DIVISION 8
STORM DRAINAGE AND EROSION CONTROL

8.1 Stormwater Management

Stormwater management shall be in accordance with the standards and specifications as set forth in the 2012 edition of the Stormwater Management Manual for Western Washington as amended in December 2014 (SWMM), published by the Washington State Department of Ecology (DOE) and adopted by the City of Lynden.

This information may be obtained on the Washington State DOE web site at http://www.ecy.wa.gov/programs/wq/Stormwater/manual.html

8.2 General Provisions

1. Stormwater facilities design and analysis (temporary and permanent) shall conform to the requirements of the SWMM.

2. The city has maps available to the public pertaining to topography and the citywide drainage system.

3. All projects must check to see if the City of Lynden’s Stormwater Management Plan, current edition, identifies the area as having additional drainage requirements. This planning document will identify specific projects that the City has identified for correcting drainage problems. These projects may require developer analysis and/or financial contributions.

8.3 Stormwater Minimum Requirements

Drainage review is required for all new development and redevelopment projects. This includes projects subject to a City of Lynden development proposal, permits, and/or approvals. The extent of the drainage review is determined based on project and site characteristics and which minimum requirements from the SWMM must be applied. At a minimum, all projects shall conform to the requirements of Minimum Requirement #2, Construction Stormwater Pollution Prevention, as described in Volume II of the SWMM.

Best management practices (BMPs) for controlling and/or treating stormwater runoff on new development or re-development sites are determined by the Minimum Requirements listed in the SWMM and summarized here.

A. Minimum Requirements

1. Thresholds. The Minimum Requirements of the SWMM may not apply to every development or redevelopment project. The applicability varies depending on the type and size of the project. The flow charts shown at the end of this chapter as Flow Chart 8-1 and 8-2 are Figures 2.4.1 New Development Flow Chart and 2.4.2 Re-development Flow Chart of the SWMM. These Flow Charts are to be used to determine which
requirements apply. The Minimum Requirements themselves are presented in Section 2.5 of the SWMM and are also listed below.

2. The Minimum Requirements (MR) in the SWMM (Section 2.5) are:
   a. MR#1 Preparation of Stormwater Site Plans
   b. MR#2 Construction Stormwater Pollution Prevention (SWPP)
   c. MR#3 Source Control of Pollution
   d. MR#4 Preservation of Natural Drainage Systems and Outfalls
   e. MR#5 On-site Stormwater Management
   f. MR#6 Runoff Treatment
   g. MR#7 Flow Control
   h. MR#8 Wetlands Protection
   i. MR#9 Operation and Maintenance

B. Stormwater Site Plan (MR#1)

A Stormwater Site Plan (SSP) is required for all projects meeting the threshold requirements of the SWMM. A Stormwater Site Plan Checklist has been included at the end of this Division that should be used in the preparation of the SSP. The SSP shall be prepared in accordance with Volume I, Chapter 3 of the SWMM. A complete SSP does not need to be submitted for site plan or preliminary plat approval. However, a narrative must be provided addressing all the minimum requirements outlined in the SWMM as they apply to the project. In addition to the narrative, an Off-Site Analysis and Mitigation report may be required. If any problem areas are identified in the downstream analysis (refer to 8.5.1.A), further analysis may be required prior to site plan or preliminary plat approval. All sections of the report must be present. If a section is not applicable, please state that and the reasoning why. The SSP shall be prepared by a professional civil engineer licensed in the State of Washington and must demonstrate compliance with Chapter 3 of Volume I of the SWMM. All stormwater plans and reports shall be submitted to the City for review and approval. The City will normally contract out the review and require a deposit for this review.

C. Construction Storm Water Pollution Prevention Plan (SWPPP – MR#2)

1. Prior to any clearing or grading, silt fencing shall be installed down slope of all areas to be disturbed (BMP C233).
2. Prior to any clearing or grading, downstream storm drain inlet protection shall be installed (BMP C220). Filter fabric wrapped under or over a grate inlet is not an acceptable method of inlet protection.
3. Prior to any delivery of materials or construction of any kind, a stabilized construction entrance shall be installed
4. Sediment traps with interceptor swales and check dams at a minimum shall be proposed unless the applicant has proven the site is too small for a
sediment trap and the City of Lynden has given their written approval.
(BMP's C240, C200 and C207)

5. Temporary and permanent cover measures shall be provided to protect
disturbed areas. Cover methods include mulch, erosion control nets and
blankets, plastic covering, seeding, and sod. (BMP's C100 series).

