



# **City of Tacoma Stormwater Management Manual 2016 Update**



**January 6, 2016 Public Training**

# Stormwater Management Manual (SWMM)

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- ▶ **The SWMM:**
  - ▶ Establishes Minimum Requirements and design standards for new development and redevelopment projects through the use of best management practices (BMPs)
  - ▶ Can be used to identify options for retrofit and design BMPs for retrofit projects
  - ▶ Provides design standards for the stormwater conveyance system
  - ▶ Applies to all types of development
  - ▶ Applies to existing sites as well as new sites.
  - ▶ Codified in TMC 12.08



# Code Changes for NPDES Permit

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- ▶ **NPDES required permittees to review all development regulations to make Low Impact Development the commonly-used and preferred method of stormwater management.**
- ▶ **Tacoma reviewed and updated:**
  - ▶ **SWMM**
  - ▶ **Right-of-Way Design Manual**
  - ▶ **Code**
  - ▶ **Standard Plans**



# TMC 2

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- ▶ **Allowing vegetated roofs**



# TMC 10

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- ▶ **10.14.060 Planting Strips**
  - ▶ Allowing permeable when these areas are allowed to be paved.
- ▶ **10.18.010 Materials –**
  - ▶ Where existing is permeable, new sidewalks must infiltrate, unless approved otherwise.
- ▶ **10.22**
  - ▶ Defn added for Right-of-Way Design Manual,
  - ▶ Codifies the Design Manual (10.22.030),
  - ▶ Stockpiling on permeable prohibited unless adequate containment.



# TMC 13

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- ▶ Sustainability in pilot housing, cottage and PRD
  - ▶ 13.06.140.F.6b – preserve native vegetation
  - ▶ 13.04.040 Definitions
    - ▶ All-weather surface now includes permeable
    - ▶ Hard surfaces
    - ▶ Low Impact Development – Practices – Principles
    - ▶ Vegetated roof
  - ▶ 13.04.180 – revised to allow for permeable
  - ▶ 13.05.095 Development Regulation Agreements – points for LID
  - ▶ 13.06.501 building design standards – permeable allowed, LID can be both
  - ▶ 13.06.502 (and other parts of 13.06) vegetated LID can be counted as landscaping must be designed per SWMM
  - ▶ 13.11 Definition changes
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# TMC 12.08

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- ▶ **Changes for consistency and compliance with Permit:**
  - ▶ Definitions
  - ▶ 12.08.090



## **TMC 12.08.560 Low Impact development surface water rate reduction**

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- ▶ **Beyond the SWMM requirements or where LID not required (retrofit)**
  - ▶ **Request submitted prior to construction**
  - ▶ **Designed per SWMM**
  - ▶ **Reviewed prior to installation**
  - ▶ **All required permits obtained**
  - ▶ **Inspection during and after construction**
  - ▶ **O&M document required and annual maintenance reports**
  - ▶ **C&E – City pays to record**
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## TMC 12.08

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- ▶ **One category rate reduction for a portion of site mitigated**
- ▶ **Two category rate reduction for full mitigation – all surfaces and disturbed areas.**
- ▶ **If project has to do LID per MR #5, can get the rate reduction (one category) if more LID than required is installed. If LID is used for full mitigation (two categories).**
- ▶ **If retrofit, mitigate one surface to get the rate reduction (one category). If LID is used for full mitigation, all surfaces (two categories).**



# Why?

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- ▶ **Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit (Permit) requires a program to prevent and control the impacts of runoff from new development, redevelopment, and construction activities. The City of Tacoma is electing to provide a Stormwater Management Manual equivalent to the Washington State Department of Ecology (Ecology) 2012 Surface Water Management Manual for Western Washington.**
  - ▶ **Ensures infrastructure that is safe, effective, efficient, economical, and sustainable.**
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# History

