce soil moisture loss due to evaporation.

   b. Only 100% biodegradable or photodegradable mats shall be utilized.

   c. Mat shall be selected to resist the calculated shear stress for the 2-year 24-hour design flow.

   d. Mat shall be installed after all top soiling, fertilizing, and seeding has been completed.

   e. The mat shall be in firm and continuous contact with the soil. It shall be anchored, overlapped, staked and entrenched per the manufacturer's recommendations.

3. **Mulching**: Mulching is the application of organic material to the soil surface to protect it from raindrop impact and sheet flow. Mulch covers the soil and absorbs the erosive impact of rainfall and reduces the flow velocity of runoff. When mulching is used, the following minimum requirements must be met:

   a. This practice may be applied on exposed soils as a temporary control where soil grading or landscaping has taken place or in conjunction with temporary or permanent seeding.

   b. Mulching is not allowed in channels or areas of concentrated flow.

   c. Mulching is not allowed in detention or retention basins.

   d. Mulch shall consist of natural biodegradable material such as plant residue (including but not limited to straw, hay, wood chips, bark and wood cellulose fiber), or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended effect for the required time period.

e. Mulch shall be environmentally harmless to wildlife and plants. Materials such as gravel, plastic, fabric, sawdust, municipal solid waste, solid waste byproducts shredded paper, and non-biodegradable products shall not be used.
f. Mulch shall be free of diseased plant residue, noxious weed seeds, harmful chemical residues, heavy metals, hydrocarbons and other known environmental toxicants.
g. Straw and hay mulch that will be crimped shall have a minimum fiber length of 6 inches.
h. Wood chips or wood bark shall only be used for sites that are not seeded.
    i. Wood products typically absorb available soil nitrogen as they degrade, thus making it unavailable for seed.
i. Mulch Anchoring Methods: Anchoring of mulch shall be based on the type of mulch applied, site conditions, and accomplished by one of the following techniques:
    i. Crimping;
    ii. Biodegradable Netting; or
    iii. Tackifier.
j. Considerations:
    i. The use of mulch behind curb and gutter may not be desirable unless anchored by netting because air turbulence generated from nearby traffic can displace the mulch. Consider the use of erosion mat or sod as an alternative.
    ii. In areas where lawn type turf will be established, the use of tackifiers is the preferred anchoring method. Crimping will tend to leave an uneven surface and plastic netting can become displaced and entangled in mowing equipment.
    iii. Concentrated flows above the site where mulch is applied should be diverted.
    iv. Mulch should be placed within 24 hours of seeding.
    v. Materials such as gravel may be effective for erosion control but are not considered mulches.

7.2.4 SEDIMENT CONTROLS

Sediment control BMPs identified in the SWPPP or utilized for the project site shall meet the following design standards:

1. **Perimeter Control**: Sediment control practices are installed generally at the perimeter of a project site or disturbed area. Perimeter control BMPs shall meet the following criteria:
    a. Installed per the manufacturers recommendations and applicable City of Bismarck Standard Construction Details.

b. Silt Fence, Straw Wattles, Weight Fiber Roll and similar perimeter control BMPs shall be embedded as directed by the manufacturer, or standard detail, to limit the potential for runoff to short circuit underneath the installed BMP.

c. Perimeter BMPs shall be installed along topographic contours to promote the natural dispersion of runoff. Installation across contours without consideration for the dispersion of flow will not be allowed.

d. Removal of sediment collected behind BMPs shall occur before the accumulation reaches 1/2 of the height of the BMP and per manufactures recommendations.

2. **Inlet Protection**: A temporary device installed in or around a storm drain inlet, drop inlet, or curb inlet. All inlet protection BMPs shall:

   a. Be installed and maintained per the manufactures recommendations;

   b. Allow for high flows to enter the inlet and storm sewer system;

   c. Be maintained on a regular basis to remove accumulated sediment and debris; and

   d. Meet the requirements of the Standard Specifications when installed in a public street right-of-way.

3. **Stabilized Construction Access:** Consists of a stabilized pad of stone aggregate, or other tracking prevention BMP approved by the City Engineer, located at any point where traffic will egress a construction site. Stabilized construction access pads shall meet the following minimum design standards:

   a. The construction access pad shall be installed prior to any traffic leaving the site;

   b. The aggregate for construction access pads shall be 3 to 6 inch clear or washed stone with all material retained on a 3-inch sieve;

   c. The aggregate shall be placed in a layer at least 12 inches thick. On sites with a high water table, or where saturated conditions are expected during the life of the practice, stone tracking pads shall be underlain with a separating geotextile fabric to prevent migration of underlying soil into the stone;

   d. The construction access pads shall be the full width of the egress point and a minimum of 50 feet long;

   e. Surface water must be prevented from passing through the construction access pads. Flows shall be diverted away from construction access pods or conveyed under and around them by using a variety of practices, such as culverts, or other similar practices; and

   f. Any sediment tracked onto a public or private road should be removed by street cleaning, not flushing, at a minimum before the end of each working day or sooner as weather and safety may require.

4. **Sediment Traps or Basins:** Temporary or permanent sediment basins or traps shall be sized to meet the following requirements:

   a. Sediment traps or basins shall be sized such that they provide:

      i. Storage volume corresponding to a calculated volume of runoff from a 2-year 24-hour storm per acre drained to the basin and provide not less than 1,800 cubic feet of sediment storage below the invert of the outlet pipe from each acre drained to the basin; or

ii. 3,600 cubic feet of sediment storage below the invert of the outlet pipe per acre drained to the basin if calculations are not performed.

b. Outlets must be designed to avoid short-circuiting and the discharge of floating debris. Basins must be designed with the ability to allow complete basin drawdown for maintenance activities. Basins must release the storage volume in at least 24 hours.

c. Outlet structures must be designed to withdraw water from the surface, unless not practicable. If not practicable, rationale must be provided in the SWPPP. The basin must have a stabilized emergency overflow to minimize the risk of failure. Energy dissipation must be provided for the basin outlet.

5. **Vegetative Buffers**: When vegetative buffers are utilized as perimeter sediment control, the following minimum design standards shall be met:
   a. Vegetated buffers must have a minimum width of 1 foot for every 5 feet of disturbed area that drains to the buffer.
   b. The width of the buffer shall have a slope of 5 percent or less and the area draining to the buffer shall have a slope of 6 percent or less.
   c. Concentrated flows should be minimized throughout the buffer.
   d. Buffers shall consist of dense grassy vegetation, 3 to 12 inches tall with uniform coverage over 90 percent of the buffer. Woody vegetation shall not be counted for the 90 percent coverage. No more than 10 percent of the overall buffer may be comprised of woody vegetation.

7.2.5 RUNOFF CONTROLS

Runoff control BMPs identified in the SWPPP or utilized for the project site shall meet the following minimum design standards:

1. **Check Dams:** Temporary dams constructed across a swale or drainage ditch to reduce the velocity of water flowing in the channel. Check Dams can be constructed out of stone, a double row of straw bales or from engineered products. Check Dams shall meet the following minimum design standards:
   a. Under no circumstance shall check dams be placed in an intermittent or perennial stream without approval of a USACE 404 Permit.
   b. Height:
      i. Installed, the minimum height of ditch checks shall be 10 inches and shall not exceed a maximum height of 16 inches for manufactured or biodegradable materials and 36 inches for stone (or other inorganic materials).
      ii. Installed with the center lower than the sides forming a weir to prevent scour along the edge of the channel.
      iii. Stone check dams shall have a minimum top width of 2 feet measured in the direction of flow with maximum slopes of 2:1 (2 horizontal to 1 vertical) on the upslope and downslope sides.
   c. Placement:

i. At a minimum, install one check dam for every two feet of drop in the channel.

ii. Check dams shall be placed such that the resultant ponding will not cause inconvenience or damage to adjacent areas.

d. Materials shall be in accordance with the requirements of the Standard Specifications or as approved by the City Engineer.

e. Ditch checks shall be utilized during rough grading and shall be removed once the final grading and channel stabilization is applied, unless intended to be part of a permanent SWMP.

f. Ditch checks installed in grass lined channels may kill the vegetation if water is ponded for extended periods or excessive siltation occurs. Proper maintenance is required to keep areas above and below the ditch check stabilized.

g. When placing ditch checks in swales adjacent to roadways, consider designating a 'clear zone' free of obstacles posing a threat to out of control vehicles.

2. **Temporary Stormwater Diversions**: Temporary stormwater diversions are a temporary berm or channel constructed for the purpose of intercepting, diverting and safely conveying run-on around exposed soils or the project area. Temporary stormwater divisions shall meet the following minimum design standards:

a. This practice is applicable to construction sites where temporary surface water runoff control or management is needed. Locations and conditions include:

i. Upstream of disturbed areas, to limit runoff onto the site.

ii. Across slopes to reduce slope length.

iii. Below slopes to divert excess runoff to stabilized outlets.

iv. To divert sediment-laden water to sediment control facilities.

v. At or near the perimeter of the construction area to keep sediment from leaving the site.

b. Permanent diversions shall meet the requirements of ***Sections 4.0 - 7.0*** of this SWDSM.

c. Sediment-laden runoff from disturbed areas shall be diverted into a sediment control BMP.

d. When diverting clean water, the diversion channel and its outfall shall be immediately stabilized for the 2-year frequency, 24-hour duration storm. Construct and stabilize clean water diversions before initiating down slope land-disturbing activities.

e. Diversions shall be protected from damage by construction activities. At all points where diversion berms or channels will be crossed by construction equipment, the diversion shall be stabilized or shaped appropriately. Temporary culverts of adequate capacity may be used.

f. For diversions that are to serve longer than 30 days, the side slopes including the ridge, and down slope side the diversion shall be stabilized as soon as they are constructed. The diversion channel shall be stabilized with an erosion control mat or other suitable lining that can stay in place for the service time of the diversion.

g. For diversions serving less than 30 days, the down slope side of the diversion shall be stabilized as soon as constructed.

h. The channel cross section may be parabolic, or trapezoidal. The use of "V" channels is generally discouraged due to potential erosion problems.

i. Check dams may be used to enhance sediment removal and provide energy dissipation.

7.2.6 WASTE MANAGEMENT & ILLICIT DISCHARGE CONTROLS

Waste Management & Illicit Discharge control BMPs identified in the SWPPP or utilized for the project site shall meet the following minimum design standards:

1. **Concrete Washout:** Concrete washouts are a designated area on the project site for the washout of concrete trucks to prevent or reduce the discharge of pollutants to stormwater. All sites that utilize concrete as a construction material shall have a designated concrete washout that meets the following minimum design standards:
    a. Locate washout area at least 50 feet from sensitive areas such as storm sewers, open ditches, or other natural and man-made water bodies, including wetlands.
    b. The minimum sized washout pit shall be 10-feet x 10-feet x 3-feet (LxWxD) and shall be lined with a 15-mil plastic liner.
    c. Constructed above ground to limit the potential for an illicit discharge due to overflowing from runoff or snowmelt events.
    d. Have signs directing concrete trucks to the designated wash out area.
    e. Allow convenient access for concrete trucks, preferably near the area where the concrete is being poured.
    f. On large sites with extensive concrete work, washouts may need to be placed in multiple locations for ease of use by concrete truck drivers.
    g. Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
    h. Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis, prior to exceeding 80% of the total capacity.
2. **Vehicle Wash Area**: For situations that a stabilized construction pad is not sufficient to limit tracking or non-stormwater discharge, a tire washing station shall be placed at any point of traffic egress When a vehicle wash BMP is utilized, the following minimum design standard shall be met:
    a. The washing station shall be located on-site in an area that is stabilized and drains into a suitable sediment trapping or settling device.
    b. The wash rack shall consist of a heavy grating over a lowered area. The rack shall be strong enough to support the vehicles that will cross it.

7.2.7 RESTORATION & FINAL STABILIZATION CONTROLS

Restoration and final stabilization control BMPs identified in the SWPPP or utilized for the project site shall meet the following minimum design standards:

1. **Exposed Soils**: All soils disturbed and or exposed by the construction activities shall be permanently stabilized by:
    a. Creation of permitted impervious surface; and
    b. Establishment of permanent vegetation consisting of final landscaping. Temporary seeding of exposed areas between phases in the project (for example subdivision mass grading and home site development) is not considered final stabilization.
2. **Permanent Seeding**: Permanent seeding consists of final vegetative cover of the site for the purpose of achieving final stabilization of exposed soils. Permanent seeding shall meet the minimum design standards:
    a. Topsoil installation shall be completed prior to permanent seeding.
    b. Permanent seeding requires a seedbed of loose topsoil to a minimum depth of 4 inches with the ability to support a dense vegetative cover.
    c. Application rates of fertilizer or lime shall be based on soil testing results.
    d. Prepare a tilled, fine, but firm seedbed. Remove rocks, twigs, foreign material and clods over 2 inches that cannot be broken down.
    e. The soil shall have a pH range of 5.5 to 8.0.
    f. Seed material and seeding rates shall meet the requirements of the Standard Specifications.

7.3 ANALYSIS METHODOLOGIES

The goal of this section is to provide specific analysis methodologies for Construction Stormwater Control as required by the North Dakota Construction General Permit and the City's MS4 General Permit (***Reference 7-1***). Note that Small Site CSMP applications do not need a hydrologic or hydraulic analysis.

