

1 **SECTION 6.05 STORMWATER MANAGEMENT STANDARDS**

2 A. Purpose, Goals and Definitions

- 3 1. The purpose of post construction stormwater management standards is to provide  
4 reasonable guidance for the regulation of stormwater runoff to protect local natural  
5 resources from degradation and prevent adverse impacts to adjacent and downstream land,  
6 property, facilities, and infrastructure. These standards regulate discharges from  
7 stormwater and runoff from land development projects and other construction activities to  
8 control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream  
9 channel erosion, and nonpoint source pollution associated with stormwater runoff.
- 10 2. The goal of these standards is to establish minimum stormwater management requirements  
11 and controls to protect and safeguard the general health, safety, and welfare of the public in  
12 the Town of Raymond. This regulation seeks to meet that goal through the following  
13 objectives:
- 14 a. Minimize increases in stormwater runoff from any development to reduce  
15 flooding, siltation and streambank erosion and maintain the integrity of stream  
16 channels.
  - 17 b. Minimize increases in nonpoint source pollution caused by stormwater runoff  
18 from development which would otherwise degrade local water quality.
  - 19 c. Minimize the total volume of surface water runoff which flows from any specific  
20 site during and following development to not exceed the pre-development  
21 hydrologic condition to the maximum extent practicable as allowable by site  
22 conditions.
  - 23 d. Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source  
24 pollution, wherever possible, through stormwater management controls and to  
25 ensure that these management controls are properly maintained and pose no  
26 threat to public safety or cause excessive municipal expenditures.
  - 27 e. Protect the quality of groundwater resources, surface water bodies and wetlands.

28 B. Minimum Thresholds for Applicability

- 29 1. The post-construction stormwater management standards apply to any development or  
30 redevelopment project which are subject to Site Plan Review and disturbs more than 10,000  
31 square feet or disturbs more than 2,500 square feet within 100 feet of a surface water body.
- 32 2. For sites that disturb less than 10,000 square feet, the Planning Board may grant an  
33 exemption if the amount of the total site impervious cover created does not exceed 5,000  
34 square feet. However, when an exemption is granted by the Planning Board, the following  
35 standards will still be applied to these projects as conditions of approval.
- 36 a. All runoff from new impervious surfaces and structures shall be directed to a  
37 subsurface filtration and/or infiltration device or properly discharged to a  
38 naturally occurring or fully replanted and vegetated area with slopes of 15 percent  
39 or less and with adequate controls to prevent soil erosion and concentrated flow.
  - 40 b. Impervious surfaces for parking areas and roads shall be minimized to the extent  
41 possible (including minimum parking requirements for proposed uses).
  - 42 c. All runoff generated from new impervious surfaces shall be retained on the  
43 development site and property.

- 44 d. Determination of compliance with standards (a.-c. above) will be made by the  
45 Planning Board on a case-by-case basis as site conditions and constraints will  
46 differ greatly between various development proposals.
- 47 3. The following activities are considered exempt from preparing and submitting a stormwater  
48 management plan:
- 49 a. Agricultural and forestry practices located outside wetlands and surface water  
50 setbacks and/or buffers.
- 51 b. Resurfacing and routine maintenance of existing roads and parking lots.
- 52 c. Exterior and interior alterations and maintenance to existing buildings and  
53 structures.
- 54 C. Stormwater Management for New Development
- 55 1. All proposed stormwater management practices and treatment systems shall meet the  
56 following performance standards:
- 57 a. Stormwater management and erosion and sediment control practices shall be  
58 located outside any specified buffer zones unless otherwise approved by the  
59 Planning Board. Alternatives to stream and wetland crossings that eliminate or  
60 minimize environmental impacts shall be considered whenever possible.
- 61 b. Low Impact Development (LID) site planning and design strategies are encouraged  
62 to be used to the maximum extent practicable (MEP) to reduce stormwater runoff  
63 volumes, protect water quality, and maintain predevelopment site hydrology. LID  
64 techniques have the goals of protecting water quality, maintaining  
65 predevelopment site hydrology. LID techniques that preserve existing vegetation,  
66 reduce the development footprint, minimize, or disconnect impervious area, and  
67 use enhanced stormwater best management practices (BMP's) (such as rain  
68 gardens, bio retention systems, tree box filters, and similar stormwater  
69 management landscaping techniques) shall be incorporated into landscaped  
70 areas. Capture and reuse of stormwater is strongly encouraged. The applicant  
71 must document in writing why LID strategies are not appropriate when not used  
72 to manage stormwater.
- 73 c. All stormwater treatment areas shall be planted with native plantings appropriate  
74 for the site conditions: trees, grasses, shrubs and/or other native plants in  
75 sufficient numbers and density to prevent soil erosion and to achieve the water  
76 quality treatment requirements of this section.
- 77 d. All stormwater installations and areas that receive rainfall runoff must be  
78 designed to drain within a maximum of 72 hours for vector control.
- 79 e. Salt storage areas shall be fully covered with permanent or semi-permanent  
80 measures and loading/offloading areas shall be located and designed to not drain  
81 directly to receiving waters and maintained with good housekeeping measures in  
82 accordance with NH DES published guidance. Runoff from snow and salt storage  
83 areas shall enter treatment areas as specified above before being discharged to  
84 receiving waters or allowed to infiltrate into the groundwater. See NHDES  
85 published guidance fact sheets on road salt and water quality, and snow disposal  
86 at <http://des.nh.gov/organization/commissioner/pip/factsheets/wmb/index.htm>