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- ▶ **October 1995 Manual**
  - ▶ **Response to 1995 NPDES Permit**
    - ▶ Equivalent to Ecology 1992 SWMM
- ▶ **January 2003 Manual**
  - ▶ **Response to Extension of 1995 NPDES Permit**
    - ▶ Equivalent to Ecology 2001 SWMM
- ▶ **September 2008 Manual**
  - ▶ **Response to 2007-2012 NPDES Permit**
    - ▶ Equivalent to Ecology 2005 SWMM
- ▶ **February 2012 Manual**
  - ▶ **Response to local community concerns and questions**
- ▶ **January 2016 Manual**
  - ▶ **Response to 2013-2018 NPDES Permit**
    - ▶ Equivalent to Ecology 2012 SWMM



# Vesting

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- ▶ **Effective Date: January 7, 2016**
- ▶ **Vesting – based on date an application is deemed complete**
  - ▶ **Some land use actions will vest a project to the Minimum Requirements but not the design standards.**
    - ▶ **Plats, short plats, wetland development permits.**



# Minimum Requirement - Applicability

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- ▶ **Minimum Requirements apply to all applications submitted after January 7, 2016; and all applications submitted on or before January 7, 2016, which have not started construction by January 7, 2021.**
  - ▶ **Started construction – site work associated with and directly related to the approved project has begun (grading to final grade or utility installation). Clearing does not constitute as started construction.**
- ▶ **Minimum Requirements apply to every development or redevelopment project. Applicability varies depending on type and size of the project.**
- ▶ **Minimum Requirements are based on the most sensitive receiving waterbody along the discharge route and upon final discharge location.**
- ▶ **The determination of thresholds shall be based on the total increase or replacement of hard surfaces that occurred after adoption of the 2003 SWMM (January 1, 2003)**

# Minimum Requirements (MRs)

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- ▶ 1. Preparation of a Stormwater Site Plan
- ▶ 2. Construction Stormwater Pollution Prevention
- ▶ 3. Source Control of Pollution
- ▶ 4. Preservation of Natural Drainage Systems and Outfalls
- ▶ 5. Onsite Stormwater Management\*
- ▶ 6. Water Quality Treatment
- ▶ 7. Flow Control\*
- ▶ 8. Wetland Protection
- ▶ 9. Operation and Maintenance
- ▶ 10. Offsite Analysis and Mitigation\*



# Exemptions – Not Required to Comply with MRs

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- ▶ **Pavement maintenance practices:**
  - ▶ Pothole and square cut patching
  - ▶ Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
  - ▶ Shoulder grading
  - ▶ Reshaping/regrading drainage systems
  - ▶ Crack Sealing
  - ▶ Resurfacing with in-kind material without expanding the road prism
  - ▶ Pavement preservation activities that do not expand the road prism
  - ▶ Vegetation maintenance
  - ▶ Catch basin and pipe maintenance
- ▶ **The following are not exempt:**
  - ▶ **These are considered replaced surfaces**
    - ▶ Removing and replacing a paved surface to base course or lower, or repairing the roadway base
  - ▶ **These are considered new surfaces:**
    - ▶ Extending the pavement edge without increasing the size of the road prism,
    - ▶ Paving graveled shoulders,
    - ▶ Resurfacing by upgrading from dirt to gravel, asphalt, or concrete
    - ▶ Resurfacing by upgrading from gravel to asphalt or concrete, or
    - ▶ Resurfacing by upgrading a bituminous surface treatment to asphalt or concrete.

# Exemptions – Not Required to Comply with MRs

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- ▶ **Underground utility projects (subject to MR#2)**
- ▶ **Minor clearing and grading (subject to MR#2)**
  - ▶ Well excavation
  - ▶ Exploratory exploration under direction of soil engineers
  - ▶ Removal of hazardous trees
  - ▶ Removal of trees or other vegetation which cause sight distance obstructions at intersections
  - ▶ Minor clearing and grading associated with cemetery graves
  - ▶ Land clearing associated with routine maintenance by public utility agencies
- ▶ **Emergencies**