7.3.1 HYDROLOGY (COMPUTING RUNOFF)

1. **Computing Runoff:** Runoff calculation methods shall be consistent with those discussed in ***Section 4.4.1***.
2. **Newly Graded Ground:** A minimum CN of 90 shall be used for all newly graded ground regardless of Hydrologic Soil Group.

7.3.2 HYDRAULIC ANALYSIS

Hydraulic analyses shall be made using the methods described below unless otherwise approved by the City Engineer.

1. **Velocity:** Shall be obtained using one of the acceptable methods presented in ***Reference 6-4.***

2. **Shear Stress:** Shall be calculated using the following equation:

   $\tau = \gamma D S$

   Where:

   τ = Shear Stress (lb/ft^2)

   γ = Weight of Water (lb/ft^3)

   D = Average Depth of Water (ft)

   S = Surface Water Slope (Energy Grade Line

3. **Capacity of Swales and Ditches:** Shall be analyzed using one of the methods presented in ***Reference 6-4***.

7.4 REFERENCES

Reference 7-1 – North Dakota Construction General Permit

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Appendix 1 - Introduction

Reference 1-1 – Stormwater Design Standards Manual Revision Log

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Reference 1-1 – *Stormwater Design Standards Manual Revision Log*

Version	*Effective Date*	*Comment*

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Appendix 2 - Stormwater Management Program

Reference 2-1 – City of Bismarck Title 14.1 of the City Code of Ordinances

Reference 2-2 – North Dakota MS4 General Permit

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Reference 2-1 – City of Bismarck Title 14.1 of the City Code of Ordinances

The current Title 14.1 of the City Code of Ordinances can be found on the City of Bismarck website at http://www.bismarcknd.gov/90/Code-of-Ordinances.

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Reference 2-2 – North Dakota MS4 General Permit

The current edition of the North Dakota MS4 General Permit can be obtained from the NDDoH's website at http://www.ndhealth.gov/wq/Storm/MS4/MS4Permit.htm.

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Appendix 3 - Submittal and Review Procedures

Reference 3-1 – Stormwater Management Permit Application (SM-01)

Reference 3-2 – Small Site CSMP Application Checklist (SM-02)

Reference 3-3 – Large Site CSMP Application Checklist (SM-03)

Reference 3-4 – Mandatory Stormwater Scoping Sheet (SM-04)

Reference 3-5 – PCSMP Application Checklist (SM-05)

Reference 3-6 – Basis of Design & Construction Plan Submittal Checklist (SM-06)

Reference 3-7 – Certification Report Submittal Checklist (SM-07)

Reference 3-8 – Stormwater Management Plan Template (SM-08)

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Stormwater Permit
SM-01

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

STORMWATER MANAGEMENT PERMIT APPLICATION

(Complete all applicable items)

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: _____ **Subdivision:** _____

Project Classification:

❑ Residential Lot ❑ Site Plan Application ❑ Plat Application
❑ City Contracted ❑ Development or Redevelopment Not Requiring Land Use Approval

Project Size:

Land Disturbance: _____ Impervious Surface Created: _____

Part of a larger common plan of development or sale that will disturb greater than or equal to one (1) acre
❑ Yes ❑ No

Permit:

❑ Small Site Construction Stormwater Management Permit (Use SM-02)
❑ Large Site Construction Stormwater Management Permit (Use SM-03)
❑ Post-Construction Stormwater Management Permit (Use SM-05)

Contact Information:

APPLICANT: _____ Phone: _____ Fax: _____
Contact Name: _____ Email: _____
Mailing Address: _____ State _____ Zip Code _____

PROPERTY OWNER: _____ Phone: _____ Fax: _____
Mailing Address: _____ State _____ Zip Code _____

GENERAL CONTRACTOR: _____ Phone: _____ Fax: _____
Contact Name: _____ Email: _____
Mailing Address: _____ State _____ Zip Code _____

ENGINEER: _____ Phone: _____ Fax: _____
Contact Name: _____ Email: _____
Mailing Address: _____ State _____ Zip Code _____

Notes:

No land disturbance is permitted on any project site without an approved City of Bismarck Construction Stormwater Management Permit

This permit is separate from any permits that may be required by the North Dakota Department of Health. See http://www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm for requirements.

Stormwater Permit
SM-01

STORMWATER MANAGEMENT PERMIT APPLICATION

(Complete all applicable items)

Acknowledgement Certificate

I certify that I am the Owner or Owner's authorized agent. If acting as an authorized agent, I further certify that I am authorized to act as the Owners agent regarding the property at the above-referenced address for the purpose of filing applications for decisions, permits or review under the City of Bismarck Zoning Ordinance and have full power and authority to perform on behalf of the Owner all acts required to enable the City to process and review such applications.

I certify that the information on this application is true and correct and understand that I shall not start this project until this application is approved. I shall comply with the laws of the State of North Dakota and the ordinances of the City of Bismarck.

_____	_____
Signature of Legally Responsible Person	Date Signed
_____	_____
Name (Printed)	Title

For Office Use Only

Large Site CSMP		**By**	**Date**
❑ CSMP Checklist	**Site Visit:**	_____	_____
❑ CSMP Site Plan	**Approval:**	_____	_____
❑ SWPPP (CSMP SWPPP or NDDoH SWPPP)	**Comments:**		
❑ Payment -			
Post-Construction Stormwater Management Permit			
❑ Approved Mandatory Stormwater Scoping Sheet			
❑ PCSMP Checklist			
❑ Stormwater Management Plan (SWMP)			
❑ Payment -			
NDDoH General Permit Sites			
❑ ND Notice of Intent (NOI)			

Small Site CSMP Checklist
SM-02

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

SMALL SITE CONSTRUCTION STORMWATER MANAGEMENT PERMIT

(Complete all applicable items)

Authorization and Applicability:

City of Bismarck Zoning Ordinance Title 14.1 requires that all activities that will disturb greater than 3,000 square feet obtaining a mandatory stormwater permit prior to the construction activities commencing. The City's Stormwater Design Standard Manual requires a Small Site CSMP for all projects that result in a land disturbance of less than 10,000 square feet and greater than 3,000 square feet. This includes one- and two-family residential construction that is part of a larger common plan of development or sale that will disrupt more than one acre. This application form is provided to assist in meeting the requirements of Tile 14.1 and the SWDSM and is intended to function as a site specific Stormwater Pollution Prevention Plan (SWPPP).

Project Information:

Site Address: _____

Lot & Block Number: _____ **Subdivision:** _____

Land Disturbance: _____(sf)

Part of a larger common plan of development or sale that will disturb greater than or equal to one (1) acre

❑ Yes ❑ No

Contact Information:

Applicant: _____ Phone: _____ Fax: _____

Contact Name: _____ Email: _____

Mailing Address: _____ State _____ Zip Code _____

Property Owner: _____ Phone: _____ Fax: _____

Mailing Address: _____ State _____ Zip Code _____

Person Responsible for SWPPP Implementation Phone: _____ Fax: _____

Contact Name: _____ Email: _____

Mailing Address: _____ State _____ Zip Code _____

Project Schedule

Start Date: _____ Completion Date: _____ Final Stabilization Date: _____

Waterbodies and Storm Conveyance Systems

Waterbodies within 200 feet of Project (Lakes, Rivers, Streams, Wetlands, Sloughs, etc.):

1. _____ 2. _____

Storm Conveyance Systems within 200 feet of Project (Storm Sewer, Ditches, Detention Facilities, etc.):

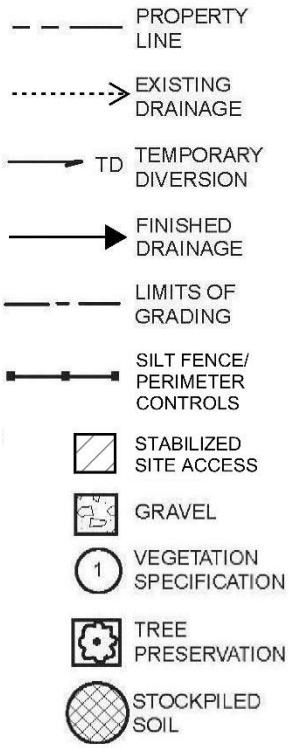
1. _____ 4. _____

2. _____ 5. _____

Site Diagram **Scale 1 inch - _____ feet**

Please indicate north by completing the arrow.

EROSION CONTROL PLAN LEGEND



Construction Stormwater Management Plan Checklist

Check (✔) the appropriate boxed below and complete the site diagram with the required information.

Site Characteristics (to be completed at time of application)

Requirements to be shown on Site Diagram:	Site Diagram	Description
North arrow, scale and lot dimensions and adjacent streets or roadways.	❑ Yes	
The disturbed area on the lot including phasing if applicable.	❑ Yes	
Areas of avoidance (i.e. drainageways, streams, wetlands etc.)	❑ Yes ❑ N/A	
Approximate gradient and direction of slopes before grading operations	❑ Yes	
Approximate gradient and direction of slopes after grading operations	❑ Yes	
Location of onsite or adjacent storm sewer inlets within 200 feet of site.	❑ Yes	
Location of onsite storm sewer conveyance system if applicable..	❑ Yes ❑ N/A	
Potential sources of pollution (i.e. portable toilets, trash receptacles, etc.).	❑ Yes	
Ares to be utilized for soil stockpiles.	❑ Yes ❑ N/A	
Impervious and pervious surface after construction.	❑ Yes	
Overland runoff (sheet flow) coming onto the site from adjacent areas	❑ Yes ❑ N/A	

Erosion & Sediment Best Practices Narrative (to be completed at time of application)

The following temporary BMPs are the minimum requirements that the applicant shall implement at the project site to reduce the contribution of pollution in stormwater runoff. Indicate the BMP to be implemented for each control listed below on the Site Diagram and provide a description of the BMP utilized. All BMPs shall be installed per the manufactures recommendations and the current edition of the City of Bismarck Construction Specification for Public Works Construction.

Requirements to be shown on Site Diagram:	Site Diagram	Description
Location of Perimeter Controls Note: Perimeter controls include silt fence, fiber rolls or a minimum 10 foot wide vegetative buffer that will prevent eroded soil from leaving the site.	❑ Yes ❑ N/A	
Location of Inlet Protection Note: Inlet protection is required for all onsite and adjacent storm sewer inlets or catch basins that are connected to the Public Storm Sewer System down gradient within 200 feet of the project.	❑ Yes ❑ N/A	
Location of Roof Drains and/or Sump Pump Outlet Extensions (Erosion) Note: All roof drains should be provided with sufficient splash pads and/or downspout extensions to prevent erosion from roof runoff. Flow from downspouts and sump pump outlets is to be temporarily routed through plastic drainage pipe to stable areas such as established sod or pavement but should not be placed over a sidewalk.	❑ Yes ❑ N/A	
Location of Surface Water Diversions (Erosion) Note: It is recommended that concentrated flow (drainageways) be diverted (re-directed) around disturbed areas. Overland runoff (sheet flow) from adjacent areas greater than 10,000 sq. ft. should also be diverted around disturbed areas.	❑ Yes ❑ N/A	
Location of Practices on to Steep Slopes (greater than 12%) (Erosion) Note: Such practices include maintaining existing vegetation, placement of additional sediment fences, diversions, and re-vegetation by sodding or seeding with use of erosion control mats.	❑ Yes ❑ N/A	
Location of Practices to Control Erosion on Areas of Concentrated Flow Note: Unstabilized drainageways, ditches, diversions, and inlets should be protected from erosion through use of such practices as in-channel fabric or straw bale barriers, erosion control mats, staked sod, and rock rip-rap. When used, a given in-channel barrier should not receive drainage from more than two acres of unpaved area, or one acre of paved area. In-channel practices should not be installed in perennial streams (streams with year round flow).	❑ Yes ❑ N/A	
Site Specific Elements Included on the Site Diagram Note: Provide a narrative description of any non-standard items included on the Site Diagram that are necessary for the implementation of the Erosion Control Plan	❑ Yes ❑ N/A	