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- f. Surface runoff shall be directed into appropriate stormwater control measures designed for treatment and/or filtration to the MEP and/or captured and reused onsite.
  - g. All newly generated stormwater from new development shall be treated on the development site. Runoff shall not be discharged from the development site to municipal drainage systems or privately owned drainage systems (whether enclosed or open drainage) or to surface water bodies and wetlands in rates greater than discharged under existing conditions (developed condition or undeveloped condition). A development plan shall include provisions to retain natural predevelopment watershed areas on the site by using the natural flow patterns.
  - h. Runoff from impervious surfaces shall be treated to achieve at least 80% removal of Total Suspended Solids and at least 60% removal of both total nitrogen and total phosphorus using appropriate treatment measures, as specified in the NH Stormwater Manual. Volumes 1 and 2, December 2008, as amended (refer to Volume 2, page 6, Table 2.1 Summary of Design Criteria, Water Quality Volume for treatment criteria) or other equivalent means. Where practical, the use of natural, vegetated filtration and/or infiltration practices or subsurface gravel wetlands for water quality treatment is preferred given its relatively high nitrogen removal efficiency. All new impervious area draining to surface waters impaired by nitrogen, phosphorus or nutrients shall be treated with stormwater BMP's designed to optimize pollutant removal efficiencies based on design standards and performance data published by the UNH Stormwater Center and/or included in the latest version of the NH Stormwater Manual. Note: The Anti-Degradation provisions of the State Water Quality Standards require that runoff from new development shall not contribute additional pollutant loads to existing water body impairments.
  - i. Measures shall be taken to control the post-development peak rate runoff so that it does not exceed pre-development runoff. Drainage analyses shall include calculations comparing pre- and post-development stormwater runoff rates (cubic feet/second) and volumes (cubic feet) for the 1-inch rainstorm and the 2-year, 10-year, 25-year, and 50-year 24-hour storm events. Similar measures shall be taken to control the post-development runoff volume to infiltrate the groundwater recharge volume GRV according to the following ratios of Hydrologic Soil Group (HSG) type versus infiltration rate multiplier: HSG-A: 0.4; HSG-B: 0.25; HSG-C: 0.1; HSG-D: 0.00. For sites where infiltration is limited or not practicable, the applicant must demonstrate that the project will not create or contribute to water quality impairment. Infiltration structures shall be in locations with the highest permeability on the site.
  - j. The design of the stormwater drainage systems shall provide for the disposal of stormwater without flooding or functional impairment to streets, adjacent properties, downstream properties, soils, or vegetation.

129 k. The design of the stormwater management systems shall account for upstream  
130 and upgradient runoff that flows onto, over, or through the site to be developed  
131 or re-developed, and provide for this contribution of runoff.