# New Development (comply with MRs)

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- ▶ All new development shall be required to comply with Minimum Requirement #2 ~~and #11~~. Minimum Requirement ~~#10 and #12~~ #9 may apply to any project where a permanent stormwater facility exists or is proposed to be constructed. **Minimum Requirement #10 may apply to projects that increase the amount of stormwater runoff to the downstream stormwater system.**
- ▶ The following new development shall comply with Minimum Requirement #1 through #5 for the new and replaced ~~impervious~~ **hard** surfaces and the land disturbed:
  - ▶ ~~Creates or adds~~ **Results in** 2,000 square feet, or greater, of new, replaced, or new plus replaced ~~impervious~~ **hard** surface area, or
  - ▶ Has land disturbing activity of 7,000 square feet or greater.
- ▶ The following new development shall comply with Minimum Requirement #1 through #10 for the new **and replaced** ~~impervious~~ **hard** surfaces and the converted ~~pervious surfaces~~ **vegetation areas**:
  - ▶ ~~Creates or adds~~ **Results in** 5,000 square feet or ~~more~~ **greater** of new **plus replaced** ~~impervious~~ **hard** surface area, or
  - ▶ Converts  $\frac{3}{4}$  acres, or more, of ~~native~~ vegetation to lawn or landscaped areas, or
  - ▶ Converts 2.5 acres, or more, of native vegetation to pasture.

# Redevelopment (comply with MRs)

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- ▶ All redevelopment shall be required to comply with MR#2. MR #9 may apply to any project where a permanent stormwater facility exists or is proposed to be constructed. MR#10 may apply to projects that increase the amount of stormwater runoff to the downstream stormwater system.
- ▶ The following redevelopment shall comply with MR#1 through #5 for the new and replaced hard surfaces and the land disturbed:
  - ▶ Results in 2,000 square feet, or greater, of new, replaced, or new plus replaced hard surface area, or
  - ▶ Has land disturbing activity of 7,000 square feet or greater.
- ▶ In addition to meeting MR #1-#5, the following redevelopment shall comply with MR #6 through #10 for the new hard surfaces and converted vegetation areas:
  - ▶ Adds 5,000 sf or more of new hard surface, or
  - ▶ Converts  $\frac{3}{4}$  acres, or more, of vegetation to lawn or landscaped areas, or
  - ▶ Converts 2.5 acres, or more, of native vegetation to pasture.
- ▶ In addition to meeting MR#1-10 for the new and converted surfaces, the following shall comply with all the MRs for the new and replaced hard surfaces and converted vegetation areas:
  - ▶ The total of new plus replaced hard surfaces is 5,000 sf or more and the valuation of the proposed improvements exceeds 50% of the assessed value of the existing site improvements, or
  - ▶ For road related projects: The total of new hard surfaces is 5,000 square feet or more and total 50% or more of the existing hard surfaces within the project limits.

## Grade and Fill Projects (comply with MR #2)

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- ▶ Do not include clearing or adding or replacing hard surfaces.
- ▶ Grade and fill projects (per SWMM) require stormwater pollution prevention and the following require a SWPPP to be submitted.
  - ▶ Projects grading/filling between 50 and 499 cubic yards of material may submit a short form SWPPP
  - ▶ Projects grading/filling 500 cubic yards or more of material are required to complete a full SWPPP.

# New Development and Redevelopment – Big Changes

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- ▶ Redevelopment has similar language changes to new development (hard surface, vegetation areas...)
- ▶ All new development sites will be required to mitigate for both new and replaced hard surfaces regardless of monetary or space thresholds. (New development has less than 35% existing impervious surface coverage).
- ▶ New Terms:
  - ▶ **Project – Any proposed action to alter or develop a project site. The proposed action of a permit application or an approval which requires drainage review. Projects can be defined by:**
    - ▶ Common plans of development
    - ▶ Land use actions, excluding BLAs
    - ▶ New development or redevelopment on contiguous or non-contiguous parcels that are permitted under a single permit number or that are part of a subdivision regardless of ownership.
    - ▶ Other City departmental conditions and review (e.g. offsite improvements are imposed on multiple parcels)
  - ▶ **Single Family/Duplex Projects can be defined by:**
    - ▶ Land use actions, excluding BLAs
    - ▶ New development or redevelopment on contiguous or non-contiguous parcels that are permitted under a single permit number or that are part of a subdivision regardless of ownership.
    - ▶ Other City departmental conditions and review (e.g. offsite improvements are imposed on multiple parcels)

Land use actions that would affect if a proposed development is a project include, without limitation, plats, short plats, site specific rezones, wetland development permits, conditional use permits, shoreline development permits, and SEPA, if the intent of those land use actions is to develop the affected parcel, parcels, or right of way. All other land use permits may create a project depending upon the project scope proposed in the land use action.