Construction Stormwater Management Best Practices Narrative (to be completed at time of application) *The following BMPs are to be utilized as applicable by the Applicant for the day to day operation on the project site to reduce the contribution of pollutants in stormwater runoff.*		
Requirements to be shown on Site Diagram:	**Site Diagram**	**Description**
Location of Stabilized Site Access Note: Access drive should have 2 to 3 inch aggregate stone laid at least 7 feet wide and 6 inches thick. Drives should extend from the roadway 50 feet or to the house foundation (whichever is less).	❑ Yes	
Location of Temporarily Stockpiled Material Note: Soil storage piles should be placed behind a sediment fence, 10 foot wide vegetative strip, covered with a tarp or seeded with temporary ground cover if they will remain for more than 7 days.	❑ Yes ❑ N/A	
Location of Waste Disposal Note: All construction debris must be placed in an appropriate container to prevent the debris from being carried away from the site by wind or water.	❑ Yes	
Location of Concrete Washout Note: Concrete wash water must never be discharged or allowed to drain into any waters of the state, storm sewer systems or adjacent properties. Wash water disposal must be limited to a defined area of the site or to an area designated by the developer for cement washout.	❑ Yes	
Location of Dewatering Operations (If Applicable) Note: Show location of dewatering discharge point on Site Diagram if applicable. Sediment-laden discharge water from pumping operations should be ponded behind a sediment barrier until most of the sediment settles out.	❑ Yes	
Construction Site Management & Good Housekeeping Strategies Narrative(to be completed during construction activities) The following minimum construction site management and good housekeeping procedures are to be implemented for all project sites.		
Requirement	**Completed**	**Comments**
Inspection of BMPs • Inspection of all sediment and erosion control devices and measures should take place every 14 calendar days and within 24 hours after any storm event greater than 1/4 inch of rain per 24-hour period. • Document all inspections on the NDDoH or City inspection forms. • Site inspection records are to be kept onsite and available for review by the City Stormwater Staff.	❑ Yes	
Maintenance of BMPs • All erosion and sediment control BMPs shall be maintained per manufactures recommendations or the requirement of the City, whichever is more stringent. • When any BMP in need of maintenance or repair is found, the maintenance or repair shall occur within 24 hours. • Sediment will be removed from behind silt fences and barriers before it reaches a depth that is equal to half the height of the barrier. • Breaks and gaps in silt fences and barriers will be repaired immediately. Decomposing straw BMPs will be replaced.	❑ Yes	
Good Housekeeping • Good housekeeping should be practiced at all times and includes cleaning and maintaining all erosion and sediment control devices, cleaning sediment off streets, and picking up all debris that has been deposited off site by wind or water. • All sediment that moves off-site due to construction activity will be cleaned up before the end of the same workday. • All sediment that moves off-site due to storm events will be cleaned up before the end of the next workday • Access drives will be maintained throughout construction. • All installed erosion control practices will be maintained until the disturbed areas they protect are stabilized.	❑ Yes	
Removal of Sediment and Erosion Controls BMPs • If any construction activity leads to the accidental removal of a sediment or erosion control device, the device must be replaced immediately. • If any construction activity must be done where a device is already in place, the device may be removed but must be replaced once the activity has ceased. • Sediment and erosion control devices must be used and maintained until 70 percent of pre-existing vegetative coverage has been achieved on all pervious surface areas, such as lawns, that are located upslope from the device..	❑ Yes	

Temporary and Final Stabilization Practices Narrative (to be completed during construction activities)

The following stabilization requirements will be followed for all construction activities at the project site.

Requirements:	Completed	Describe Stabilization and Note Dates
Temporary Stabilization of Disturbed Areas Note: Temporary cover should be immediately applied to: • Areas where construction activity is ceased and is not planned to resume within 14-days • Areas with a continuous slope within 200 feet of any surface water. • Temporary topsoil and clay stockpiles. Clean aggregate, demolition concrete and sand stockpiles are exempt. In the Comments and Notes section indicate the schedule of areas to be temporarily stabilized and note the areas on the Site Diagram with the date the installation occurred.	❑ Yes ❑ N/A	
Final Stabilization of Disturbed Areas Note: Permanent cover should be applied to all completed areas that will not be disturbed or have additional construction activities performed in the area as soon as possible. • Indicate re-vegetation method: ☐ Seed ☐ Sod ☐ Other • Expected date of permanent re-vegetation: _____ • Temporary seeding or mulching is planned if site is not permanently stabilized by October 1? ☐ Yes ☐ No Contractor is responsible for the Final Stabilization of the lot and the Small Site CSMP NOT cannot be submitted to the City until Final Stabilization is achieved.	☐ Yes	

Permit Coverage Termination (to be completed after construction is complete)

Requirement:	Addressed	Indicate Which Method was Utilized
The process to terminate coverage can begin when one of the following scenarios has been achieved: 1. All soil disturbing activities for the project have been completed and all soils have been stabilized by a permanent surface covering. For "grass" vegetated areas, soils will be considered stabilized when a uniform perennial vegetative cover with a density of 70 percent is achieved; OR 2. All of the following conditions are met: 1) all soil disturbing activities for the project have been completed and all soils have been stabilized.; 2) down gradient stormwater controls for individual lots has been implemented and the residence has been transferred to the homeowner; and 3) the permittee has distributed a "Stormwater Fact Sheet" to the homeowner to inform the homeowner of the lot specific need for drainage patterns and maintenance of the final stabilization. OR 3. The control of the residential lot is transferred to a homeowner and the house becomes an occupied residence. If the transfer and occupation occurs during the stabilization period (or scheduled stabilization period) the requirement to stabilize the site ends for the permittee.	❑ Yes	
Notice of Termination (NOT)and Final Inspection NOT form submitted on date: _____ Final Inspection completed on date: _____	❑ Yes	

Small Site CSMP General Conditions

The following requirements are applicable to all project covered under the City of Bismarck's Small Site Construction Stormwater Management Permit

1. All projects shall meet the requirements of City of Bismarck Ordinance 14.1 Stormwater Management and the Stormwater Design Standards Manual.
2. Projects that are part of a common plan of development or sale, where the common plan of development disturbed over one-acre shall meet the requirements of the North Dakota Department of Health NDDoH Construction General Permit.
3. A copy of this completed and signed application, a signed Notice of Intent (NOI), site inspection records shall be kept at the project site during normal working hours. If the site is inactive, then the documents may be stored at the local office of the applicant. Projects that are part of a common plan of development or sale shall also include a copy of the NDDoH coverage letter and General Construction Permit with the site records. Electronic records are acceptable if these records are accessible at the project site.
4. The Small Site CSMP Application is intended to function as a site specific SWPPP for the majority of one and two-family residential construction projects. Project specific conditions may require a more detailed SWPPP to meet all of the requirements of the NDDoH General Construction Permit.
5. Issuance of the City Small Site CSMP does not guarantee coverage under, or compliance with, the NDDoH Construction General Permit.
6. The Applicant grants the right for City of Bismarck Staff to enter the project site for the purpose of observing and documenting the installation of construction stormwater BMPs and practices.
7. Failure to comply with the requirements of the Small Site CSMP or NDDoH Construction General Permit can result in enforcement procedures as described in Title 14.1 of City Code of Ordnances.

Acknowledgement Certificate

I certify that I am the Owner or Owner's authorized agent. If acting as an authorized agent, I further certify that I am authorized to act as the Owners agent regarding the property at the above-referenced address for the purpose of filing applications for decisions, permits or review under the City of Bismarck Zoning Ordinance and have full power and authority to perform on behalf of the Owner all acts required to enable the City to process and review such applications.

I certify that the information on this application is true and correct and understand that I shall not start this project until this application is approved. I shall comply with the laws of the State of North Dakota and the ordinances of the City of Bismarck.

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

_____	_____
Signature of Legally Responsible Person	Date Signed
_____	_____
Name (Printed)	Title

For Office Use Only

Small Site CSMP	**By**	**Date**
❑ Small Site CSMP Checklist	**Site Visit:** _____	_____
	Approval: _____	_____

Comments:

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

Large Site CSMP Checklist
SM-03

LARGE SITE CONSTRUCTION STORMWATER MANAGEMENT PERMIT

(Complete all applicable items)

Authorization and Applicability:

City of Bismarck Zoning Ordinance Title 14.1 requires that all activities that will disturb greater than 3,000 square feet obtaining a mandatory stormwater permit prior to the construction activities commencing. The City's Stormwater Design Standard Manual requires a Large Site CSMP for all projects that result in a land disturbance of greater than 10,000 square feet. This application form is provided to assist in meeting the requirements of Tile 14.1 and the SWDSM and is intended to function as a site specific Stormwater Pollution Prevention Plan (SWPPP).

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: _____ **Subdivision:** _____

Land Disturbance: **(SF or Acre)** **Impervious Area Created:**

Is Project part of a plan of common development or sale that disturbs greater than one (1) acre? ❑ Yes ❑ No

Projects that are part of a common plan of sale or development that disturbs greater than one (1) acre are required to submit a SWPPP and Erosion Control Plan that meet the requirements of the NDDoH Construction General Permit.

Contact Information:

Applicant: _____ Phone: _____ Fax: _____

Contact Name: _____ Email: _____

Mailing Address: _____ State _____ Zip Code _____

Property Owner: _____ Phone: _____ Fax: _____

Mailing Address: _____ State _____ Zip Code _____

Person Responsible for SWPPP Implementation Phone: _____ Fax: _____

Contact Name: _____ Email: _____

Mailing Address: _____ State _____ Zip Code _____

Project Schedule

Start Date: _____ Completion Date: _____ Final Stabilization Date: _____

Waterbodies and Storm Conveyance Systems

Waterbodies within 200 feet of Project (Lakes, Rivers, Streams, Wetlands, Sloughs, etc.):

1. _____ 3. _____
2. _____ 4. _____

Storm Conveyance Systems within 200 feet of Project (Storm Sewer, Ditches, Detention Facilities, etc.):

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Construction Stormwater Management Requirements *This application checklist is valid for projects that require a Large Site CSMP from the City of Bismarck and are not part of a common plan of sale or development that disturbs greater than one-acre.*			
Item	**Description**	**Complete**	**Comment**
1.0	**SWPPP**	❑ Yes ❑ N/A	
1.1	**Construction Site Management Controls**	❑ Yes ❑ N/A	
1.1.1	Project Description 1. Project Type & Construction Activities; 2. Total Project Area & Total Disturbed Area; 3. NRCS Soil Type Description; and 4. Location of Point(s) of Discharge.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.1.2	Construction Site Management Narrative 1. Person Responsible for BMPs; 2. BMP Installation, Maintenance, & Removal Requirements for each Phase/Stage; 3. Rationale for BMP Selection; and 4. State whether BMPs are Temporary or Permanent.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.1.3	Construction Operational BMPs 1. Describe Maintenance Practices; 2. Describe Preventative Practices; 3. Describe Spill Prevention & Response Procedures; and 4. Site Operation BMPs to Limit Exposed Soils.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.2	**Erosion Controls**	❑ Yes ❑ N/A	
1.2.1	Construction Phasing & Stabilization 1. Phased Grading & Stabilization; 2. Protection of Existing Vegetation; and 3. Staging & Stockpile Areas Identified.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.2.2	Minimum Stabilization Requirements 1. Stabilization of Exposed Soils; 2. Stabilization of Soils on Steep Slopes; and 3. Stabilization of Channels, Ditches, & Swales.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.2.3	Protection of Outlets: BMPs shall be installed at all inlets and outlets.	❑ Yes ❑ N/A	
1.3	**Sediment Controls**	❑ Yes ❑ N/A	
1.3.1	Design Storm: BMPs withstand & function during events up to the 2-year 24-hour storm.	❑ Yes ❑ N/A	
1.3.2	Minimum Sediment Control BMPs 1. Perimeter Control; 2. Inlet Protection; 3. Stabilized Construction Access; and 4. Soil Stockpiles.	 ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.3.3	Sediment Traps or Basins: Utilized at all Points of Discharge where tributary area is equal to or greater than 10 acres.	❑ Yes ❑ N/A	

1.3.4	Natural Buffers: 50-foot natural buffer, or equivalent erosion & sediment control, where project is within 50 feet of surface water.	❑ Yes ❑ N/A	
1.3.5	Soil Stockpiles 1. Utilize Perimeter Sediment Controls; 2. Utilize Temporary Stabilization where necessary; and 3. Final Stabilization of all stockpiles left on-site.	❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.4	**Runoff Control**	❑ Yes ❑ N/A	
1.4.1	Design Storm 1. Check Dams withstand & function in 2-year 24-hour storm; 2. Temporary Stormwater Diversions withstand 5-year 24-hour storm; and 3. Permanent Stormwater Diversions meet Post-Construction Requirements.	❑ Yes ❑ N/A ❑ Yes ❑ N/A ❑ Yes ❑ N/A	
1.4.2	Overflow Paths Identified	❑ Yes ❑ N/A	
1.5	**Waste Management & Illicit Discharge Control**	❑ Yes ❑ N/A	
1.5.1	Concrete Washout Identified	❑ Yes ❑ N/A	
1.5.2	Vehicle Washing Areas On-Site	❑ Yes ❑ N/A	
1.5.3	Spill Prevention & Control Plan	❑ Yes ❑ N/A	
1.5.4	Waste Disposal Provided	❑ Yes ❑ N/A	
1.6	**Restoration & Final Stabilization** (Schedule & Type Identified)	❑ Yes ❑ N/A	
2.0	**Construction Stormwater Site Plan** (Must Meet the Requirements of the ND Construction General Permit)	❑ Yes ❑ N/A	

Acknowledgement Certificate

I certify that I am the Owner or Owner's authorized agent. If acting as an authorized agent, I further certify that I am authorized to act as the Owners agent regarding the property at the above-referenced address for the purpose of filing applications for decisions, permits or review under the City of Bismarck Zoning Ordinance and have full power and authority to perform on behalf of the Owner all acts required to enable the City to process and review such applications.

I certify that the information on this application is true and correct and understand that I shall not start this project until this application is approved. I shall comply with the laws of the State of North Dakota and the ordinances of the City of Bismarck.