132 l. Whenever practicable, native site vegetation shall be retained, protected, or  
133 supplemented. Any stripping of vegetation shall be done in a manner that  
134 minimizes soil erosion. development impervious surfaces, buildings and  
135 structures; surface water bodies and wetlands; drainage patterns, sub-catchment  
136 and watershed boundaries; building setbacks and buffers, locations of various  
137 hydrologic group soil types, mature vegetation, land topographic contours with  
138 minimum 2-foot intervals and spot grades where necessary for sites that are flat.

139 2. Submission Requirements for Stormwater Management Report and Plans

140 a. The SMP shall include a narrative description and a Proposed Conditions Site Plan  
141 showing all post-development proposed impervious surfaces, buildings and  
142 structures; temporary and permanent stormwater management elements and  
143 BMP, including BMP GIS coordinates and GIS files; important hydrologic features  
144 created or preserved the site; drainage patterns, sub-catchment and watershed  
145 boundaries; building setbacks and buffers; proposed tree clearing and topographic  
146 contours with minimum 2-foot intervals. The plans shall provide calculations and  
147 identification of the total area of disturbance proposed on the site (and off site if  
148 applicable) and total area of new impervious surface created. A summary of the  
149 drainage analysis showing a comparison of the estimated peak flow and volumes  
150 for various design storms (see Table 1. Stormwater Infrastructure Design Criteria)  
151 at each of the outlet locations shall be included.

152 b. The SMP shall describe the general approach and strategies implemented, and the  
153 facts relied upon, to meet the goals of Section 1.15-3. A and C.: The SMP shall  
154 include design plans and/or graphical sketch(es) of all proposed above ground LID  
155 practices.

156 c. The SMP shall include calculations of the change in impervious area, pollution  
157 loading and removal volumes for each best management practice, and GIS files  
158 containing the coordinates of all stormwater infrastructure elements (e.g. catch  
159 basins, swales, detention/bioretenion areas, piping).

160 d. The SMP shall include a description and a proposed Site Plan showing proposed  
161 erosion and sediment control measures, limits of disturbance, temporary and  
162 permanent soil stabilization measures in accordance with the NHDES Stormwater  
163 Manual Volume 3 (most recent version) as well as a construction site inspection  
164 plan including phased installation of best management practices and final  
165 inspection upon completion of construction.

166 e. The SMP shall include a long-term stormwater management BMP inspection and  
167 maintenance plan (see Section 1.15-2.E) that describes the responsible parties and  
168 contact information for the qualified individuals who will perform future BMP  
169 inspections. The inspection frequency, maintenance and reporting protocols shall  
170 be included.

- 171 f. The SMP shall describe and identify locations of any proposed deicing chemical  
172 and/or snow storage areas. SMP will describe how deicing chemical use will be  
173 minimized or used most efficiently.
- 174 g. In urbanized areas that are subject to the EPA MS4 Stormwater Permit and will  
175 drain to chloride-impaired waters, any new developments and redevelopment  
176 projects shall submit a description of measures that will be used to minimize salt  
177 usage, and track and report amounts applied using the UNH Technology Transfer  
178 Center online tool (<http://www.roadsalt.unh.edu/Salt/>) in accordance with  
179 Appendix H of the NH MS4 Permit.
- 180 3. General Performance Criteria for Stormwater Management Plans
- 181 a. All applications shall apply site design practices to reduce the generation of  
182 stormwater in the post-developed condition, reduce overall impervious surface  
183 coverage, seek opportunities to capture and reuse and minimize and discharge of  
184 stormwater to the municipal stormwater management system.
- 185 b. Water quality protection.
- 186 i. All stormwater runoff generated from new development or redevelopment  
187 shall not be discharged directly into a jurisdictional wetland or surface water  
188 body without adequate treatment.
- 189 ii. All developments shall provide adequate management of stormwater runoff  
190 and prevent discharge of stormwater runoff from creating or contributing to  
191 water quality impairment.
- 192 c. Onsite groundwater recharge rates shall be maintained by promoting infiltration  
193 through use of structural and non-structural methods. The annual recharge from  
194 the post development site shall maintain or exceed the annual recharge from pre-  
195 development site conditions. Capture and reuse of stormwater runoff is  
196 encouraged in instances where groundwater recharge is limited by site conditions  
197 All stormwater management practices shall be designed to convey stormwater to  
198 allow for maximum groundwater recharge. This shall include, but not be limited  
199 to:
- 200 i. Maximizing flow paths from collection points to outflow points.  
201 ii. Use of multiple BMPs.  
202 iii. Retention of and discharge to fully vegetated areas.  
203 iv. Maximizing use of infiltration practices.  
204 v. Stormwater System Design Performance Standards.
- 205 d. Stormwater system design, performance standards and protection criteria shall be  
206 provided as prescribed in Table 1 below. Calculations shall include sizing of all  
207 structures and best management practices, including sizing of emergency  
208 overflow structures based on assessment of the 100-year 24-hour frequency  
209 storm discharge rate.
- 210 e. The sizing and design of stormwater management practices shall utilize new  
211 precipitation data from the Northeast Region Climate Center (NRCC) or the most  
212 recent precipitation atlas published by the National Oceanic and Atmospheric  
213 Administration (NOAA) for the sizing and design of all stormwater management  
214 practices. See the NRCC website at <http://precip.eas.cornell.edu/>.