6. Sediment traps with interceptor swales and check dams at a minimum
shall be proposed unless the applicant has proven the site is too small for a
sediment trap and the City of Lynden has given their written approval.
(BMP's C240, C200 and C207)

7. It is the responsibility of the applicant to maintain erosion control
measures in proper working condition to ensure that no sediment is
leaving the site.

8. If, in the opinion of the City the temporary erosion control measures are
not installed, installed incorrectly, or need repair, a "Stop Work Order"
may be issued until corrective action is taken and the City has had an
opportunity to inspect and approved the corrective action.

D. Stormwater BMP Selection

1. BMPs for On-site Stormwater Management, Flow Control, and Runoff
(Water Quality) Treatment are designed to reduce the flow rates or
volumes stormwater runoff from and/or reduce the level of pollutants
leaving the project site.

2. Determination of the applicable BMPs for a project and steps to follow
when correct BMPs have been selected are found in the SWMM (Volume
1 Chapter 4 Section 4.2 BMP and Facility Selection Process).

E. Low Impact Development (LID)

1. All construction projects in the City of Lynden shall incorporate
infiltration to the greatest extent practicable. New and/or significantly
modified Single Family Residences and Multi-Family Residential
Buildings shall incorporate infiltration to the greatest extent practicable,

2. All projects subject to SWMM Minimum Requirement #5, On-Site
Stormwater Management, shall utilize the BMP’s or Low Impact
Development Performance Standard selection requirements as outlined in
this Minimum Requirement or provide sufficient information in the SSP to
showing why they are not feasible.

F. Construction

1. Construction Stormwater Pollution Prevention facilities shall be in place
before any land is disturbed.

2. Erosion and sediment control facilities shall be regularly inspected by the
Applicant and maintained as needed.

3. Failure of said facilities to be in place or failure due to insufficient maintenance is grounds for a stop work order.

4. Fencing is required at the maximum water surface elevation, or higher, when a pond slope is steeper than 3:1. The City may also require appropriate fencing as an additional safety requirement. Fencing shall be 5-foot-high chain link with appropriate gates for maintenance.

5. Access roads are required for maintenance and shall extend around the entire pond perimeter. Access roads shall meet the standards as set forth in the current edition of the SWMM.

6. Where Type 2 catch basins are functioning as control structures for detention ponds a shear gate with a lift handle shall be provided on the orifice structure for cleaning purposes. Control structures shall comply with WSDOT Standard Plan B-10.40-01, unless otherwise approved in writing by the Public Works Director. Lift handle shall be 1-inch rod or tubing with adjustable hook as shown in Figure 8-10.

G. Inspection

Retention and detention (Flow Control and Runoff Treatment) systems shall be inspected by the City at the following stages:

1. Upon completion of excavation to sub-foundation and where required, installation of structural supports or reinforcement for structures, including but not limited to:
   a. Core trenches for structural embankments
   b. Inlet-outlet structures and anti-seep structures, watertight connectors on pipes
   c. Trenches for enclosed storm drainage facilities
   d. Slope stabilization.

2. During placement of structural fill, concrete, backfill of foundations and trenches and installation of piping and catch basins.

3. During embankment construction.

4. Upon completion of final grading and establishment of permanent stabilization.

5. “As-built” certification by a registered professional engineer licensed in the state of Washington is required from the Applicant within 30 days of the final inspection to certify that the facility has been constructed as shown on the “as-built” plans and meets approved plans and specifications.
H. Maintenance

1. The maintenance and protection of buffers, including erosion control, care of vegetation, and removal of trash and obstructions, shall be the responsibility of the property owner or an association of property owners unless specifically agreed to be accepted by the City.

2. The owner of the property on which work has been done for private storm drainage systems, or any other person or agent in control of such property, shall maintain in good condition and promptly repair and restore all graded surfaces, walls, drains, dams and structures, vegetation, erosion and sediment control measures, and other protective devices. Such repairs or restorations, and maintenance shall be in accordance with approved plans and the SWMM.

3. A maintenance schedule shall be developed for the life of any storm drainage system element which shall state the maintenance to be completed, the time period for completion, and who shall perform the maintenance. This maintenance schedule shall be printed on the project construction plan.