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

_____ _____
Signature of Legally Responsible Person Date Signed

_____ _____
Name (Printed) Title

Design Engineer			
All CSMP application materials are to be submitted under the seal and signature of a Professional Engineer registered in the State of North Dakota.			
Have all items included in the CSMP application been sealed and signed by a Professional Engineer registered in the State of North Dakota?	**Yes**	**No**	**Page**
Submittal Copies:			
1 PDF Copy Uploaded to TRAKiT			
Application Fee Paid			

Comments:

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

Mandatory Scoping Sheet
SM-04

MANDATORY STORMWATER MANAGEMENT SCOPING SHEET

(Complete all applicable items)

Section 1 - To Be Completed by Applicant

(*Return to the City of Bismarck Engineering Department)*

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: _____ **Subdivision** _____

Project Classification:

❑ Residential Lot ❑ Site Plan Application ❑ Plat Application

❑ City Contracted ❑ Development or Redevelopment Not Requiring Land Use Approval

Project Size:

Land Disturbance: _____ Impervious Surface Created: _____

Part of a larger common plan of development or sale that will disturb greater than or equal to one (1) acre?

❑ Yes ❑ No

Contact Information:

Applicant: _____ Phone: _____ Fax: _____

Contact Name: _____ Email: _____

Mailing Address: _____ State _____ Zip Code _____

Project Description (Attach a Location Map showing the project in reference to the City Public Storm Sewer System)

Stormwater Management System (Describe the Point(s) of Discharge to the Public Storm Sewer System and attach a Drainage Map noting at a minimum the project site, contours indicating the overall drainage of the region, and Point(s) of Discharge)

Proposed Post-Construction Stormwater BMPs *(Provide a description of the proposed BMPs to mitigate impacts to water quantity and quality impacts. Include additional sheets if necessary.)*

MANDATORY STORMWATER MANAGEMENT SCOPING SHEET

(Complete all applicable items)

Section 2 - To Be Completed by the City

(At a minimum, all boxes checked by the City on this sheet shall be incorporated into the SWMP for the PCSMP application to be deemed complete and ready for review. Additional requirements may be identified during the permit application review process.)

Stormwater Management Plan Submittal Requirements

Based upon the information provided in Section 1, the following represents the minimum requirements for a complete submittal for a Post-Construction Stormwater Management Permit. However, this list should not be used in lieu of the City of Bismarck Zoning Ordinances, the City's Stormwater Design Standards Manual, or accepted engineering fundamentals and practice. Compliance with these requirements does not constitute permit or project approval.; Additional site specific information may be required to allow review and approval of the Post-Construction Stormwater Management Permit. Note: Upon scoping sheet submittal, ensure completed form has been signed in the space provided below:

Applicable Previous Completed Studies, Master Plans or Stormwater Management Plan (The project SWMP is required to meet the recommendations of previously completed plans for the project site)

Watershed Master Plan _____

SWMP _____

Other Plan _____

Summary of Previous Recommendations for Project Area (If applicable, the following are the City Engineer's findings regarding general recommendations for the project site based on previous studies. Additional requirements may be outlined in the studies referenced above)

Post-Development % Impervious _____

Post-Development Pervious CN _____

Post-Development Flow Rates _____

Required Improvements _____

Other _____

Known drainage issues in the vicinity of the Project and other applicable information

Requirements for SWMP Submittal (If project specific stormwater post-construction BMPs are required, or the proposed project exceeds the regional BMP sizing criteria, the following design standards shall be met by the project specific BMP)

Point(s) of Analysis _____

Expedited PCSMP Application (1) ❑ Yes

Standard PCSMP Application (2) ❑ Yes

Stormwater Quantity BMP	❑ Regional	❑ Local	❑ On-Site
Stormwater Quality BMP	❑ Regional	❑ Local	❑ On-Site
Required Improvements	❑ Regional	❑ Local	❑ On-Site

Other _____

(1) Projects eligible for an Expedited PCSMP Applications are located inside of a Regional BMP service area or a common project with a previously approved local BMP. Expedited applications shall include information necessary to demonstrate consistency with the regional or local facility sizing criteria noted above. (2) Standard PCSMP applications must propose water quality and water quantity BMPs.

This form shall be included as an attachment, inside of the front cover, of the SWMP submitted with the Post-Construction Stormwater Management Plan application submittal. Failure to include the approved Mandatory Stormwater Management Scoping sheet with the SWMP will result in the application being deemed incomplete for processing.

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: **Subdivision:**

General Submittal Materials

Standard Application Materials	**Complete**	**Comment**
Stormwater Management Permit Application (SM-01)	❑ Yes	
Stormwater Permit Fee	❑ Yes	
Approved Mandatory Stormwater Scoping Sheet (SM-04)	❑ Yes	
Stormwater Management Plan & Exhibits *See Required Items Below*	❑ Yes	
Design Waivers or Variances (if Acceptable)	❑ Yes ❑ N/A	
Optional Materials for Conditional Approval (Required for Expedited Review Process)	**Complete**	**Comment**
Construction Plans & Basis of Design Report	❑ Yes ❑ N/A	
Geotechnical Report	❑ Yes ❑ N/A	
Access & Drainage Easements	❑ Yes ❑ N/A	
Operation and Maintenance Manuals	❑ Yes ❑ N/A	

Summary of Site Cover

	Pervious Area (square feet)	**Impervious Area (square feet)**	**Total Area (square feet)**
Existing Conditions			
Post-Construction Conditions			
Change in Area (+/-)			

Stormwater Management Plan Narrative

Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	**Description**	**Yes**	**N/A**	**Page**
1.0	**Site & Applicant Information** ***3.4.2 of the SWDSM***			
1.0A	Applicant, Contact Name, Address, Phone, & Email			
1.0B	Site Address and Subdivision Lot & Block as Applicable			
1.1	Brief Description of Project			
1.2	Project Size and Impervious Surface Created			

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan Narrative
Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	Description	Yes	N/A	Page
2.0	**Recommendations for the Project Area** ***3.4.2 of the SWDSM***			
2.0A	Summary Table by Lot & Block of allowable Post-Construction Pervious CN and % Impervious for future Expedited SWMP or Basis of Design Reports.			
2.0B	Summary Table of the Existing Conditions and Post-Construction peak flow and volumes at the Point(s) of Analysis for all storm events required by ***Table 4-1*** of the SWDSM.			
2.1	Required Easements for Post-Construction Stormwater BMPs			
2.2	Inter-Lot Drainage Requirements to be Addressed by Future Grading Plans and CSMP.			
2.3	Post-Construction Stormwater BMPs Required to be Implemented by Future Development			
2.4	Additional Project Specific Recommendations as Necessary			
3.0	**Project Stormwater Management Summary** ***3.4.2 of the SWDSM*** The SWMP shall include a brief description of the following items**.**			
3.1	Description of the Point(s) of Analysis			
3.2	Description of the Point(s) of Discharge			
3.3	Description of existing channels, pipes, culverts, or other stormwater features.			
3.4	Description of existing wetlands on and adjacent to the project including the source (i.e. field delineation, NWI, LWI, etc.)			
3.5	Identify FEMA FIRM map and location.			
3.6	Report the NRCS soil types for the project area. Note if NRCS soils are listed as Hydric Soils.			
3.7	Description of how Project proposes to manage post-construction stormwater runoff consistent with the requirements of the SWDSM.			
4.0	**Hydrologic Analysis Summary** ***3.4.2 of the SWDSM*** The SWMP shall include a description of each catchment by Point of Analysis that includes a brief description of the existing and post-construction conditions of each catchment. The design engineer can utilize sub-catchments to define specific areas within the overall Point of Analysis.			
4.1	Description of Existing Zoning & Land-use			
4.2	Summary Table for the Existing Conditions Catchment by Point of Analysis that Includes: 1. Tributary Area (both onsite and off-site run-on); 2. Impervious Coverage Area; 3. Impervious Coverage Curve Number; 4. Pervious Coverage Area; 5. Pervious Coverage Curve Number; and 6. Time of Concentration.			

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan Narrative
Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	Description	Yes	N/A	Page
4.3	Post-Construction Zoning & Land-use			
4.4	Summary Table for the Post-Construction Catchment by Point of Analysis that Includes: 1. Tributary Area (both on- site and off-site run-on); 2. Impervious Coverage Area; 3. Impervious Coverage CN; 4. Pervious Coverage Area; 5. Pervious Coverage Curve Number; and 6. Time of Concentration.			
4.0A	Included as an appendix to the SWMP modeling results for the existing and post-construction condition hydrographs to each Point of Discharge for the storm events listed ***Table 4-1*** of the SWSDM.			
4.5	The SWMP hydrologic analysis and reporting shall account for and consider the following: 1. The project shall safely pass the 100-year 24-hour event without impacting of inundating any homes, structures or other buildings. 2. If the off-site contributing areas are greater than 50-percent of the catchment total, provide a description of the impact of future development in the off-site watershed on the proposed post-construction stormwater BMPs and make any applicable recommendations.			
5.0	**Post-Construction Stormwater Management BMPs Summary** The SWMP shall include documentation that the Project meets the Performance Requirements, Design Standards and Analysis Method of the SWDSM for A) Post-Construction Peak Flow Compliance (Section 4.0) B) Post-Construction Water Quality Compliance (Section 5.0) and C) Post-Construction Drainage and Conveyance.			
5.1	**Post-Construction Peak Flow Compliance BMP** *(Section 4 of the SWDSM)*			
5.1.1	**Engineered Outlets** The SWMP shall include a summary of the proposed engineered outlet structure in a table that reports: 1. Outlet configuration including size and inverts; 2. Outlet culvert discharge velocity and depth for all storm events required by ***Table 4-1*** of the SWDSM; 3. Calculated water surface elevation for all storm events required by ***Table 4-1*** of the SWDSM; 4. Maximum available storage in the proposed basin (to emergency spillway or overflow elevation); and 5. Reference to where the Stage/Storage/Discharge report is contained in the SWMP.			

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan Narrative
Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	Description	Yes	N/A	Page
5.1.2	**Emergency Spillway and Uncontrolled Overflows** The SWMP shall include the hydrologic and hydraulic summary demonstrating that the proposed emergency spillway\overflow satisfies the following conditions: 1. Capable of passing the post-construction 100-year 24-hour event without overtopping the detention basin berm during a clogged outlet structure condition; 2. Properly armored to resist the erosive forces during the post-construction 100-year 24-hour event; and 3. Will not be utilized during the normal function of the detention basin.			
5.0A	Included as an appendix to the SWMP modeling results for the inflow and outflow hydrographs for the post-construction condition for each of the storm events listed ***Table 4-1*** of the SWDSM.			
5.2	**Post-Construction Water Quality Compliance BMP** *(Section 5 of the SWDSM)*			
5.2.1	**Wet Detention Basins** The SWMP shall include a summary table that reports: 1. Required Water Quality Volume (Vwqreq); 2. Proposed Water Quality Volume in the form of a Stage-Storage relationship; 3. Calculated drawdown time; and 4. Reference to where the Stage/Storage/Discharge report is contained in the SWMP.			
5.2.2	**Dry Detention Basins (w/Extended Detention)** The SWMP shall include a summary table that reports: 1. Required Extended Detention Water Quality Volume (Vwqreq); 2. Proposed Extended Detention Water Quality Volume in the form of a Stage-Storage relationship; 3. Calculated drawdown time; and 4. Reference to where the Stage/Storage/Discharge report is contained in the SWMP.			
5.2.3	**Infiltration** The SWMP shall include a summary table that reports: 1. Required Water Quality Volume (Vwqreq); 2. Proposed Water Quality Volume in the form of a Stage-Storage relationship; 3. Calculated infiltration time; and 4. Reference to where the Stage/Storage/Discharge report is contained in the SWMP.			
5.2.4	If applicable, Alternative BMP Method analysis and reporting requirements consistent with ***Section 5.2.2*** of the SWDSM.			

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan Narrative
Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	Description	Yes	N/A	Page
5.0B	Included as an attachment to the SWMP modeling results for post-construction water quality BMPs demonstrating compliance with ***Table 5-1*** of the SWSDM.			
5.3	**Post-Construction Drainage & Conveyance BMPs** *(Section 6 of the SWDSM)*			
5.3.1	**Streets** Demonstrate compliance with ***Table 6-1*** and ***Table 6-2*** if the SWDSM Summary table listing: 1. Street Classification; 2. Critical Design Grade; 3. Calculated Maximum Street Flow Depth; and 4. Maximum Encroachment.			
5.3.2	**Storm Sewer** Brief summary of the storm sewer system. *Detailed design calculations meeting the requirements of **Section 6.0** of the SWDSM can be included in future Basis of Design Report.*			
5.3.3	**Culverts** Brief summary of required culverts. *Detailed design calculations meeting the requirements of **Section 6.0** of the SWDSM can be included in future Basis of Design Report.*			
5.3.4	**Open Channels** When engineered open channels are utilized as a post-construction BMP include the following information: 1. The size and shape of open channels shall be based on flow quantities calculated using the hydrologic methods set forth in ***Section 4.3.1*** of the SWDSM. 2. Post-Construction flows and the maximum Froude number for each design event. 3. Calculations reporting the velocity and shear stress to support the channel lining material selection. 4. Graphical profile of the channel longitudinal section reporting the design slope and 5-year 24-hour and 100-year 24-hour storm hydraulic grade lines.			
5.4	Identification of Parties Responsible for the Operation and Maintenance of the Post-Construction Stormwater Structural and Non-Structural BMPs. *Note: O&M Manuals for each approved post-construction BMP shall be required as a condition of approval of the PCSMP.*			

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan Narrative
Provide a SWMP Narrative consistent with the requirements of the SWDSM and the approved Mandatory Stormwater Scoping Sheet. Attach this checklist to the SWMP Narrative that matches the outline as defined in Section 3.4.2 of the SWDSM

Item	Description	Yes	N/A	Page
6.0	**Construction Schedule & Phasing**			
6.1	Narrative of proposed project construction phases and the necessary future submittals and approvals as required by the SWDSM. For example, grading project, water sewer project, final site development, etc.			
6.0A	Summary table indicating future PCSMP application materials and approximate timing. Examples include Basis of Design Report, Construction Plans, Geotechnical Report, and Certification Report			
7.0	**Engineer's Statement of Compliance & Seal**			

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan – Required Exhibits

All Stormwater Management Plans are to include the exhibits listed below. Additional exhibits may be required for complex sites or multiple phase projects.