215 f. All stormwater management practices involving bioretention and vegetative cover  
216 as a key functional component must have a landscaping plan detailing both the  
217 type and quantities of plants and vegetation to be in used in the practice and how  
218 and who will manage and maintain this vegetation. The use of native plantings  
219 appropriate for site conditions is strongly encouraged for these types of  
220 stormwater treatment areas. The landscaping plan must be prepared by a  
221 registered landscape architect, soil conservation district office, or another  
222 qualified professional.

- 223 4. Spill Prevention, Control and Countermeasure (SPCC) Plan. Any existing or otherwise  
224 permitted use or activity having regulated substances in amounts greater than five gallons,  
225 shall submit to the local official such as Fire Chief or Emergency Response Official a SPCC  
226 plan for review and approval. The Plan will include the following elements:
- 227 a. Disclosure statements describing the types, quantities, and storage locations of all  
228 regulated substances that will be part of the proposed use or activity.
  - 229 b. Owner and spill response manager’s contact information.
  - 230 c. Location of all surface waters and drainage patterns.
  - 231 d. A narrative describing the spill prevention practices to be employed when  
232 normally using regulated substances.
  - 233 e. Containment controls, both structural and non-structural.
  - 234 f. Spill reporting procedures, including a list of municipal personnel or agencies that  
235 will be contacted to assist in containing the spill, and the amount of a spill  
236 requiring outside assistance and response.
  - 237 g. Name of a contractor available to assist in spill response, contaminant, and  
238 cleanup.
  - 239 h. The list of available clean-up equipment with instructions available for use on-site  
240 and the names of employees with adequate training to implement containment  
241 and clean up response.

242 D. Stormwater Management for Redevelopment

- 243 1. Redevelopment (as applicable to this stormwater regulation) means:
- 244 a. Any construction, alteration, or improvement that disturbs existing impervious  
245 area (including demolition and removal of road/parking lot materials down to the  
246 erodible subbase) or expands existing impervious cover by any amount, where the  
247 existing land use is commercial, industrial, institutional, governmental,  
248 recreational, or multifamily residential.
  - 249 b. Any redevelopment activity that results in improvements with no increase in  
250 impervious area shall be considered redevelopment activity under this regulation  
251 if capital cost of improvements is greater than 30% of the assessed property  
252 value.
  - 253 c. Any new impervious area over portions of a site that are currently pervious.
- 254 2. The following activities are not considered redevelopment unless they meet the above  
255 criteria in section D.1.b.:
- 256 a. Interior and exterior building renovation.
  - 257 b. Resurfacing of an existing paved surface (e.g. parking lot, walkway or roadway).