Conveyances into different ownership for the ostensible purpose of avoiding more comprehensive stormwater review and requirements, or where an innocent conveyance has this effect, may be considered to be part of a project and reviewed by Environmental Services for cumulative impacts. The final determination of a project shall be made by Environmental Services.



# New Development and Redevelopment

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## ▶ New Terms (cont.)

- ▶ **Common Plan of Development** – A project site where multiple separate and distinct construction activities may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include:
  - ▶ 1. Phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a plat or short plat where lots are sold to separate builders).
  - ▶ 2. A development plan that may be phased over multiple years, but is still under a consistent plan for long-term development.
  - ▶ New development or redevelopment in contiguous areas that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility.
  - ▶ New development or redevelopment on contiguous lots that are not associated with a land use action, that are owned by a single entity, even if construction on the lots will not occur at the same time.
  - ▶ New development or redevelopment on non-contiguous lots that are located on the same City block and discharge to the same threshold discharge area, owned by a single entity, even if construction will not occur at the same time.
  - ▶ New development or redevelopment on linear projects such as roads, pipelines, or utilities.
- ▶ **Hard Surface** – An impervious surface, a permeable pavement, or a vegetated roof.
- ▶ **Vegetation** – As related to applicability of the Minimum Requirements, vegetation shall mean native vegetation, pasture, scrub/shrub, uncultivated vegetation, or unmaintained non-native vegetation (e.g., Himalayan blackberries, scotch broom). (Note, different than Ecology definition)



# New Development and Redevelopment

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## ▶ New Terms (cont.)

- ▶ Road-related projects – A project whose objective is the construction or maintenance of elements within the roadway section or right-of-way including the driving surface, sidewalks, bike paths, and pedestrian paths. Sidewalks, bike paths, and pedestrian paths must be associated with an abutting or adjacent driving surface. Roadway elements built as a requirement for onsite actions and permit issuance are not included in this category.
- ▶ Landscaped areas – Vegetation, including but not limited to, annuals, woody and herbaceous perennials such as shrubs, vines, or trees that are regularly and/or systematically maintained through a combination of pruning, mowing, watering, trimming, fertilizing, and other activities. Landscaped areas are typically used for aesthetic purposes.
- ▶ Land disturbing activities – Any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening are not considered land disturbing activity if conducted in accordance with established standards and procedures. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.



# Exceptions to the MRs

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- ▶ **Must be requested in writing to allow a waiver of a requirement.**
- ▶ **Public process requiring filing decision with publication with public comment period (TMC 12.08.095)**
- ▶ **Exceptions must meet the following criteria:**
  - ▶ **Application of the MRs would impose a severe and unexpected economic hardship, and**
  - ▶ **The exception will not increase risk to the public health and welfare nor be injurious to other properties in the vicinity and/or downstream, and the quality of waters of the state; and**
  - ▶ **The exception is the least possible exception that could be granted to comply with the intent of the MRs.**
- ▶ **Applications in writing must include:**
  - ▶ **The current use of the site; and**
  - ▶ **How application of the MRs restricts the proposed use of the site compared to the restrictions that existed prior to the adoption of the MRs; and**
  - ▶ **The possible remaining issues of the site if the exception were not granted; and**
  - ▶ **The uses of the site that would have been allowed prior to the adoption of the MRs; and**
  - ▶ **A comparison of the estimated amount and percentage of value loss as a result of the MRs versus the estimated amount of percentage of value loss as a result of requirements that existed prior to adoption of the MRs; and**
  - ▶ **The feasibility for the owner to alter the project to apply the MRs.**

