STORMWATER REPORT REVIEW CHECKLIST

Contents of a storm report shall follow the format listed in *Final Stormwater Report Requirements* in Section 4-2.03 of the current *City's General Requirements and Details for the Design and Construction of Water, Sanitary Sewer, and Surface Water Systems;* available online at www.cityofvancouver.us on the Business & Development tab under Water, Sewer and Stormwater Standards and Details.

- ☐ Stamped, signed and dated by the professional engineer(s), registered in the State of Washington
- ☐ Date reports and documents submitted, revision dates, **ENG and PRJ numbers on ALL report covers and documents.**
- ☐ Table of Contents (Sections, Tables, Figures, Appendix, with page numbers)
- ☐ Vicinity Map
- ☐ Soils Map
- ☐ Wellhead Protection Map (if within 1,900 of public water supply)
- ☐ Basin Map with delineated sub-basin and pervious/impervious surfaces labeled
- ☐ Other Maps (if applicable) (Floodplain, Shoreline Management Areas, Prairie Condition)
- ☐ Describe the site location
- ☐ Describe the topography, natural drainage patterns, vegetative ground cover, and presence of critical areas (VMC Chapter 20.740)
- ☐ Identify and discuss existing on-site stormwater systems and their functions
- ☐ Identify and discuss site parameters that influence stormwater system design
- ☐ Describe drainage to and from adjacent properties
- ☐ Describe adjacent areas, including streams, lakes, wetland areas, residential areas, and roads that might be affected by the construction project
- ☐ Generally describe proposed site construction, size of improvements, and proposed methods of mitigating stormwater runoff quantity and quality impacts

SECTION B – MINIMUM REQUIREMENTS

- ☐ Describe land-disturbing activity for the project
- ☐ The amount of existing, new and replaced impervious surface
- ☐ The amount of native vegetation converted to lawn or landscaping
- ☐ The total amount of land-disturbing activity
- ☐ Provide the amount of effective impervious area in each Threshold Discharge Area (TDA)
- ☐ Determine whether project is New☐ or Redevelopment☐ (Section 4-1.01)
- ☐ List the TDAs that must meet the runoff treatment requirements listed in MR #6 and Section 4-6
- ☐ List the TDAs that must meet the flow control requirements listed in MR #7 and Section 4-5

SECTION C – FINAL SOILS EVALUATION

- ☐ Soils Report/Infiltration Testing in conformance with Section 4-5.07 Infiltration Investigation and Appendix B, "A Review of Infiltration Standards and Practices in Clark County"
- ☐ Identify all on-site soil types and discuss their suitability for the project:
- ☐ Identify seasonal high water table elevations and provide groundwater monitoring if evidence of high groundwater is found:
- ☐ Complete soil tests to determine the infiltration rates per Section 4-5.07. Additional geo-technical

information may be required by the Director:

- ☐ Map showing where the test pits are located. Soil and percolation tests taken at location(s) and depth(s) of proposed facilities:
- ☐ Tested at a depth _____feet below ground surface:
- ☐ Calculated coefficient of permeability _____inches/hour:
- ☐ Allowable design infiltration rate is inches/hour (Correction factor applied per Section 4-5.08)

SECTION D (MR #3) – SOURCE CONTROL

- ☐ Applicable Minimum Standards of VMC 14.26.120 listed
- ☐ Applicable Source Control BMPs listed
- ☐ Operations Classified under VMC14.26.125 shall list the appropriate Greater Standards of VMC14.26.130 listed

SECTION E (MR #5) – ON-SITE STORMWATER MANAGEMENT BMPS

- ☐ Reference conceptual (preliminary) design and identify revisions within the final engineering plans
- ☐ If project qualifies as flow control exempt in accordance with MR #7, LID performance standard or List #2 not required. Implement BMPs T5.13, T5.10A/B/C and BMP T5.11 or T5.12 if feasible
- ☐ For project not flow control exempt, use On-site Stormwater Management BMPs from List #2 ☐ or demonstrate compliance with LID Performance Standard ☐
- ☐ If List #2 is used, include narrative describing infeasibility/feasibility of rejected and selected On-site Stormwater Management BMPs on the list
- ☐ If LID Performance Standard option is selected, include WWHM2012 LID Report showing compliance with standard (8% of the 2-yr to 50% of the 2-yr)
- ☐ Describe hydrologic soil groups, slopes, areas of native vegetation, and adequate location of each BMP

SECTION F (MR #6) – RUNOFF TREATMENT ANALYSIS AND DESIGN

For land-disturbing activities where the thresholds within Minimum Requirement #6, Section 4-1.01 and Section 4-1.02 indicate that runoff treatment facilities are required, provide the following:

- ☐ Reference the conceptual runoff treatment design proposed in the preliminary stormwater site plan and identify revisions plan
- ☐ Complete a detailed analysis and design of all proposed runoff treatment system elements in accordance with Section 4-6, Vol.V of the Stormwater Manual and the Underground Injection Control Program. Reference runoff treatment system elements to labeled points shown on the site location map or final development plan
- ☐ Include and reference all computations, equations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design water quality system elements in the technical appendix
- ☐ Summarize the results of the runoff treatment design, and describe how the proposed design meets the requirements of Section 4-6, the Stormwater Manual and the UIC Program
- ☐ WWHM2012 modeling using the Bioretention Element
- ☐ Underdrain Used checkbox checked if applicable, underdrain data entered
- ☐ SMMWW 12 in/hr specified for Soil Layer 1
- ☐ KSat Safety Factor set to 2 for contributing area less than 5,000 s.f. ☐, 4 for contributing area greater than 5,000 s.f. ☐
- ☐ Outlet Structure data correctly entered
- ☐ Native Infiltration selected (yes/no) with correct data entered
- ☐ Minimum 91% WQ Percent Filtered
- ☐ Include screen shot of Bioretention Element to confirm all inputs
- ☐ If gravel section extends beyond base of cell and/or receives additional runoff (I.E. roof, landscape) native infiltration must be set to "No" and underdrain used to route to Gravel Trench Bed element

For permeable pavements, provide the following:

- ☐ Supporting design calculations showing adequate infiltration rates to accommodate flows from all impervious surfaces directed onto any permeable pavement
- ☐ Supporting design calculations showing adequate infiltration rates to accommodate flows from all impervious surfaces directed onto any permeable pavement
- ☐ WWHM2012 Permeable Pavement element used to model runoff
- ☐ Minimum depth of 1-feet of native soil between base material seasonal high ground water or confining layer such as bedrock
- ☐ Identify revisions to the conceptual design proposed in the preliminary stormwater site plan
- ☐ Describe any assumptions used to complete the analyses, including the use of on-site stormwater BMPs or LID measures
- ☐ Complete a detailed hydrologic analysis for developed site conditions in accordance with the requirements of Section 4-5
- ☐ WWHM2012 modeling showing compliance with the Standard Flow Control Requirement (matching predeveloped discharged rates from 50% of the 2-year peak flow to the full 50-year peak flow)
- ☐ Sites with no effective impervious area (full infiltration), include WWHM2012 modeling showing 100% infiltration onsite
- ☐ If stage-storage-discharge element (SSD Table) used in WWHM2012 modeling, include narrative describing how data in table was calculated
- ☐ Refer to labeled points shown on the site location map and development plan
- ☐ Include and reference all hydrologic and hydraulic computations, equations, rating curves, stage-storage-discharge tables, graphs, and any other aids necessary to clearly show the methodology and results
- ☐ Include all maps, exhibits, graphics and references used to determine existing and developed site hydrology

Low Impact Development Flow Modeling

BMPs are modeled in accordance with Appendix III-C Washington State Department of Ecology Low Impact Development Flow Modeling Guidance of the stormwater manual

- ☐ Provide an illustrative sketch of the flow control facility and its appurtenances. The sketch shall correspond with final engineering plans. Alternatively, a final site grading plan that incorporates the above information may be included as an attachment to the final stormwater plan
- ☐ Show basic measurements necessary to confirm storage volumes
- ☐ Show all orifice, weir and flow restrictor dimensions and elevations
- ☐ Approved permits from other agencies (HPA, Wetlands, etc.).
- ☐ Washington State Department of Ecology UIC Program rule authorization. The UIC well owner or operator must register the UIC well 60 days before construction with the department. Registration forms are available for single and multiple sites and can be found on the department's web site at http://www.ecy.wa.gov/programs/wq/grndwtr/uic. Provide a copy of the authorization registration prior to engineering approval
- ☐ Identify the criteria used to complete the analyses and their sources
- ☐ Identify and discuss initial conditions, including stream base flows, beginning water surface elevations, hydraulic or energy grade lines, beginning storage elevations, and other data or assumptions used to complete the analyses of initial conditions
- ☐ Describe any assumptions used to complete the analyses
- ☐ Hydraulic analysis of all proposed collection and conveyance system elements and existing collection and conveyance elements
- ☐ Compute & tabulate flows and velocities and conveyance element capacities for all conveyance

elements within the development

- ☐ Reference conveyance system elements to labeled points shown on the site location map or development plan
- ☐ Verify the capacity of each conveyance system element to convey design flow (see table D-1in section 4-3.03 for minimum pipe slopes) and discharge at non-erosive velocities (including ultimate build-out of upstream areas)
- ☐ Single event 24-hour storm model (SBUH) may be used to calculate peak runoff for conveyance, 10-year event for drainage areas less than 40 acres, 25-year event for drainage areas greater than 40 acres, 100-year event for culverts draining areas greater than 200 acres. (Sec. 4-3.03)
- ☐ Inlet capacity calculations showing flow depth at edge travel lane does not exceed 0.12 feet. (Sec. 4-4)
- ☐ Include and reference all hydraulic computations, equations, pipe flow tables, flow profile computations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design and confirm the performance of conveyance systems
- ☐ Summarize the results of system analyses, and describe how the proposed design meets the requirements

- ☐ Geotechnical
- ☐ Floodplains and floodways
- ☐ Groundwater

Other

- ☐ For privately maintained systems, clearly identify the funding mechanism & responsible parties:
- ☐ For private facilities, include maintenance and operations manual