- 258 c. Pavement excavation and patching that is incidental to the primary project  
259 purpose, such as replacement of a collapsed storm drain.  
260 d. Landscaping installation and maintenance.
- 261 3. Redevelopment applications shall comply with the requirements of Sections C.2 Submission  
262 Requirements for Stormwater Management Report and Plans, C.3 General Performance  
263 Criteria for Stormwater Management Plans, and C.4 Spill Prevention, Control and  
264 Countermeasure (SPCC) Plan.
- 265 4. For sites meeting the definition of a redevelopment project and having less than 60%  
266 existing impervious surface coverage, the stormwater management requirements will be  
267 the same as other new development projects. The applicant must satisfactorily demonstrate  
268 that impervious area is minimized, and LID practices have been implemented on-site to the  
269 MEP.
- 270 5. For sites meeting the definition of a redevelopment project and having more than 60%  
271 existing impervious surface area, stormwater shall be managed for water quality in  
272 accordance with one or more of the following techniques, listed in order of preference:  
273 a. Implement measures onsite that result in disconnection or treatment of 100% of  
274 the additional proposed impervious surface area and at least 30% of the existing  
275 impervious area and pavement areas, preferably using filtration and/or infiltration  
276 practices.  
277 b. If resulting in greater overall water quality improvement on the site, implement  
278 LID practices to the MEP to provide treatment of runoff generated from at least  
279 60% of the entire developed site area.
- 280 6. Runoff from impervious surfaces shall be treated to achieve at least 80% removal of Total  
281 Suspended Solids and at least 60% removal of both total nitrogen and total phosphorus  
282 using appropriate treatment measures, as specified in the NH Stormwater Manual. Volumes  
283 1 and 2, December 2008, as amended (refer to Volume 2, page 6, Table 2.1 Summary of  
284 Design Criteria, Water Quality Volume for treatment criteria) or other equivalent means.  
285 Where practical, the use of natural, vegetated filtration and/or infiltration practices or  
286 subsurface gravel wetlands for water quality treatment is preferred given its relatively high  
287 nitrogen removal efficiency. All new impervious area draining to surface waters impaired by  
288 nitrogen, phosphorus or nutrients shall be treated with stormwater BMP's designed to  
289 optimize pollutant removal efficiencies based on design standards and performance data  
290 published by the UNH Stormwater Center and/or included in the latest version of the NH  
291 Stormwater Manual. Note: The Anti-Degradation provisions of the State Water Quality  
292 Standards require that runoff from development shall not contribute additional pollutant  
293 loads to existing water body impairments.
- 294 7. All newly generated stormwater from redevelopment shall be treated on the development  
295 site. Runoff shall not be discharged from a redevelopment site to municipal drainage  
296 systems or privately owned drainage systems (whether enclosed or open drainage) or to  
297 surface water bodies and wetlands in rates greater than discharged under existing  
298 conditions (developed condition or undeveloped condition).
- 299 8. Off – site mitigation allowance: In cases where the applicant demonstrates, to the  
300 satisfaction of the Planning Board, that on-site treatment has been implemented to the MEP  
301 or is not feasible, off-site mitigation will be an acceptable alternative if implemented within

302 the same subwatershed, within the project’s drainage area or within the drainage area of  
303 the receiving water body. To comply with local watershed objectives the mitigation site  
304 would be preferably situated in the same subwatershed as the development and  
305 impact/benefit the same receiving water. Off-site mitigation shall only be approved by the  
306 Planning Board with the following conditions:

- 307 a. The Conservation Commission has been given the opportunity to advise the  
308 Planning Board regarding the proposed off-site mitigation.
- 309 b. The off-site mitigation shall be equivalent to no less than the total area of  
310 impervious cover NOT treated on-site. Treatment of the impervious area shall  
311 comply with all standards of this regulation.
- 312 c. An approved off-site location must be identified, the specific management  
313 measures identified, and if not owned by the applicant, with a written agreement  
314 with the property owner(s) and an implementation schedule developed in  
315 accordance with planning board review. The applicant must also demonstrate that  
316 there is no downstream drainage or flooding impacts that would result from not  
317 providing on-site management for large storm events.