**The decision to grant an exception is within the sole discretion of the City. New or additional requirements may be imposed on the project to offset or mitigate harm that may be caused by approving the exception.**

# Adjustments to MRs (new)

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- ▶ Adjustments to the MRs may be requested, in writing, to allow a reduction or modification of a requirement or to permit an alternative requirement.
- ▶ Applications shall be made in writing and include documentation that outlines how:
  - ▶ The adjustment provides substantially equivalent environmental protection; and
  - ▶ Based on Sound Engineering Practice, the objectives of safety, function, environmental protection and facility maintenance are met.

The decision to grant an exception is within the sole discretion of the City. New or additional requirements may be imposed on the project to offset or mitigate harm that may be caused by approving the exception.





# Other Exceptions

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- ▶ **Exceptions to other requirements, including project specific design exceptions, not including exceptions and adjustments to MRs or exceptions and adjustments that would alter facility function may be requested in writing to Environmental Services.**
- ▶ **The exception must describe why the requirement in the manual cannot be met and why it will not likely affect downstream properties, the quality of waters of the state, facility function, and the health and welfare of the public.**

# MR#1 – Stormwater Site Plan

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- ▶ **Stormwater Site Plans shall use site-appropriate development principles, as required by Tacoma Municipal Code, to retain native vegetation and minimize impervious surfaces to the extent feasible.**
- ▶ **The following principles shall be used where feasible:**
  - ▶ **Minimization of land disturbance by confining construction to the smallest area feasible and away from critical areas;**
  - ▶ **Preservation of natural vegetation;**
  - ▶ **Locating impervious surfaces over less permeable soils;**
  - ▶ **Clustering Buildings;**
  - ▶ **Minimizing Impervious Surfaces**
- ▶ **As part of the SSP, the applicant must discuss the use of the principles. (Part of Ch. 4 checklist and part of SSP Short Form).**

## MR #2 – Construction Stormwater Pollution Prevention

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- ▶ All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters.
- ▶ Projects that meet or exceed thresholds shall prepare a SWPPP.
- ▶ The following can use short form SWPPP:
  - ▶ Add or replace between 2,000 and 5,000 sf of hard surface.
  - ▶ Clear or disturb between 7,000 square feet and 1 acre of land.
  - ▶ Grade/fill 50-499 cubic yards of material.



# MR #2 – Stormwater Pollution Prevention Plan

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- ▶ **SWPPP must address 13 elements of SWPP – these are addressed by the use of BMPs**
  - ▶ **1. Preserve Vegetation/Mark Clearing Limits**
    - ▶ Buffer Zones, Silt Fence, High Visibility Fence
  - ▶ **2. Establish Construction Access**
    - ▶ Stabilized Construction Entrance, Wheel Wash
  - ▶ **3. Control Flow Rates**
    - ▶ Sediment Pond, Check Dams
  - ▶ **4. Install Sediment Controls**
    - ▶ Silt Fence, Wattles, Sediment Ponds, Chemical Treatment
  - ▶ **5. Stabilize Soils**
    - ▶ Temporary/Permanent Seeding, Mulching, Sodding, Compost, Topsoiling
  - ▶ **6. Protect Slopes**
    - ▶ Temporary/Permanent Seeding, Mulching, Nets and Blankets, Gradient Terraces

# MR #2 – Stormwater Pollution Prevention Plan

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- ▶ **7. Protect Drain Inlets**
  - ▶ Storm Drain Inlet Protection
- ▶ **8. Stabilize Channels and Outlets**
  - ▶ Nets and Blankets, Channel Lining, Check Dams
- ▶ **9. Control Pollutants**
  - ▶ Concrete Handling, Material Delivery, Storage and Containment, pH Control
- ▶ **10. Control Dewatering**
  - ▶ Vegetative Filtration, Filtration
- ▶ **11. Maintain BMPs**
  - ▶ Materials on Hand, Erosion and Sediment Control Lead
- ▶ **12. Manage the Project**
  - ▶ Erosion and Sediment Control Lead, Scheduling
- ▶ **13. Protect BMPs (new one)**
  - ▶ Buffer Zone, Silt Fence, Check Dams, Wattles