General Requirements:

1. *Paper Size*
2. *Minimum = 11x17*
3. *Maximum = 24x36*
4. *All Exhibits must have a unique name and number*
5. *All Exhibits are to be labeled "For Regulatory Review Only – Not Approved for Construction"*

Item	Description	Yes	N/A	Page
1	**Exhibit 1.0 – Cover Sheet & Location Map** *(if more than one sheet is required use 1.0, 1.1, 1.2, etc.)*			
A	Name of Project or Name of the Plat			
B	Owner with Contact Information			
C	Applicant			
D	Engineer			
E	Site Location by Address and/or PLSS			
F	SWMP Exhibits Sheet Index by Number & Title			
G	Location Map – *GIS data is sufficient for accuracy. The purpose of the location map is to demonstrate where the proposed project fits in the existing Public Storm Sewer System.* 1. North Arrow 2. Scale 3. Project Site Highlighted 4. Streets 5. Adjacent Parcels 6. Existing Offsite Stormwater Facilities 7. Regional Stormwater Facilities (If Used for the Project) 8. Stormwater Master Plan Study Boundary 9. Point(s) of Analysis			
2	**Exhibit 2.0 – Existing Conditions Site Plan** *(if more than one sheet is required use 2.0, 2.1, 2.2, etc.)*			
A	North Arrow and Bar Scale			
B	Existing topography at a minimum of 1-foot interval. For sites with grades steeper than 10%, the existing topography can be shown at 2-foot contour intervals.			
C	Identify the Point(s) of Analysis and delineate each corresponding drainage area.			
D	Identify the Point(s) of Discharge to the Public Storm Sewer System and delineate the sub-catchment area boundary(s) including any upstream areas that flow on to the project site.			
E	Time of concentration path for each catchment or sub-catchment.			
F	Property boundaries and street ROW			

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan – Required Exhibits

All Stormwater Management Plans are to include the exhibits listed below. Additional exhibits may be required for complex sites or multiple phase projects.

General Requirements:

1. *Paper Size*
2. *Minimum = 11x17*
3. *Maximum = 24x36*
4. *All Exhibits must have a unique name and number*
5. *All Exhibits are to be labeled "For Regulatory Review Only – Not Approved for Construction"*

Item	Description	Yes	N/A	Page
G	Existing underground public utilities			
H	Existing above ground public utilities			
I	Existing impervious ground cover			
J	Existing pervious ground cover			
K	Location of wetlands			
L	FEMA Floodplains and Floodways			
M	NRCS Soils Boundaries			
N	Legend identifying all layers or features.			
O	Notes Identifying: 1. Source and Date of Topography 2. Source of NRCS Soil Boundaries 3. Total Site Impervious and Pervious Area 4. Point(s) of Analysis Total Drainage Area			
	Exhibit 3.0 – Post-Construction Site Plan *(if more than one sheet is required use 3.0, 3.1, 3.2, etc.)*			
A	North Arrow and Bar Scale			
B	Post-construction grading at a minimum of 1-foot interval. For sites with grades steeper than 10% the existing topography can be shown at 2-foot contour intervals.			
C	Identify the Point(s) of Analysis			
D	Identify the Point(s) of Discharge to the Public Storm Sewer System and delineate the corresponding Catchment area including any upstream areas that flow on to the project site.			
E	All catchments and sub-catchments labeled with identifiers that match the hydrologic modeling results.			
F	Post-construction impervious ground cover			
G	Post-construction pervious ground cover			
H	Post-construction BMPs			
I	Post-construction time of concentration paths for each catchment or sub-catchment			
J	Legend identifying all layers or features.			

PCSMP Checklist
SM-05

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Stormwater Management Plan – Required Exhibits

All Stormwater Management Plans are to include the exhibits listed below. Additional exhibits may be required for complex sites or multiple phase projects.

General Requirements:

1. *Paper Size*
2. *Minimum = 11x17*
3. *Maximum = 24x36*
4. *All Exhibits must have a unique name and number*
5. *All Exhibits are to be labeled "For Regulatory Review Only – Not Approved for Construction"*

Item	Description	Yes	N/A	Page
	Exhibit 4.0 – Post-Construction BMP Details *(if more than one sheet required use 4.0, 4.1, 4.2, etc.)*			
A	Peak Flow and/or Water Quality Basin Typical Section and Outlet Structure Detail with: 1. Outlet structure including sizes of orifices, weirs and culverts; 2. Invert elevations for all outlet orifices, weirs and culverts; 3. Invert elevation for emergency spillway or overflow structure; 4. Elevation of the top of embankment or basin structure; 5. Calculated water surface elevation for all storm events required by ***Table 4-1*** of the SWDSM; 6. Post-Construction Outlet Protection, and 7. If applicable, the elevation of the nearest adjacent finished floor or other critical elements.			

Design Engineer

All PCSMP application materials; SWMP, Construction Plans, Basis of Design Report, Geotechnical Report and Certification Report are to be submitted under the seal and signature of a Professional Engineer registered in the State of North Dakota.

	Yes	No	Page
Have all items included in this PCSMP application been sealed and signed by a Professional Engineer registered in the State of North Dakota?			
Submittal Copies:			
1 PDF Copy Uploaded to TRAKiT			
Application Fee Paid			

Comments:

_____

_____

_____

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT CHECKLIST

(Complete all applicable items)

Required Summary Tables:

(Note: The Design Engineer may reproduce the following tables electronically and attach to this checklist as a summary.)

Project Hydrologic Modeling Summary – Existing Conditions			
Storm Event	**Peak Flow (cfs) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

Project Hydrologic Modeling Summary – Existing Conditions			
Storm Event	**Total Volume (acre-feet) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

Project Hydrologic Modeling Summary – Post-Construction Conditions			
Storm Event	**Peak Flow (cfs) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

Project Hydrologic Modeling Summary – Post-Construction Conditions			
Storm Event	**Total Volume (acre-feet) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

Basis of Design
SM-06

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505

For Office Use Only:
Date Received:
TRAKiT #:

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: **Subdivision:**

Summary of Site Conditions

The purpose of this summary is to provide a brief comparison of the SWMP Post-Construction pervious and impervious areas utilized in the Conditional Approval Review to the Design Post-Construction pervious and impervious areas. If the site coverages have changed between the Conditional Approval and the preparation of the Construction Plans please provide updated hydrologic and hydraulic modeling consistent with the requirements of the SWDSM.

	Pervious Area (square feet)	Impervious Area (square feet)	Total Area (square feet)
SWMP Post-Construction			
Design Post-Construction Conditions			
Change in Area (+/-)			

Basis of Design Report

All Construction Plans submitted for review and approval by the City Engineer are to include a Basis of Design Report that documents how the final designs meet the requirements of the SWDSM and the Conditionally Approved PCSMP.

Item	Description	Yes	N/A	Page
1	**Site & Applicant Information**			
A	Applicant, Contact Name, Address, Phone & Email			
B	Site Address and Subdivision Lot & Block as Applicable			
2	**Summary of the Requirements of the Conditionally Approved PCSMP**			
A	Point(s) of Analysis and/or Point(s) of Discharge			
B	Requirements or Recommendations of the Approved SWMP			
C	Description of Deviations from the Approved SWMP			
3	**Hydrologic Analysis Summary**			
A	Summary of the Approved SWMP Existing & Post-Construction Hydrology, or			
B	Revised Existing and Post-Construction Hydrology following the requirements of PCSMP submittal checklist or approved SWMP outline.			
5	**Post-Construction Stormwater Management BMPs Summary**			
5-A	**Post-Construction Peak Flow Compliance BMP**			
A.1	Summary of the Approved SWMP Peak Flow Compliance BMP; or			
A.2	Revised Peak Flow Compliance BMP analysis and design following the requirements of PCSMP submittal checklist or approved SWMP outline.			

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Basis of Design Report
All Construction Plans submitted for review and approval by the City Engineer are to include a Basis of Design Report that documents how the final designs meet the requirements of the SWDSM and the Conditionally Approved PCSMP.

Item	Description	Yes	N/A	Page
5-B	**Post-Construction Water Quality Compliance BMP**			
B.1	Summary of the Approved SWMP Water Quality BMP; or			
B.2	Revised Water Quality Compliance BMP analysis and design following the requirements of PCSMP submittal checklist or approved SWMP outline.			
5-C	**Post-Construction Drainage & Conveyance BMPs**			
C.1	**Streets** Summary table listing: 1. Street Classification; 2. Critical Design Grade; 3. Calculated Maximum Street Flow Depth; and 4. Maximum Encroachment.			
C.2	**Storm Sewer** Summary Table of Inlets & Catch Basins reporting for each structure: 1. Location, type, size, rim elevation and depth of the proposed inlet; 2. 5-year 24-hour design flow to the inlet; 3. Theoretical inlet capacity; 4. Depth of water in the gutter at the inlet; 5. Flow intercepted and flow bypassed; and 6. Street drainage spread width. Summary Table of Storm Sewer Pipes reporting for each length of pipe: 1. Pipe calculations that state the design peak flow rates and design information for each pipe run, such as size, slope, length, material type, and Manning's coefficient; 2. Velocities at design flow for each segment of proposed pipe; 3. HGL at each inlet, manhole, angle point, and outlet; 4. Depth from finish grade to pipe invert for each segment of proposed pipe; and 5. When there is a significant change in slope of the pipe through a manhole or other structure, the EGL at the structure assuming the velocity approaches zero. Detailed design calculations meeting the requirements of **Section 6.0** of the SWDSM as an attachment to this Basis of Design Report.			

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Basis of Design Report
All Construction Plans submitted for review and approval by the City Engineer are to include a Basis of Design Report that documents how the final designs meet the requirements of the SWDSM and the Conditionally Approved PCSMP.

Item	Description	Yes	N/A	Page
C.3	**Culverts** Report shall include the following information documenting the performance of the culvert: 1. Complete culvert calculations that state the design peak flow rates, culvert size, slope, inverts, length, material type, wall thickness, and Manning's coefficient. 2. Type of end treatment. 3. Headwater depths and water surface elevations for the design storm events. 4. Velocities at the inlet and outlet for the design storm events. 5. Flow control type (inlet or outlet). 6. Roadway cross-section and roadway profile. Detailed design calculations meeting the requirements of ***Section 6.0*** of the SWDSM as an attachment to this Basis of Design Report.			
C.4	**Open Channels** When engineered open channels are utilized as a post-construction BMP include the following information: 1. The size and shape of open channels shall be based on flow quantities calculated using the hydrologic methods set forth in ***Section 4.3.1*** of the SWDSM. 2. Post-Construction flows and the maximum Froude number for each design event. 3. Calculations reporting the velocity and shear stress to support the channel lining material selection. 4. Graphical profile of the channel longitudinal section reporting the design slope and 5-year 24-hour and 100-year 24-hour storm hydraulic grade lines.			
5-D	Identification of Parties Responsible for the Operations and Maintenance of the Post-Construction Stormwater Structural and Non-Structural BMPs. *Note: O&M Manuals for each approved post-construction BMP shall be required as a condition of approval of the PCSMP.*			
6	**Construction Schedule & Phasing**			
A	Narrative of proposed project construction phases and the necessary future submittal and approvals as required by the SWDSM. For example, grading project, water sewer project, final site development, etc.			
B	Summary table indicating future PCSMP application materials and approximate timing. (Updated from Approved SWMP)			

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Basis of Design Report

All Construction Plans submitted for review and approval by the City Engineer are to include a Basis of Design Report that documents how the final designs meet the requirements of the SWDSM and the Conditionally Approved PCSMP.

Item	Description	Yes	N/A	Page
7	**Engineer's Statement of Compliance & Seal**			
8	**Attachments & Additional Information**			
A	Post-Construction Hydrologic & Hydraulic Modeling Results			
B	Post-Construction Peak Flow Compliance BMP Calculations			
C	Post-Construction Water Quality Compliance BMP Calculations			
D	Post-Construction Drainage and Conveyance Calculations			

Construction Plans

Item	Description	Yes	N/A	Page
A	Public Improvement Construction Plan – Meeting the requirements of the City of Bismarck CAD Standards.			
B	Site Plan – Meeting the requirements of the City of Bismarck Site Plan submittal requirements.			
C	Private Improvement Construction Plans			

Design Engineer

All PCSMP application materials; SWMP, Construction Plans, Basis of Design Report, Geotechnical Report and Certification Report are to be submitted under the seal and signature of a Professional Engineer registered in the State of North Dakota.