The following are minimum standards for the maintenance of stormwater facilities:

a. Facilities shall be inspected annually and cleared of debris, sediment, and vegetation when they affect the functioning and/or design capacity of the facility.

b. Grassy swales and other biofilters shall be inspected monthly and mowed or replaced as necessary. Clippings are to be removed and properly disposed of.

4. The City shall be responsible for the maintenance and operation of all public storm drainage facilities following the successful completion of the two-year maintenance period and the acceptance of such facilities by the City. The applicant shall submit a surety bond guaranteeing maintenance until the system is accepted by the City.

5. The applicant or property owner shall execute an inspection and maintenance agreement binding on all subsequent owners of land served by a private storm drainage system. Such agreement shall provide for access to the system at reasonable times for regular inspection by the City or its authorized representative and for regular or special assessments of property owners to ensure that the facility is maintained in proper working condition to meet design conditions and any provisions established in the maintenance agreement.

The agreement shall be recorded by the applicant and/or owner in the land records of the County. The agreement shall also provide that, if after...
notice by the City to correct a malfunction of the facilities and satisfactory corrections are not made by the owner(s) within a reasonable period of time (30 days maximum), the city may perform all necessary work to place the facility in proper working condition. The owner(s) of the facility shall be assessed the cost of the work and any penalties, and there shall be a lien on the property, which may be placed on the tax bill and collected as ordinary taxes by the City.

8.4 Other Permits and Plan Requirements

In addition to the Stormwater Site Plan requirements by the City of Lynden, other agencies may require a plan to describe the proposed project’s impact on surface, ground and stormwater. These other agency requirements are separate and in addition to the City’s requirements. It is the responsibility of the Applicant to coordinate with the other agencies. Copies of all such permits shall be given to the City. Agency Permit/Approvals that may be necessary include, but are not limited to:

A. Hydraulic Project Approval - issued by Washington State Department of Fish and Wildlife.

B. Short-Term Water Quality Modification Approval and/or Dam Safety Permit - issued by Washington State Department of Ecology.

C. Section 404 Permit & Section 10 Permit/letter of permission - issued by United States Army Corps of Engineers.

D. General Permit for Stormwater Discharges from Construction Activities (NPDES).

E. Developer/Local Agency Agreement - issued by the Washington State Department of Transportation.

8.5 Design Specifications

8.5.1 Pipe Conveyance Systems

A. Conveyance systems shall be designed for a 25-year storm occurrence, provided that the 100-year storm can safely bypass the area without flooding. An initial qualitative analysis shall extend downstream for the entire flow path from the project site to the receiving water or up to one mile, whichever is less. If a receiving water is within one-quarter mile, the analysis shall extend within the receiving water to one-quarter mile from the project site. The analysis shall extend one-quarter mile beyond any improvements proposed as mitigation. The analysis must extend upstream to a point where any backwater effects created by the project cease. Copies of conveyance calculations shall be submitted.

B. All new developments shall have a positive lot drainage system, which
allows the lot and buildings to be drained to an approved storm sewer system, or approved infiltration facility. Existing lots without positive lot drainage may use a through curb outlet, which drains directly through the face of the curb to the gutter, but only with approval of the Public Works Director.

C. A pipe system with through curb type catch basins shall be provided for Street Sections whenever the length of surface drainage on road grade extends either direction from crest vertical curves as follows:

150 feet for grades 0.5% to 1.5%
200 feet for grades 1.5% to 3.0%
300 feet for grades 3.0% and greater

D. Pipe for storm sewers and drainage facilities shall be one of the following:

1. PVC pipe shall conform to ASTM D3034-SDR 35.
2. Corrugated Polyethylene Storm Sewer Pipe, 12 to 60 inch diameter maximum, shall conform to AASHTO M294 per WSDOT Standard Specification 9-05.20.
3. Concrete pipe shall be as specified in WSDOT/APWA Specification Section 9-05.7.

E. Minimum pipe size for storm sewers is twelve (12) inch diameter. Storm sewer leads under fifty (50) feet in length which serve single catch basins may be eight (8) inch diameter. Larger diameter pipe may be required as determined by the conveyance calculations.

F. Connections to the pipe system shall be made only at catch basins or manholes.

G. Storm drain gradients shall provide a minimum flowing full velocity of 3 ft/sec.

H. Minimum pipe coverage is 2 feet. In areas where this is not possible, ductile iron pipe shall be provided.

I. Natural streams shall not be placed in pipes except for essential roadway crossings as determined by the City and subject to permit by the Washington State Department of Fish and Wildlife (WDFW) and other State and Federal Agencies which have jurisdiction.