# MR #3 – Source Control of Pollution

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- ▶ All known, available and reasonable source control BMPs shall be applied to all projects.
- ▶ Source Control BMPs include both operational and structural BMPs.
- ▶ Volume 4 – BMPs
  - ▶ **BMPs for Homeowners**
    - ▶ Car washing, composting, material storage, yard maintenance, pet waste
  - ▶ **BMPs for Commercial and Industrial**
    - ▶ Washing, liquid transfer, fueling stations, wood treatment, metal production, storage and stockpiling
    - ▶ Mandatory BMPs for all activities has been expanded.



# MR #4 – Preservation of Natural Drainage Systems and Outfalls

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- ▶ **For all projects, the natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location to the maximum practicable.**
  - ▶ In short, discharges within a watershed should remain within that watershed.
  - ▶ Part of SSP to describe pre project and proposed project discharge locations.
- ▶ **MR #4 - Guidance on discharging stormwater and BMPs to use for various scenarios:**
  - ▶ Discharge onto private property requires permission.
  - ▶ 100-year return period flowrate is 0.2 cfs – discharge to rock pad
  - ▶ 100-year return period flowrate is 0.5 cfs – discharge to dispersion trench
  - ▶ 100-year return period flowrate is greater than 0.5 cfs – discharge through conveyance system

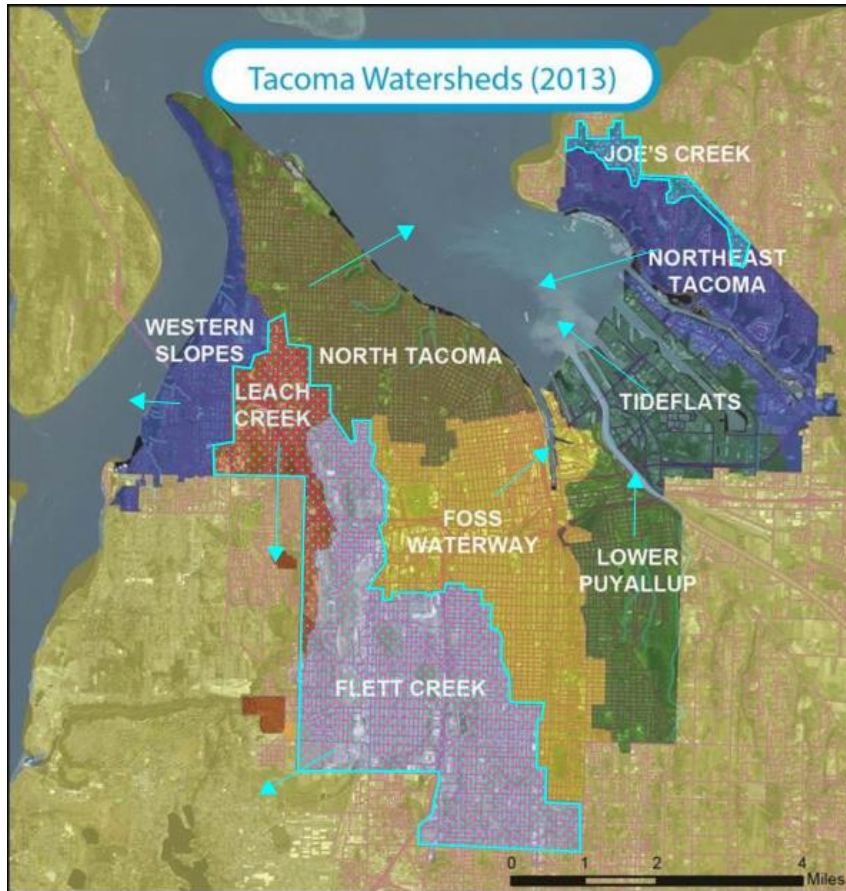
# Minimum Requirement #5 – Onsite Stormwater Management