	Yes	No	Page
Have all items included in this PCSMP application been sealed and signed by a Professional Engineer registered in the State of North Dakota?			
Submittal Copies:			
1 PDF Copy Uploaded to TRAKiT			
Application Fee Paid			

Comments:

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Required Summary Tables:

(Recreate from Approved SWMP or update with changes as documented in the Basis of Design Report)

Project Hydrologic Modeling Summary – Existing Conditions			
Storm Event	**Peak Flow (cfs) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			
Project Hydrologic Modeling Summary – Existing Conditions			
Storm Event	**Total Volume (acre-feet) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

Project Hydrologic Modeling Summary – Post-Construction Conditions			
Storm Event	**Peak Flow (cfs) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			
Project Hydrologic Modeling Summary – Post-Construction Conditions			
Storm Event	**Total Volume (acre-feet) by Point of Analysis**		
	Point 1	***Point 2***	***Point 3***
2-year 24-hour			
5-year 24-hour			
10-year 24-hour			
100-year 24-hour			

POST-CONSTRUCTION STORMWATER MANAGEMENT
Basis of Design & Construction Plan Submittal Checklist

(Complete all applicable items)

Basin & Outlet Sizing							
	Approved			***Design***			
	Size	***Invert Elevation***	***Volume (acre-feet)***	***Size***	***Invert Elevation***	***Volume (acre-feet)***	
Outlet 1							❑ N/A
Outlet 2							❑ N/A
Outlet 3							❑ N/A
Outlet 4							❑ N/A
Outlet 5							❑ N/A
Overflow							❑ N/A

Certification Report
SM-07

Engineering Department
City of Bismarck
221 N. 5th Street
P.O. Box 5503
Bismarck, ND 58506
701-355-1505
(Complete all applicable items)

For Office Use Only:
Date Received: _____
TRAKiT #: _____

Project Information:

Site Address: _____

Description of Work: _____

Lot & Block Number: **Subdivision (if applicable):**

Contact Information:

PERMITTEE: _____ Phone: _____ Fax: _____
Contact Name: _____ Email: _____
Mailing Address: _____ State _____ Zip Code _____

DESIGN ENGINEER: _____ Phone: _____ Fax: _____
Mailing Address: _____ State _____ Zip Code _____

CERTIFYING ENGINEER: _____ Phone: _____ Fax: _____
Contact Name: _____ Email: _____
Mailing Address: _____ State _____ Zip Code _____

Summary of Site Conditions

The purpose of this summary is to provide a brief comparison of the Basis of Design Post-Construction pervious and impervious areas utilized in the As-Constructed pervious and impervious areas.

	Pervious Area (square feet)	**Impervious Area (square feet)**	**Total Area (square feet)**
Basis of Design Post-Construction			
As-Constructed Conditions			
Change in Area (+/-)			

Certification Report Requirements

The Certification Report is to provide documentation that the installed post-construction BMP will function as described in the approved SWMP and/or Basis of Design Reports. The Certifying Engineer is to provide the information listed below and provide a statement that the project was, or was not, completed consist with the conditions of the PCSMP approval.

Item	**Description**	**Complete**	**Comment**
1.0	**Narrative & Summary Tables**	❑ Yes ❑ N/A	
1.1A	Post-Construction Peak Flow BMP(s) (See Table 1)	❑ Implemented ❑ N/A	
1.1B	Post-Construction Water Quality BMP(s) (See Table 1)	❑ Implemented ❑ N/A	
1.1C	Street Drainage (Provide Updated Streets Summary Table)	❑ Implemented ❑ N/A	
1.1D	Storm Sewer (Summarize Changes in a Narrative)	❑ Implemented ❑ N/A	

Certification Report
SM-07

(Complete all applicable items)

1.1E	Culverts (See Table 2)	❑ Implemented ❑ N/A	
1.1F	Open Channels (Summarize Changes in a Narrative)	❑ Implemented ❑ N/A	
1.1G	Outlet Protection (Summarize Changed in a Narrative)	❑ Implemented ❑ N/A	
1.2	Final Hydrology & Hydraulics (See Table 3 & Table 4)	❑ Yes ❑ N/A	
2.0	**Statement on Function of Implemented Post-Construction BMPs**	❑ Yes ❑ N/A	
3.0	**Quality Assurance Testing Results**	❑ Yes ❑ N/A	
4.0	**Record Drawings**	❑ Yes ❑ N/A	

Certifying Engineer

All Certification Report materials are to be submitted under the seal and signature of a Professional Engineer registered in the State of North Dakota.

	Yes	**No**	**Page**
Have all items included in the Certification Report been sealed and signed by a Professional Engineer registered in the State of North Dakota?			
Submittal Copies:			
1 PDF Copy Uploaded to TRAKiT			
Application Fee Paid			

Comments:

(Complete all applicable items)

Required Summary Tables:

(Note: The Certifying Engineer may reproduce the following tables electronically and attach to this checklist as a summary.)

Table 1: Basin & Outlet Sizing

	Approved			*As-Constructed*			
	Size	***Invert Elevation***	***Volume (acre-feet)***	***Size***	***Invert Elevation***	***Volume (acre-feet)***	
Outlet 1							❑ N/A
Outlet 2							❑ N/A
Outlet 3							❑ N/A
Outlet 4							❑ N/A
Outlet 5							❑ N/A
Overflow							❑ N/A

Table 2: Culverts

	Approved				*As-Constructed*				
	Size (inches)	***Length (feet)***	***Upstream Invert***	***Downstream Invert***	***Size (inches)***	***Length (feet)***	***Upstream Invert***	***Downstream Invert***	
Culvert 1									❑ N/A
Culvert 2									❑ N/A
Culvert 3									❑ N/A
Culvert 4									❑ N/A
Culvert 5									❑ N/A

Table 3: Project Post-Construction Hydrologic Modeling Summary – Peak Flows

Storm Event	**Peak Flow (cfs) by Point of Analysis**					
	Point 1		***Point 2***		***Point 3***	
	Approved	***Constructed***	***Approved***	***Constructed***	***Approved***	***Constructed***
2-year 24-hour						
5-year 24-hour						
10-year 24-hour						
100-year 24-hour						

(Complete all applicable items)

Table 4: Project Post-Construction Hydrologic Modeling Summary – Total Volume						
Storm Event	**Total Volume (acre-feet) by Point of Analysis**					
	Point 1		***Point 2***		***Point 3***	
	Approved	***Constructed***	***Approved***	***Constructed***	***Approved***	***Constructed***
2-year 24-hour						
5-year 24-hour						
10-year 24-hour						
100-year 24-hour						

Project Name

Post-Construction Stormwater Management Plan

Date:

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TABLE OF CONTENTS

LIST OF FIGURES

No table of figures entries found.

LIST OF TABLES

LIST OF REFERENCES

No table of figures entries found.

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1.0 SITE & APPLICANT INFORMATION

APPLICANT:

CONTACT NAME:

CONTACT ADDRESS:

PHONE #:

EMAIL:

SITE ADDRESS:

SUBDIVISION, LOT, & BLOCK:

1.1 PROJECT BACKGROUND & DESCRIPTION

Write a brief description of the project including a summary of the proposed improvements and final use, location and significant existing features

PROJECT SIZE:

IMPERVIOUS SURFACE CREATED:

2.0 RECOMMENDATIONS FOR THE PROJECT AREA

Table 2-1 – *Post-Construction Recommendations Summary*

Block #	*Lot #*	*Pervious CN*	*% Impervious*

Table 2-2 – *Existing Conditions & Post-Construction Runoff Summary*

Point of Analysis	*Existing Conditions Flow (cfs)*	*Post-Construction Flow (cfs)*	*Existing Conditions Volume (Acre-Ft)*	*Post-Construction Volume (Acre-Ft)*

2.1 DESCRIPTION OF EASEMENTS

2.2 INTER-LOT DRAINAGE REQUIREMENTS

2.3 REQUIRED POST-CONSTRUCTION STORMWATER BMPS

2.4 ADDITIONAL PROJECT RECOMMENDATIONS

3.0 PROJECT STORMWATER MANAGEMENT SUMMARY

3.1 DESCRIPTION OF POINT(S) OF ANALYSIS (IF APPLICABLE)

Provide a description of the point of analysis and if applicable why it is not the same location as the Project Point of Discharge.

3.2 DESCRIPTION OF POINT(S) OF DISCHARGE

Provide a description of where the proposed project will connect to the Public Storm Sewer System. If there is not a direct adjacent connection, describe what easements the applicant must obtain to reach the Public Storm Sewer System.

3.3 DESCRIPTION OF EXISTING STORMWATER FEATURES

Provide a narrative of the existing post-construction stormwater BMPs including peak flow mitigation, water quality, storm sewer, culverts, and open channels.

3.4 DESCRIPTION OF EXISTING WETLANDS

Note wetland areas that are shown on NWI or aerial photography. Provide documentation that a USACE 404 permit is not require for the project or state that the applicable permit will be obtained prior to the start of construction.

3.5 FEMA FIRM

Identify FIRM panel and 100-year WSE if applicable.

3.6 NRCS SOIL TYPES

Provide the NRCS soil types and HSG, note any soils that are listed as being hydric.

3.7 DESCRIPTION OF POST-CONSTRUCTION RUNOFF MANAGEMENT

Provide a summary of how post-construction stormwater will be managed to meet the Peak Flow, Water Quality, and Drainage & Conveyance performance standards included in the SWDSM.

4.0 HYDROLOGIC ANALYSIS SUMMARY

4.1 DESCRIPTION OF EXISTING ZONING & LAND USE

Provide a summary by (sub)catchment, reference the applicable figure and modeling schematic/

4.2 EXISTING CONDITIONS POINT OF ANALYSIS SUMMARY

Table 4-1 – *Existing Conditions Point of Analysis Summary*

	Point(s) of Analysis		
	1	***2***	***3***
Tributary Area (on-site & off-site)			
Impervious Area			
Impervious CN			
Pervious Area			
Pervious CN			
Tc (minutes)			

4.3 DESCRIPTION OF POST-CONSTRUCTION ZONING & LAND USE

Provide a summary by (sub)catchment, reference the applicable figure and modeling schematic/

4.4 POST-CONSTRUCTION POINT OF ANALYSIS SUMMARY

Table 4-2 – *Post-Construction Point of Analysis Summary*

	Point(s) of Analysis		
	1	***2***	***3***
Tributary Area (on-site & off-site)			
Impervious Area			
Impervious CN			
Pervious Area			
Pervious CN			
Tc (minutes)			

4.5 HYDROLOGIC ANALYSIS CONSIDERATIONS

(Does the project safely pass the 100-year 24-hour event, potential impact of future development upstream, recommendations, etc.)

5.0 POST-CONSTRUCTION STORMWATER MANAGEMENT BMPS

5.1 POST-CONSTRUCTION PEAK FLOW COMPLIANCE BMP

5.1.1 ENGINEERED OUTLETS

Table 5-1 – *Engineered Outlet Summary*

Outlet Size		
Upstream Invert		
Downstream Invert		
Outlet Velocity and Depth		
2-Year Event	ft/sec	ft
5-Year Event	ft/sec	ft
10-Year Event	ft/sec	ft
100-Year Event	ft/sec	ft
Maximum Basin Storage		
Pervious CN		
Tc (minutes)		
Stage/Storage/Discharge Location		
Calculated Water Surface Elevation		
2-Year Event		
5-Year Event		
10-Year Event		
100-Year Event		

5.1.2 EMERGENCY SPILLWAY AND UNCONTROLLED OVERFLOWS

5.2 POST-CONSTRUCTION WATER QUALITY COMPLIANCE BMP

5.2.1 WET DETENTION BASINS

Table 5-2 – *Wet Detention Basin*

Required Water Quality Volume (Vwqreq)	
Proposed Water Quality Depth	
Calculated Drawdown Time	
Stage/Storage/Discharge Location	

5.2.2 DRY DETENTION BASINS

Table 5-3 – *Dry Detention Basin*

Required Water Quality Volume (Vwqreq)	
Proposed Water Quality Depth	
Calculated Drawdown Time	
Stage/Storage/Discharge Location	

5.2.3 INFILTRATION

Table 5-4 – *Infiltration Basin*

Required Water Quality Volume (Vwqreq)	
Proposed Water Quality Depth	
Calculated Infiltration Time	
Stage/Storage/Discharge Location	

5.2.4 ALTERNATIVE BMP METHOD REQUIREMENTS

5.3 POST-CONSTRUCTION DRAINAGE & CONVEYANCE BMPS

5.3.1 STREETS

Table 5-5 – *Streets Summary*

Street Classification	
Critical Design Grade	
Calculated Maximum Street Flow Depth	
Maximum Encroachment	

5.3.2 STORM SEWER

5.3.3 CULVERTS

5.3.4 OPEN CHANNELS

5.4 POST-CONSTRUCTION BMP OPERATION AND MAINTENANCE

(Identify parties responsible for the operation and maintenance of the post-construction stormwater structural and non-structural BMPs)

6.0 CONSTRUCTION SCHEDULE & PHASING

6.1 DESCRIPTION

(Describe construction phases and the necessary future submittals and approvals as required by the SWDSM)

Table 6-1 – *Future PCSMP Application Materials*

Application Material	*Approximate Timing*
Basis of Design Report	
Construction Plans	
Geotechnical Report	
Certification Report	

7.0 ENGINEER'S STATEMENT OF COMPLIANCE & SEAL

8.0 ATTACHMENTS

Appendix 4 - Post-Construction Peak Discharge Compliance

Reference 4-1 – Geotechnical Investigation and Report Requirements

Reference 4-2 – Advanced Options of the NRCS Web Soil Survey

Reference 4-3 – Rainfall Depths

Reference 4-4 – Acceptable Software

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Reference 4-1 – Geotechnical Investigation and Report Requirements

Geotechnical Reporting General Requirements:

1. Types of soil and subsurface materials underlying the infiltration facility;
2. Infiltration rates, locations, and test dates at the infiltration facility locations (e.g., generally within 50' of the facility unless the geotechnical professional provides an opinion that the substrate at the tested/observed location extends to the infiltration facility);
3. Permeability test method, reduction factor, and permeability of the soil and subsurface materials underlying the infiltration facility;
4. Slope and geometry of the site;
5. Proximity to surface water;
6. Proximity of the seasonal high ground water table beneath the bottom of the infiltration facility;
7. Proximity and classification of bedrock beneath the bottom of the infiltration facility; and
8. The infiltration rate shall be measured at a depth equal to the proposed bottom grade of the facility.