8.5.2 Catch Basins and Manholes

A. Catch Basin structures shall be provided as follows:

1. Maximum spacing of catch basins are as follows:

   150 feet for grades 0.5% to 1.5%
   200 feet for grades 1.5% to 3.0%
300 feet for grades 3.0% and greater

Additional catch basins shall be installed as needed to confine drainage to the gutter and prevent street drainage from sheet flowing across roadways or intersections.

2. At all intersections. Valley gutters at intersections are not permitted.

3. At junctions of dissimilar materials (PVC, concrete, metal) or dissimilar sizes.

4. Change in horizontal or vertical alignment.

5. As required by the City.

B. On storm sewers with depths less than five feet to the invert of the lowest pipe, catch basins may be one of the following:

CB Type 1 Figure 8-1
CB Type 1-L Figure 8-2
Inlet Figure 8-3
CB Type 2 (48", 96") Figure 8-4

C. On storm sewers with depths five feet and over to the invert of the lowest pipe, catch basins may be one of the following:

CB Type 2 (48", 96") Figure 8-4

D. Where a structure is needed for access or for juncture of storm sewers, but not for catchment of silt, the structure shall be one of the following types of manhole in suitable size:

MH Type 1 (48", 54") Figure 7-2
MH Type 2 (72", 96") Figure 7-3
MH Type 3 Figure 7-4

With approval of the City, a pre-cast cone may be substituted for the top slab. Manholes shall be a minimum of five feet deep to the invert of pipe. Joints on manhole sections shall be rubber gasket type. In addition, all joints shall be grouted.

E. Catch basin, manhole ladders, steps, and handholds shall conform to Figure 8-8. Reinforcing details for catch basin top slabs are shown on Figure 8-8.

F. On catch basins not serving as inlets solid metal cover shall be used as shown on Figure 8-6. Catch Basin Frames and Grates shall be as shown on Figures 8-5, 8-6 and 8-7. The standard inlet grate pattern shall be herringbone, unless specified otherwise. All catch basin, ring and covers, frame and solid lids or frame and
grates shall be bolt down.

G. Pipes connecting single inlets to main storm sewer by structure such as catch basins, shall be 8-inch diameter minimum.

H. Access roads are required for maintenance of manholes. Access roads shall meet the standards as set forth in the SWMM.

8.5.3 Open Channels

A. Open channels shall be designed to safely convey the 100-year storm event with one foot (1') freeboard.

B. Open channels discharging into an enclosed system shall only enter the enclosed system through a Type-2 catch basin with a beehive grate. A Type-1 catch basin with beehive grate may be allowed for maximum peak flows less than 0.25 cfs.

8.5.4 Bridges

A. Bridges shall be designed by a Structural Engineer, registered in the State of Washington.

B. Bridges shall be designed per the WSDOT bridge manual.

C. The stream channel and floodplain shall be modeled for both the existing condition and with the proposed structure utilizing HEC-RAS modeling. A copy of the modeling inputs and outputs, and a report summarizing existing conditions and proposed modifications with all calculations must accompany submittal of all bridge plans.

D. The stream channel underneath the bridge structure, 25' upstream, and 25' downstream shall be designed using WDFW ‘stream simulation’ fish passage design. (Wchannel bottom = Wbed x 1.2 +2”)

E. The bottom chord of the bridge shall be a minimum of 18” above the HEC-RAS model results for the 100-year design flood water surface elevation.

8.5.5 Runoff (Water Quality) Treatment

Runoff treatment requirements shall be per Minimum Requirement #6 of the SWMM. Discharge of wash down and incidental storm water from petroleum handling facilities, car washes, and restaurant trash receptacles must be sent to sanitary sewer facilities. Pump islands, wash pads, and trash enclosures must be covered.
8.5.6 Storm Water Facilities within Wetlands, Streams and Associated Buffers

The City of Lynden may allow water quality facilities within wetland buffers, streams and associated buffers subject to applicable City, land use and environmental requirements. All stormwater facilities impacting wetlands or other designated critical areas shall comply with Minimum Requirement # 8 of the SWMM.