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- ▶ **Projects shall employ, where feasible and appropriate, onsite stormwater management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts.**



# Minimum Requirement #5 – Onsite Stormwater Management



- ▶ Requirements vary depending on discharge location.
- ▶ **Marine Waterbodies and Flow Control Exempt Waterbodies**
  - ▶ Puget Sound
  - ▶ Puyallup River
  - ▶ First Creek
- ▶ **Non-Flow Control Exempt Waterbodies**
  - ▶ Freshwater Bodies

# MR #5 – Changes to SWMM

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## 2012 SWMM

- ▶ Same for the entire City.
- ▶ Roofs
  - ▶ 1. Infiltration
  - ▶ 2. Dispersion
  - ▶ 3. Collect and Convey
- ▶ Other Surfaces
  - ▶ 1. Disperse
- ▶ Soil Quality BMP

## 2015 SWMM

- ▶ Varies through the City depending on final discharge location.
  - ▶ LID List Approach, or
  - ▶ LID Performance Standard, or
  - ▶ Flow Control Exempt List



# MR #5 – Marine Waterbodies and Flow Control Exempt Waterbodies

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- ▶ **Projects shall employ the following BMPs as feasible:**

- ▶ **Roofs**

- ▶ BMP L602: Downspout Full Infiltration, OR
    - ▶ BMP L603: Downspout Dispersion, OR
    - ▶ BMP L604: Perforated Stubouts Connections, OR
    - ▶ BMP L605: Collect and Convey (only if infiltration, dispersion, perforated stubouts are not feasible).

- ▶ **Other Hard Surfaces**

- ▶ BMP L611: Concentrated Flow Dispersion, OR
    - ▶ BMP L612: Sheet Flow Dispersion, OR
    - ▶ BMP L605: Collect and Convey (if concentrated flow dispersion or sheet flow dispersion are not feasible)

- ▶ **Lawn and Landscaped Areas**

- ▶ Soil Quality BMP – BMP L613

# MR #5 – Non-Flow Control Exempt

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- ▶ Projects required to comply with MR#1-5 shall comply with List #1 or demonstrate compliance with LID Performance Standard
- ▶ Projects required to comply with MR#1-10 shall comply with List #2 or demonstrate compliance with LID Performance Standard
- ▶ For each surface category, consider the BMPs in the order listed, using the first BMP considered feasible. Feasibility shall be determined by evaluation against:
  - ▶ Design Criteria, limitations, and infeasibility criteria for each BMP
  - ▶ Competing Needs Criteria – onsite BMPs can be superseded or reduced where they conflict with:
    - ▶ Requirements of the Historic Preservation Laws and Archaeology Laws, Federal Superfund or MTCA, Federal Aviation, ADA
    - ▶ Conflicts with special zoning districts
    - ▶ Public Health and Safety Standards
    - ▶ Transportation regulations to maintain the option for future expansion or multi-modal use of public rights-of-way
    - ▶ Critical Areas Ordinance

# MR#5 – List #1

Use the first BMP that is considered feasible.

- ▶ **Lawn and Landscaped Areas**
  - ▶ **BMP L613: Post Construction Soil Quality and Depth**
- ▶ **Roofs**
  - ▶ **1. Either (evaluate both for feasibility)**
    - ▶ a. BMP L614: Full Dispersion, OR
    - ▶ b. BMP L602: Downspout Full Infiltration
  - ▶ **2. Either (choose either a or b to evaluate for feasibility)**
    - ▶ a. BMP L601: Rain Gardens, OR
    - ▶ b. BMP L630: Bioretention

