Permanent Stormwater Design Review Checklist

Site:	Applicant/Owner:

Date LDP Received:	Date Reviewed:	Reviewed By:

Notes:

GENERAL

1)		Owner, contractor, engineer name, address, phone and email is listed.
2)		Proposed drainage plan and hydraulic calculations are dated and signed by a licensed professional.
3)		Plan is to scale and north arrow is shown.
4)		Size of project shown.
5)		Existing impervious and pervious surface areas of the site.
6)		Ultimate (when site fully developed) impervious and pervious surface of the site.
7)		Develop Schedule: Show phasing and calendar year each phase is planned for construction.
8)		Plan is drawn in 2-foot contours, Existing contours - dashed, Proposed contours - solid. Minimum 100 feet beyond site boundary.
9)		Existing vegetation: Describe and identify the location of existing vegetation.
10)		Areas not to be disturbed clearly defined.
11)		On-site soil characteristics: Boundaries of different soil types and described. Groundwater elevation shown.
12)		Existing Drainage: Show pre-developed drainage areas, land use and the direction of flow for each area and travel path used to determine the Time of Concentration.
13)		Final Drainage: Show post-developed drainage areas, land use and the direction of flow for each area and travel path used to determine the Time of Concentration.
14)		Identify off-site catchment areas draining to the site. Provide 2-foot contours. Show land use and direction of flow for each area and travel path used to determine the Time of Concentration.
15)		Existing public and private utilities shown.
16)		All receiving waters, including wetlands, identified.
17)		Property limits shown. Street labeled. Lot and block information shown if platted. Street address shown if unplatted.
18)		A long-term inspection and maintenance plan for all permanent stormwater treatment practices. Responsible party identified.

DRAINAGE SWALES, EASEMENTS, BUILDING LOTS

19)		Existing and proposed drainage easements shown and labeled on the plan.
20)		All existing and proposed lot corners shown on the plan.
21)		Control/spot elevations for drainage ways provided.
22)		100-year flow contained in easement.
23)		Minimum slope of side lot drainage swales is 2%, direction arrow shown.
24)		Minimum back lot drainage swale slope is 1%, direction arrow shown.

25)		Building pads, type of house to be built, garage floor elevation, lowest floor elevation and lowest opening elevation are shown.
26)		Driveway slope, from garage to the gutter is shown.
27)		Lowest opening elevation: min. 2 feet above 100-year HWL, and min. 1 foot above emergency overflow elevation.

STORM DRAIN SYSTEM, INLETS, AND OVERFLOWS

28)		Storm drain system design: Rainfall frequency shall be based on Atlas 14 precipitation frequency estimates.
29)		Pipe size, length, grade and material shown.
30)		Top of castings and all inverts of catch basins and manholes shown. Label storm drain structures.
31)		All apron elevations (inlets and outlets) shown.
32)		400-foot max. manhole spacing.
33)		Flow direction change ≤ 90 degrees at junctions is desirable.
34)		Apron inlets to storm sewer system include trash guards. Trash guards are optional on true culverts.
35)		Discharge direction of flow generally 45 degrees or less to the flow direction of receiving ditch or stream.
36)		Overflow design to be considered for events greater than storm sewer system design event.

PERMANENT PONDS

37)		Entire drainage/service area shown (in the report).
38)		Grading plan with pond cross section. All apron elevations (inlet and outlet) shown.
39)		Hydraulic calculations for ponding provided. 100-year high water level shown. and normal water level shown.
40)		Where possible, provide a forebay at the inlet; locate inlet and outlet at opposite ends of pond; and provide length to width ratio 3:1.
41)		Multi-cell design where practical.
42)		Pond side slopes shall not exceed 4 feet horizontal to 1 foot vertical (4:1) above normal water level.
43)		10:1 bench is provided for first 1 foot of depth below normal water elevation.
44)		The permanent pool must reach a minimum of 3 feet, stay below 10 feet, and be configured to minimize scour and re-suspension of solids. Vegetation and slope stabilization methods are subject to City's approval.
45)		Outlet is designed to prevent short-circuiting and discharge of floating debris.
46)		Permanent pool volume 1,800 cf per acre drained (minimum).
47)		Outlet sized to discharge water quality volume at no more than 5.66 cfs/acre of pond surface area.
48)		Energy dissipation on outlet piping.
49)		Emergency overflow spillway provided to accommodate storms greater than the 100-year event. High point elevation and direction of overflow are marked on plans. Top of berm is 1 foot above emergency overflow spillway.
50)		Emergency overflow spillway is located to protect adjacent property and large fill sections.
51)		Minimum 8-foot width at top of berm.
52)		12-foot wide access and turn-around area for maintenance vehicles is shown on a slope ≤15%, cross slope ≤6%.
53)		Pond access is included in a min. 15-foot wide portion of the pond outlot. If access is in an easement across private property, a 12-foot wide access road is provided.
54)		Ponds shall not be located in a wetland unless mitigated for.
55)		Table of: Elevation of normal water level (NWL), elevation of 100-year high water level (HWL), with respective discharge rate, elevation of water quality water level, with respective discharge rate, and pond water surface in sq. ft., sediment storage volume (for sediment accumulation during construction and 20 years thereafter).