318 E. Stormwater Management Plan and Site Inspections

- 319 1. The applicant shall provide that all stormwater management and treatment practices have  
320 an enforceable operations and maintenance plan and agreement to ensure the system  
321 functions as designed. This agreement will include all maintenance easements required to  
322 access and inspect the stormwater treatment practices, and to perform routine  
323 maintenance as necessary to ensure proper functioning of the stormwater system. The  
324 operations and maintenance plan shall specify the parties responsible for the proper  
325 maintenance of all stormwater treatment practices. The operations and maintenance shall  
326 be provided to the Planning Board as part of the application prior to issuance of any local  
327 permits for land disturbance and construction activities.
- 328 2. The applicant shall provide legally binding documents for filing with the Registry of Deeds  
329 which demonstrate that the obligation for maintenance of stormwater best management  
330 practices and infrastructure runs with the land and that the Town has legal access to inspect  
331 the property to ensure their proper function or maintain onsite stormwater infrastructure  
332 when necessary to address emergency situations or conditions.
- 333 3. The property owner shall bear responsibility for the installation, construction, inspection,  
334 and maintenance of all stormwater management and erosion control measures required by  
335 the provisions of these regulations and as approved by the Planning Board, including  
336 emergency repairs completed by the Town.

337 F. Stormwater Management Plan Recordation

- 338 1. Stormwater management and sediment and erosion control plans shall be incorporated as  
339 part of any approved site plan. A Notice of Decision acknowledging the Planning Board  
340 approval of these plans shall be recorded at the Registry of Deeds. The Notice of Decision  
341 shall be referenced to the property deed (title/book/page number) and apply to all persons  
342 that may acquire any property subject to the approved stormwater management and  
343 sediment control plans. The Notice of Decision shall reference the requirements for  
344 maintenance pursuant to the stormwater management and erosion and sediment control  
345 plans as approved by the Planning Board.

- 346 2. The applicant shall submit as-built drawings of the constructed stormwater management  
347 system following construction.
- 348 G. Inspection and Maintenance Responsibility
- 349 1. Select Board or their designated agent shall have site access to complete inspections to  
350 ensure compliance with the approved stormwater management and sediment and erosion  
351 control plans. Such inspections shall be performed at a time agreed upon with the  
352 landowner.
- 353 a. If permission to inspect is denied by the landowner, municipal staff or their  
354 designated agent shall secure an administrative inspection warrant from the  
355 district or superior court under RSA 595-B Administrative Inspection Warrants.  
356 Expenses associated with inspections shall be the responsibility of the  
357 applicant/property owner.
- 358 b. If violations or non-compliance with a condition(s) of approval are found on the  
359 site during routine inspections, the inspector shall provide a report to the Planning  
360 Board documenting these violations or non-compliance including recommend  
361 corrective actions. The Planning Board shall notify the property owner in writing  
362 of these violations or non-compliance and corrective actions necessary to bring  
363 the property into full compliance. The Planning Board, at their discretion, may  
364 recommend to the Select Board to issue a stop work order if corrective actions are  
365 not completed within 10 days.
- 366 c. If corrective actions are not completed within a period of 30 days from the  
367 Planning Board or Board notification, the Planning Board may exercise their  
368 jurisdiction under RSA 676:4-a Revocation of Recorded Approval.
- 369 2. The applicant shall bear final responsibility for the installation, construction, inspection, and  
370 disposition of all stormwater management and erosion control measures required by the  
371 Planning Board. Site development shall not begin before the Stormwater Management Plan  
372 receives written approval by the Planning Board.
- 373 3. In the event a property owner refuses to repair infrastructure that is damaged or is not  
374 functioning properly, the Town retains the right but not the obligation and accepts no  
375 responsibility, to repair or maintain stormwater infrastructure if a property is abandoned or  
376 becomes vacant.
- 377 4. Landowners shall be responsible for submitting a report to the Planning Department or  
378 designated agent by September 1 every two years, with the first report due within two years  
379 of the receipt of an Occupancy Permit. The report shall be signed and stamped by a qualified  
380 professional engineer of the landowner's choice that all stormwater management and  
381 erosion control measures are functioning per the approved stormwater management plan.  
382 The report shall note if any stormwater infrastructure has needed any repairs other than  
383 routine maintenance and the results of those repairs. If the stormwater infrastructure is not  
384 functioning per the approved stormwater management plan the landowner shall report on  
385 the malfunction in their report and include detail regarding when the infrastructure shall be  
386 repaired and functioning as approved.
- 387 5. If no report is filed by September 1 in the year the report is due, the Select Board or their  
388 designated agent shall have site access to complete routine inspections to ensure

389 compliance with the approved stormwater management and sediment and erosion control  
 390 plans. Such inspections shall be performed at a time agreed upon with the landowner.