Geotechnical field work, test pit and boring requirements:

1. Dig a standard soil boring to a depth of 10 feet below the proposed facility bottom;
2. Determine depth to groundwater table (if within 10 feet of proposed bottom) upon initial digging or drilling, and again 24 hours later;
3. Determine United States Department of Agriculture (USDA) or Unified Soil Classification (USC) soil characteristics and textures at the proposed bottom; and
4. Site specific percolation testing meeting the requirements of EPA Falling Head Percolation Test Procedure or similar approved method.

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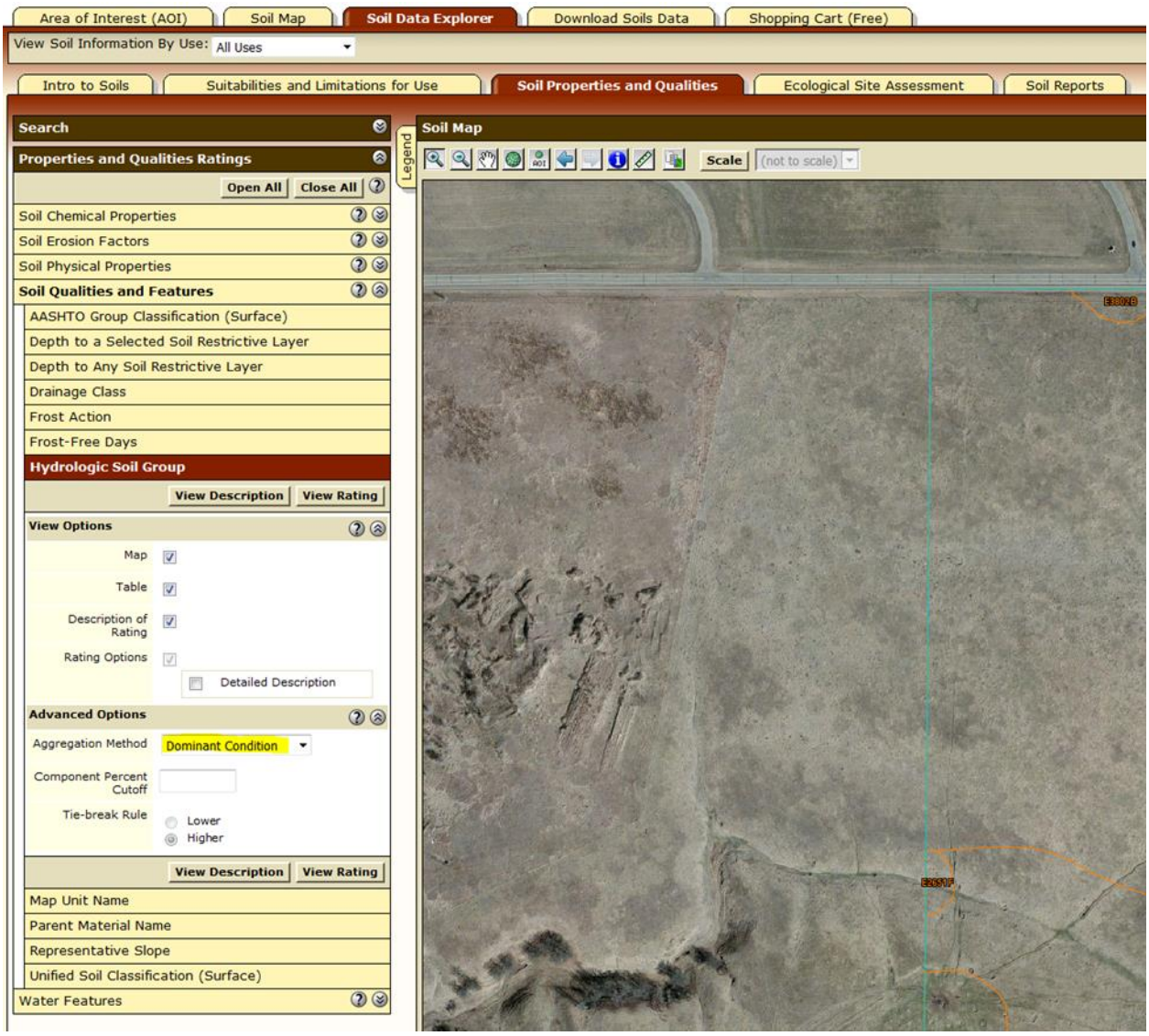
Reference 4-2 – Advanced Options of the NRCS Web Soil Survey



Source: http://websoilsurvey.sc.egov.usda.gov/

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Reference 4-3 – Rainfall Depths

NOAA Atlas 14 Rainfall Depths

Average Recurrence Frequency	*24-Hour Rainfall Event (inches)*
2-year (50% Chance Storm)	2.1
5-year (20% Chance Storm)	2.6
10-year (10% Chance Storm)	3.1
25-year (4% Chance Storm)	3.9
100-year (1% Chance Storm)	5.3
500-year (0.2% Chance Storm)	7.2

Source: http://www.noaa.gov/

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Reference 4-4 – Acceptable Software

The following software is allowed the analysis of peak discharge hydrologic and hydraulics associates with ***Section 4.0*** of this SWDSM. The City acknowledges that other software exists and that new software may become available in the future. As such, software requests may be made in the scoping letter for review and request for City approval.

1. HydroCAD
2. InfoSWMM
3. XP-SWMM / XP-STORM
4. Storm & Sanitary Analysis (SSA)
5. Bentley CivilStorm
6. Civil 3D Hydrographs
7. HEC-HMS

Note, the EPA-SWMM model utilizes a Curve Number methodology that is not the same as TR-55. It is not recommended for use in determining compliance with the SWDSM.

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Appendix 5 - Post-Construction Water Quality Compliance

Reference 5-1 – Prescriptive BMP Performance Requirements

Reference 5-2 – Water Quality Volume Analysis Procedure

Reference 5-3 – Standard Analysis Methodology

Reference 5-4 – Alternative Analysis Methodology

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Reference 5-1 – Prescriptive BMP Performance Requirements

Control	Water Quality Design Consideration
Wet Detention Ponds	Water Quality Volume (Vwq) = 1800 cu-ft per impervious acre draining to the pond. The drawdown time for the Vwq should be a minimum of 12 hours.
Dry Detention Ponds (w/Extended Detention)	Extended Detention / Water Quality Volume (Vwqed) = 1800 cu-ft per impervious acre draining to pond. The drawdown time for the Vwqed should be a minimum of 24 hours and not more than 72 hours.
Infiltration	Water Quality Volume (Vwq) = 0.5 inches from impervious area. The volume captured in rain gardens, or passed through biofilters with under drains, would be grouped with infiltration for water quality treatment. The Vwq should discharge through the soil or filter media within 48 hours. Additional flows that cannot be infiltrated in 48 hours should be routed to bypass the system through a stabilized outlet.
Flow-Through Treatment Devices	Size devices to treat the first 0.5 inches of runoff from impervious area.
Redevelopment / Retrofit	Incorporate water quality criteria by reducing impervious surface area and implementing controls to treat the first 0.5 inches of runoff from impervious areas.

Source: Appendix 1 of 2016 MS4 General Permit (https://www.ndhealth.gov/)

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Reference 5-2 – Water Quality Volume Analysis Procedure

Water Quality Volume (Vwq) is determined using the method described for each BMP listed in ***Reference 5-1 – Prescriptive BMP Performance Requirements***. The following is an example of computing the water quality volume for a detention facility:

Example:

Site: 40 acres, 40 percent impervious

V_{wq} = 1,800 cu. ft. / acre * (40 acres * 0.40) = 28,800 cu. ft.

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Reference 5-3 – Standard Analysis Methodology

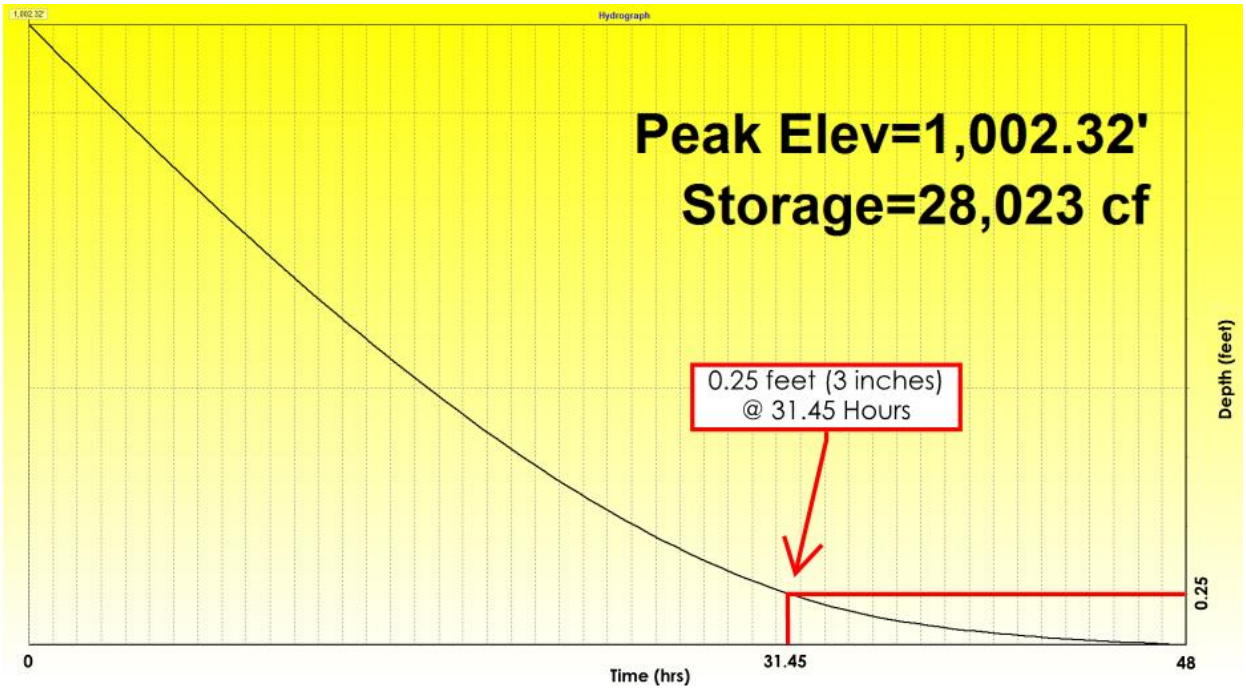
Example:

Dry Detention Basin: 100’ by 100’ at lowest engineered outlet (basin floor), 4H:1V side slopes.

Depth for Vwq is 2.32’ corresponding to approximately 28,800 cu. ft. in basin.

Set initial depth in the basin to 2.32’ with zero rainfall / runoff entering the basin.

The drawdown time to within 0.25 feet (3 inches) of the basin floor is greater than 24 hours and less than 72 hours, so the basin meets water quality performance requirements.



Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
31.30	0.00	2,652	1,000.26	0.09
31.35	0.00	2,637	1,000.26	0.09
31.40	0.00	2,621	1,000.26	0.09
31.45	0.00	2,606	1,000.25	0.09
31.50	0.00	2,591	1,000.25	0.08
31.55	0.00	2,575	1,000.25	0.08
31.60	0.00	2,560	1,000.25	0.08
31.65	0.00	2,545	1,000.25	0.08
31.70	0.00	2,530	1,000.25	0.08
31.75	0.00	2,515	1,000.25	0.08
31.80	0.00	2,500	1,000.24	0.08

0.25' Depth (Invert = 1,000)

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Reference 5-4 – Alternative Analysis Methodology

The following are examples of alternate methodologies for analyzing water quality performance.