8.5.7 Retention/Detention Facility Design

A. Retention/Detention facility design in the SWMM is modified as follows.

1. Detention Facilities shall be used only after retention (infiltration) facilities (dry ponds, infiltration galleries, etc.) are proven to not be feasible. Sufficient infiltration ("perc") tests shall be conducted to determine this feasibility unless depth to ground water is proven to be a limiting factor.

2. Retention/Infiltration facilities are preferred and encouraged due to the recent risks imposed by the introduction of the West Nile Virus (WNV) to Washington. Uses of DOE approved ‘emerging technologies’ are encouraged.

3. Detention facilities shall be designed to include both onsite disturbed areas and any new disturbed areas within the right-of-way.

4. In specific areas of Lynden, regional detention facilities are available or are being planned. The developer is responsible for providing onsite water quality treatment facilities, but may elect to pay a “fee-in-lieu” or “latecomer’s” fee in place of providing onsite detention facilities. If this option is selected, analysis of the conveyance system between the site and the regional facility site is required. If upgrades are necessary to accommodate flows from the proposed development, the upgrades or the costs associated with the upgrades will be the responsibility of the developer.

B. Where the City deems it appropriate, the City may assume responsibility for regional retention/detention facilities donated by private developers, or the City may build and maintain regional facilities. In some cases, correction of an existing stormwater problem may be planned for construction by the City. In these cases, the applicant may negotiate for potential cost-sharing to solve the existing problem.
STORMWATER SITE PLAN (SSP) CHECKLIST

Project Name: __________________________ Date:________

Project No:______________ By:______________

1. ___ Stormwater Site Plans (drainage analysis reports) shall be prepared in accordance with Volume I, Chapter 3 of the SWMM.

2. ___ All stormwater facilities shall be designed in accordance with the SWMM.

3. ___ Stamped, signed, and dated by a Washington State P.E.

4. ___ Insure the following elements are included in the SSP:
   a. ___ Existing and developed conditions basin maps
   b. ___ List of all Minimum Requirements and how the project addresses or why any are not applicable to the project. Particular detail should be provided on Minimum Requirement #5, On-site Stormwater Management.
   c. ___ Tables within the body of the report indicating areas, existing flows, developed flows, etc. This will aid in the review and reduce review time by not having to hunt through the modeling data sheets for this type of information.
   d. ___ Plans showing proposed permanent stormwater facilities and details of each.
   e. ___ Detailed narrative sections, as applicable:
      i. Project Overview
      ii. Existing Conditions
      iii. Developed Conditions
      iv. Modeling methodology and assumptions
      v. Permanent stormwater facilities – description of each element and overall system
      vi. function
      vii. Off-site analysis
      viii. Construction phase erosion and sediment control
      ix. Permanent stormwater facilities Operations and Maintenance Manual with information for each type of BMP.
      x. Model data
   f. ___ Geotechnical analysis. This analysis shall provide the design infiltration rates and provide the values of the soils necessary to determine suitability for treatment.
   g. ___ Construction Stormwater Pollution Prevention Plan (SWPPP), if required.
Figure 2.4.1 – Flow Chart for Determining Requirements for New Development

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8/9/17 CITY OF LYNDEN DESIGN STANDARDS NEW DEVELOPMENT REQUIREMENTS FLOW CHART 8-1
Does the project result in 2,000 square feet, or more, of new plus replaced hard surface area? OR Does the land disturbing activity total 7,000 square feet or greater?

Yes

Minimum Requirements #1 through #5 apply to the new and replaced hard surfaces and the land disturbed.

No

Minimum Requirements #2 applies.

Next Question

Does the project add 5,000 square feet or more of new hard surfaces? OR Convert ¼ acres or more of vegetation to lawn or landscaped areas? OR Convert 2.5 acres or more of native vegetation to pasture?

Yes

Next Question

All Minimum Requirements apply to the new hard surfaces and the converted vegetation areas.

No

Is this a road related project?

Yes

No

Does the project add 5,000 square feet or more of new hard surfaces?

Yes

Do new hard surfaces add 50% or more to the existing hard surfaces within the project limits?

No

No additional requirements

Yes

Is the total of new plus replaced hard surfaces 5,000 square feet or more, AND does the value of the proposed improvements – including interior improvements – exceed 50% of the assessed value (or replacement value) of the existing site improvements?

No

No additional requirements

Yes

All Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas.

Figure 2.4.2 – Flow Chart for Determining Requirements for Redevelopment

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