391 Table 1. Stormwater Infrastructure Design Criteria

| Design Criteria                          | Description  |                  |                         |   |      |   |      |   |      |   |      |
|--|--|------------------|-------------------------|---|------|---|------|---|------|---|------|
| <b>Water Quality Volume (WQV)</b>        | $WQV = (P)(R_v)(A)$<br>P = 1 inch of rainfall<br>R <sub>v</sub> = unitless runoff coefficient, $R_v = 0.05 + 0.9(I)$<br>I = percent impervious cover draining to the structure converted to decimal form<br>A = total site area draining to the structure  |                  |                         |   |      |   |      |   |      |   |      |
| <b>Water Quality Flow (WQF)</b>          | $WQF = (q_u)(WQV)$<br>WQV = water quality volume calculated as noted above<br>q <sub>u</sub> = unit peak discharge from TR-55 exhibits 4-II and 4-III<br><br>Variables needed for exhibits 4-II and 4-III:<br>I <sub>a</sub> = the initial abstraction = 0.2S<br>S = potential maximum retention in inches = $(1000/CN) - 10$<br>CN = water quality depth curve number<br>$= 1000 / (10 + 5P + 10Q - 10[Q^2 + 1.25(Q)(P)]^{0.5})$<br>P = 1 inch of rainfall<br>Q = the water quality depth in inches = $WQV/A$<br>A = total area draining to the design structure  |                  |                         |   |      |   |      |   |      |   |      |
| <b>Groundwater Recharge Volume (GRV)</b> | $GRV = (A_i)(R_d)$<br>A <sub>i</sub> = the total area of effective impervious surfaces that will exist on the site after development<br>R <sub>d</sub> = the groundwater recharge depth based on the USDA/NRCS hydrologic soil group, as follows:<br><table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">Hydrologic Group</th> <th style="text-align: left;">R<sub>d</sub> (inches)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.40</td> </tr> <tr> <td>B</td> <td>0.25</td> </tr> <tr> <td>C</td> <td>0.10</td> </tr> <tr> <td>D</td> <td>0.00</td> </tr> </tbody> </table> | Hydrologic Group | R <sub>d</sub> (inches) | A | 0.40 | B | 0.25 | C | 0.10 | D | 0.00 |
| Hydrologic Group                         | R <sub>d</sub> (inches)  |                  |                         |   |      |   |      |   |      |   |      |
| A  | 0.40   |                  |                         |   |      |   |      |   |      |   |      |
| B  | 0.25   |                  |                         |   |      |   |      |   |      |   |      |
| C  | 0.10   |                  |                         |   |      |   |      |   |      |   |      |
| D  | 0.00   |                  |                         |   |      |   |      |   |      |   |      |
| <b>Channel Protection Volume (CPV)</b>   | If the 2-year, 24-hour post-development storm volume <u>does not increase</u> due to development then: control the 2-year, 24-hour post-development peak flow rate to the 2-year, 24-hour predevelopment level.<br>If the 2-year, 24-hour post-development storm volume <u>does increase</u> due to development then: control the 2-year, 24-hour post-development peak flow rate to ½ of the 2-year, 24-hour pre-development level or to the 1-year, 24-hour pre-development level.   |                  |                         |   |      |   |      |   |      |   |      |
| <b>Peak Control</b>                      | Post-development peak discharge rates shall not exceed pre-development peak discharge rates for the 10-year and 50-year, 24-hour storms  |                  |                         |   |      |   |      |   |      |   |      |
| <b>EIC and UDC</b>                       | $\%EIC = \text{area of effective impervious cover} / \text{total drainage areas within a project area} \times 100$<br>$\%UDC = \text{area of undisturbed cover} / \text{total drainage area within a project area} \times 100$   |                  |                         |   |      |   |      |   |      |   |      |

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