1. P8 Urban Catchment Model
2. Source Loading and Management Model (SLAMM)
3. Water Quality Analysis Simulation Program (WASP)
4. Storm Water Management Model (SWMM)

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Appendix 6 - Post-Construction Drainage and Conveyance Compliance

Reference 6-1 – Allowable Shear and Velocity of Selected Materials

Reference 6-2 – Capacity of Sag Inlets

Reference 6-3 – IDF Curves

Reference 6-4 – Acceptable Models

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Reference 6-1 – Allowable Velocity and Shear Stress for Selected Materials

Material Category	Material Type	Allowable Velocity (ft/s)	Allowable Shear Stress (lb/ft2)
Temporary Rolled Erosion Control Product (RECP) (1)	Jute Net	1-2.5	0.45
	Straw w\ Net	1-3	1.5-1.65
	Coconut Fiber w\ Net	3-4	2.25
	Fiberglass roving	2.5-7	2
Nondegradable RECP (1)	Unvegetated	5-7	3
	Partially Established	7.5-15	4-6
	Fully Vegetated	8-21	8
Hard Surface (1)	Gabions	1-19	10
	Concrete	>18	12.5
Riprap (2)	D_{50} = 6-inches		2.4
	D_{50} = 12-inches		4.8

Source:

(1) *NRCS Part 654 Stream Restoration Design National Engineering Handbook*, Table 8-11.

(2) Kilgore, R. T. and Cotton, G. K. (2005). *Design of roadside channels with flexible linings. FHWA-NHI-05-114 Hydraulic Engineering Circular Number 15*, 3rd Edition, 153 pp.

The allowable velocity and shear stress presented in ***Reference 6-1*** are provided as a guideline for the selection of a type, or class, of stabilization. The Design Engineer shall select materials and provide manufactures literature for allowable velocity and shear of the actual material to be installed.

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Reference 6-2– Theoretical Street Sag Inlet Capacities

Sag Inlet Size	*Theoretical 6" Head Capacity (cfs)*
36-Inch	6.8
72-Inch	10.3
108-Inch	13.8
144-Inch	17.3

*Inlets were analyzed as Neenah Foundry R-3295 Type C

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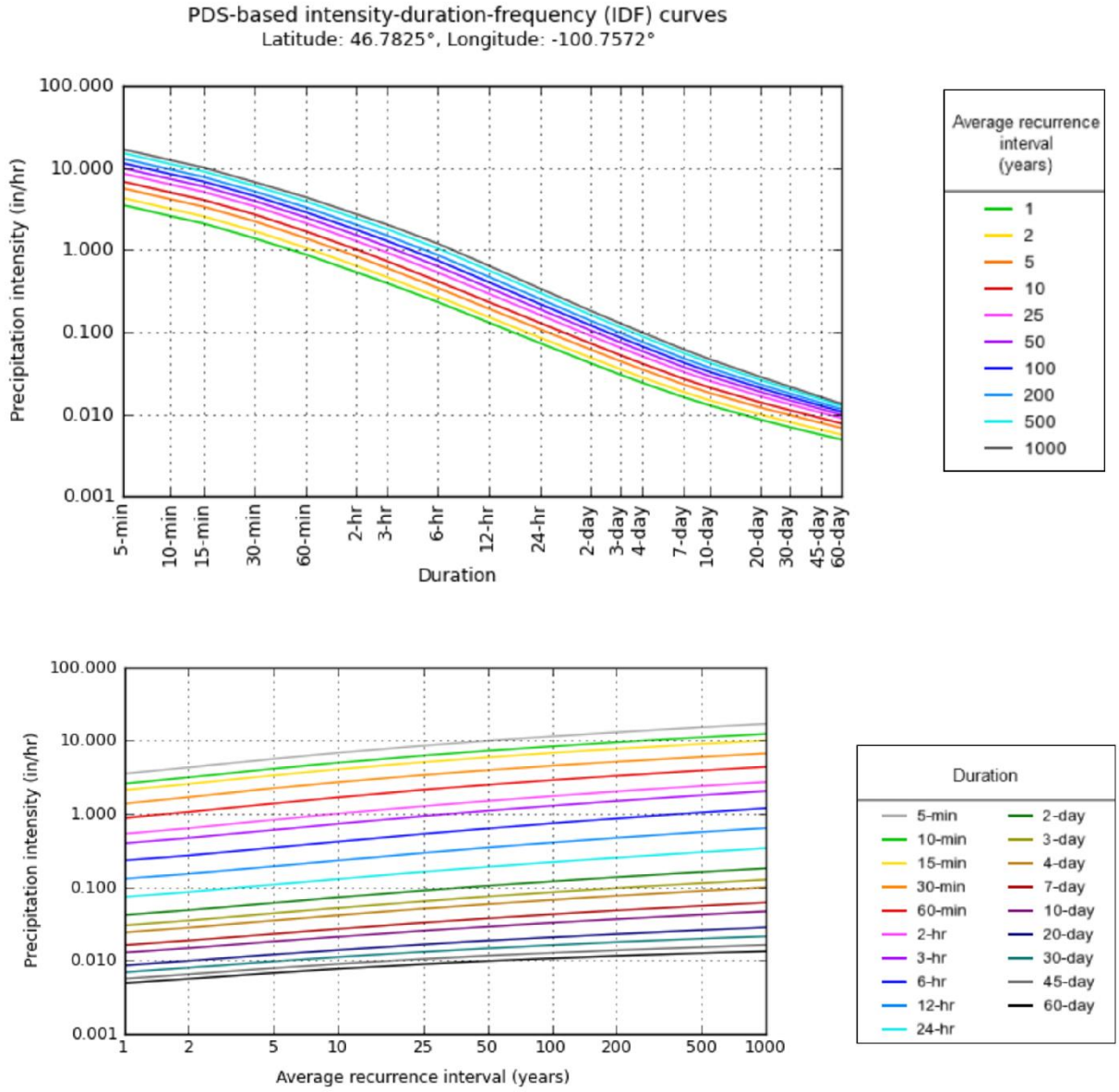
Reference 6-3 – IDF Curves

Precipitation-Intensity Graphical



Source: http://www.noaa.gov/

Precipitation-Intensity Tabular

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	3.54 (3.01-4.20)	4.31 (3.67-5.12)	5.65 (4.80-6.74)	6.83 (5.75-8.18)	8.56 (6.94-10.7)	9.96 (7.84-12.7)	11.4 (8.62-14.9)	13.0 (9.29-17.5)	15.2 (10.3-21.0)	16.9 (11.1-23.7)
10-min	2.59 (2.21-3.07)	3.16 (2.69-3.76)	4.14 (3.51-4.93)	5.00 (4.21-5.99)	6.26 (5.08-7.86)	7.29 (5.74-9.27)	8.37 (6.31-10.9)	9.52 (6.80-12.8)	11.1 (7.57-15.4)	12.4 (8.15-17.3)
15-min	2.10 (1.80-2.50)	2.56 (2.19-3.05)	3.36 (2.85-4.01)	4.06 (3.42-4.87)	5.09 (4.13-6.39)	5.93 (4.66-7.54)	6.80 (5.12-8.88)	7.74 (5.53-10.4)	9.04 (6.16-12.5)	10.1 (6.63-14.1)
30-min	1.39 (1.18-1.65)	1.70 (1.45-2.02)	2.24 (1.90-2.67)	2.71 (2.29-3.25)	3.40 (2.76-4.26)	3.96 (3.11-5.03)	4.54 (3.42-5.92)	5.16 (3.69-6.93)	6.02 (4.10-8.32)	6.69 (4.41-9.37)
60-min	0.881 (0.751-1.05)	1.07 (0.908-1.27)	1.39 (1.18-1.66)	1.69 (1.42-2.02)	2.13 (1.73-2.69)	2.50 (1.97-3.19)	2.89 (2.18-3.79)	3.31 (2.37-4.47)	3.91 (2.67-5.43)	4.39 (2.89-6.15)
2-hr	0.534 (0.458-0.630)	0.640 (0.548-0.757)	0.833 (0.710-0.988)	1.01 (0.856-1.20)	1.28 (1.05-1.61)	1.51 (1.20-1.92)	1.76 (1.33-2.29)	2.02 (1.46-2.72)	2.41 (1.66-3.32)	2.72 (1.80-3.78)
3-hr	0.397 (0.342-0.467)	0.470 (0.404-0.553)	0.606 (0.518-0.715)	0.734 (0.624-0.871)	0.934 (0.772-1.18)	1.11 (0.884-1.41)	1.30 (0.990-1.69)	1.50 (1.09-2.02)	1.80 (1.25-2.49)	2.05 (1.36-2.84)
6-hr	0.233 (0.201-0.272)	0.272 (0.235-0.318)	0.347 (0.298-0.406)	0.419 (0.358-0.493)	0.534 (0.444-0.669)	0.634 (0.510-0.802)	0.745 (0.574-0.967)	0.869 (0.635-1.16)	1.05 (0.730-1.44)	1.20 (0.802-1.65)
12-hr	0.131 (0.114-0.152)	0.152 (0.132-0.177)	0.193 (0.167-0.225)	0.232 (0.200-0.272)	0.294 (0.246-0.366)	0.348 (0.281-0.436)	0.407 (0.315-0.523)	0.472 (0.347-0.625)	0.567 (0.397-0.771)	0.645 (0.435-0.882)
24-hr	0.074 (0.064-0.085)	0.086 (0.075-0.099)	0.109 (0.094-0.126)	0.130 (0.112-0.151)	0.162 (0.136-0.199)	0.190 (0.154-0.236)	0.221 (0.171-0.281)	0.254 (0.188-0.333)	0.302 (0.213-0.407)	0.341 (0.231-0.463)
2-day	0.042 (0.037-0.048)	0.049 (0.043-0.056)	0.061 (0.053-0.070)	0.073 (0.063-0.084)	0.090 (0.076-0.109)	0.105 (0.085-0.129)	0.120 (0.094-0.152)	0.137 (0.102-0.179)	0.162 (0.115-0.216)	0.181 (0.124-0.245)
3-day	0.030 (0.027-0.034)	0.035 (0.031-0.040)	0.044 (0.039-0.051)	0.052 (0.045-0.060)	0.064 (0.054-0.078)	0.075 (0.061-0.091)	0.085 (0.067-0.107)	0.097 (0.072-0.126)	0.114 (0.081-0.151)	0.127 (0.087-0.171)
4-day	0.024 (0.021-0.028)	0.028 (0.025-0.032)	0.035 (0.031-0.040)	0.042 (0.036-0.048)	0.051 (0.043-0.061)	0.059 (0.048-0.072)	0.067 (0.053-0.084)	0.076 (0.057-0.098)	0.089 (0.063-0.118)	0.099 (0.068-0.133)
7-day	0.016 (0.014-0.018)	0.019 (0.017-0.021)	0.023 (0.020-0.026)	0.027 (0.024-0.031)	0.033 (0.028-0.039)	0.038 (0.031-0.046)	0.043 (0.034-0.053)	0.048 (0.036-0.062)	0.056 (0.040-0.074)	0.062 (0.043-0.083)
10-day	0.013 (0.011-0.014)	0.015 (0.013-0.017)	0.018 (0.016-0.021)	0.021 (0.019-0.024)	0.026 (0.022-0.030)	0.029 (0.024-0.035)	0.033 (0.026-0.041)	0.037 (0.028-0.047)	0.042 (0.030-0.056)	0.047 (0.033-0.062)
20-day	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.012 (0.011-0.014)	0.014 (0.012-0.016)	0.017 (0.014-0.019)	0.019 (0.015-0.022)	0.021 (0.017-0.025)	0.023 (0.017-0.029)	0.026 (0.019-0.034)	0.028 (0.020-0.038)
30-day	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.010 (0.009-0.011)	0.011 (0.010-0.013)	0.013 (0.011-0.015)	0.015 (0.012-0.017)	0.016 (0.013-0.020)	0.018 (0.014-0.022)	0.020 (0.014-0.026)	0.022 (0.015-0.028)
45-day	0.006 (0.005-0.006)	0.007 (0.006-0.007)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.012 (0.010-0.014)	0.013 (0.010-0.015)	0.014 (0.011-0.017)	0.015 (0.011-0.020)	0.016 (0.012-0.021)
60-day	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.011 (0.009-0.013)	0.012 (0.009-0.014)	0.013 (0.009-0.016)	0.013 (0.009-0.017)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Source: http://www.noaa.gov/

Reference 6-4 – Acceptable Models - Drainage & Conveyance

Software	Drainages and Conveyances		
	Storm Sewer	Culverts	Open Channel & Streets
HydroCAD	✓*	✓	✓**
InfoSWMM	✓	✓	✓
XP-SWMM/XP-STORM	✓	✓	✓
Storm and Sanitary Analysis (SSA)	✓	✓	✓
Bentley CivilStorm	✓	✓	✓
Civil 3D Storm Sewer	✓		
Civil 3D Express		✓	✓**
HY8		✓	
HEC-RAS		✓	✓
Manning's "n" Equation			✓**

* Only applicable if inlets are located at a low point or sag and the storm sewer has minimal surcharging.
**Only allowed when backwater conditions are not present.

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Appendix 7 - Construction Stormwater Control

Reference 7-1 – North Dakota Construction General Permit

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Reference 7-1 – North Dakota Construction General Permit

The current edition of the North Dakota Construction General Permit and application materials can be obtained from the NDDoH's website at http://www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm.

END OF MANUAL