INFILTRATION / FILTRATION

56)		Infiltration systems shall meet volume control standards as set by the City. Filtration systems shall achieve approximately 80% removal of total suspended solids.
57)		Infiltration or filtration systems should not be excavated to final grade until the contributing drainage area has been constructed and fully stabilized.
58)		During construction of infiltration or filtration systems, rigorous erosion prevention and sediment controls (e.g. diversion berms) should be used to keep sediment and runoff completely away from the infiltration or filtration area. The area must be staked off and marked so that heavy construction equipment will not compact the soil in the proposed infiltration or filtration area.
59)		A pretreatment device such as a vegetated filter strip, small sedimentation basin, or water quality inlet (e.g. grit chamber) is required before the stormwater discharges into the infiltration or filtration system. The Minnesota Stormwater Manual and Minimal Impact Design Standards (MIDS) shall be used when sizing and designing pre-treatment.
60)		Pre-treatment sumps shall have a minimum 3 foot sump depth.
61)		Area to be infiltrated or filtrated shall be delineated on plans.
62)		Calculations or computer model results that demonstrate the design adequacy of the infiltration or filtration system must be included as part of the SWPPP.
63)		The water quality volume shall discharge through the soil surface or filter media in 48 hours or less. Additional flows that cannot be infiltrated or filtered in 48 hours should be routed to bypass the system through a stabilized discharge point. A way to visually verify that the system is as designed must be provided.
64)		Appropriate on-site testing is required and must be consistent with the recommendations in the Minnesota Stormwater Manual. Testing shall be conducted to verify soil types, infiltration capacity characteristics, and to ensure a minimum of 3 feet of separation from the seasonally saturated soils and the bottom of the proposed infiltration system.
65)		Adequate maintenance access must be provided (typically 12 ft. wide).
66)		Provide scaled drawing of infiltration or filtration BMP, with typical detail and typical cross section. Outline area which runoff is directed to the BMP. As part of the drawing set submittal, provide in table form the following information:
67)		For Infiltration BMP: a) Runoff volume directed to infiltration BMP in cu. ft. b) Storage volume of infiltration BMP in cu. ft. c) Time of infiltration in hours (must be ≤ 48 hours). d) Separation in feet between the ground water table and the bottom of BMP.
68)		For Filtration BMP: a) Runoff volume directed to filtration BMP in cu. ft. b) Percent of TSS reduction level. c) Time of filtration in hours (must be ≤ 48 hours).

INFILTRATION-PROHIBITIONS AND RESTRICTIONS

69)		Infiltration is prohibited when the infiltration BMP will receive discharges from, or be constructed in areas: a) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the MPCA b) Where vehicle fueling and maintenance occur c) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock d) Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater.

70)		Infiltration is prohibited when the infiltration BMP will receive discharges from, or be constructed in areas: a) With predominately Hydrologic Soil Group D (clay) soils b) Within 1,000 feet up gradient, or 100 feet down gradient of active karst features c) Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13. d) Where soil infiltration rates are more than 8.3 inches per hour

ALTERNATIVE VOLUME REDUCTION AND TREATMENT PRACTICES

71)		Must follow requirements and recommendations in the Minnesota Stormwater Manual.
72)		Full calculations and plans included (narrative in drainage report).

BETTER SITE DESIGN / LOW IMPACT DEVELOPMENT

73)		Green Infrastructure techniques and practices (including, but not limited to, infiltration, evapotranspiration, reuse/harvesting, conservation design, urban forestry, green roofs), shall be given preference as design options consistent with zoning, subdivision and PUD requirements.
74)		Additional low impact development design features shall be considered and indicated on the plans such as preserving natural areas, site reforestation, stream and shoreline buffers, soil compost amendments, disconnecting of surface impervious cover, and stormwater landscaping.