\*Rain Garden or Bioretention must have minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.
  - ▶ **3. BMP L603: Downspout Dispersion**
  - ▶ **4. BMP L604: Perforated Stub-Out Connections**
  - ▶ **5. BMP L605: Collect and Convey**
- ▶ **Other Hard Surfaces**
  - ▶ **1. BMP L614: Full Dispersion**
  - ▶ **2. Either (Choose a, b, or c to evaluate for feasibility)**
    - ▶ a. BMP L633: Permeable pavement, OR
    - ▶ b. BMP L601: Rain Garden, OR
    - ▶ c. BMP L630: Bioretention
  - ▶ **3. Either (evaluate both for feasibility)**
    - ▶ a. BMP L612: Sheet Flow Dispersion
    - ▶ b. BMP L611: Concentrated Flow Dispersion
  - ▶ **4. BMP L605: Collect and Convey**

# MR#5 – List #2

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Use the first BMP that is considered feasible.

- ▶ **Lawn and Landscaped Areas**
  - ▶ **BMP L613: Post Construction Soil Quality and Depth**
- ▶ **Roofs**
  - ▶ **1. Either (evaluate both for feasibility)**
    - ▶ a. BMP L614: Full Dispersion, OR
    - ▶ b. BMP L602: Downspout Full Infiltration
  - ▶ **2. BMP L630: Bioretention (with a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.)**
  - ▶ **3. BMP L603: Downspout Dispersion**
  - ▶ **4. BMP L604: Perforated Stub-Out Connections**
  - ▶ **5. BMP L605: Collect and Convey**
- ▶ **Other Hard Surfaces**
  - ▶ **1. BMP L614: Full Dispersion**
  - ▶ **2. BMP L633: Permeable Pavement**
  - ▶ **3. BMP L630: Bioretention (with a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.)**
  - ▶ **4. Either (evaluate both for feasibility)**
    - ▶ a. BMP L612: Sheet Flow Dispersion
    - ▶ b. BMP L611: Concentrated Flow Dispersion
  - ▶ **5. BMP L605: Collect and Convey**

## MR #5 – LID Performance Standard

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- ▶ **Stormwater discharges shall match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 8% of the 2-year return period flowrate to 50% of the 2-year return period flowrate. Projects that must meet MR#7 must match flow durations between the 8% of the 2-year through the full 50-year flow.**

## **MR #5 BMPs – BMP L614 Full Dispersion**

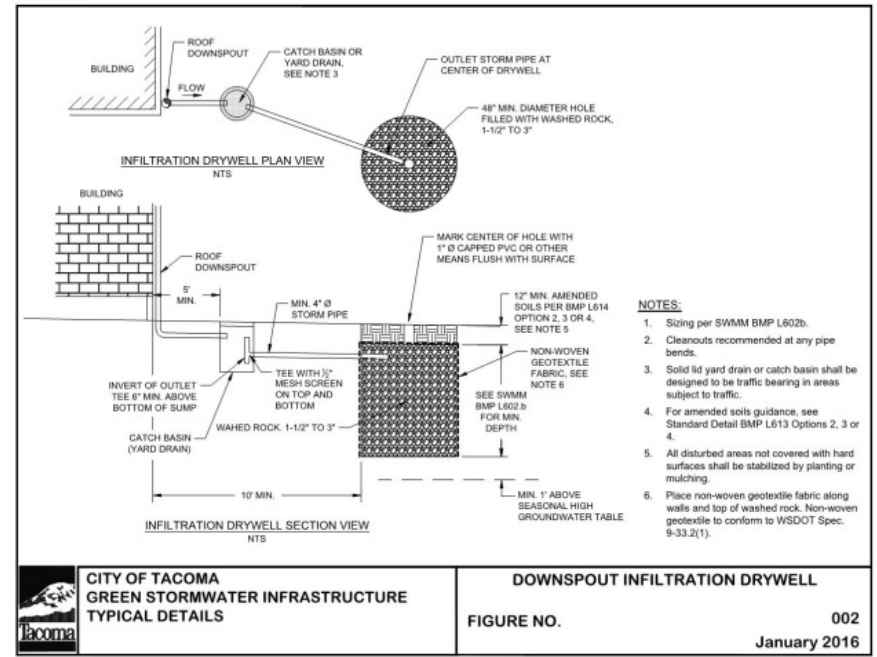
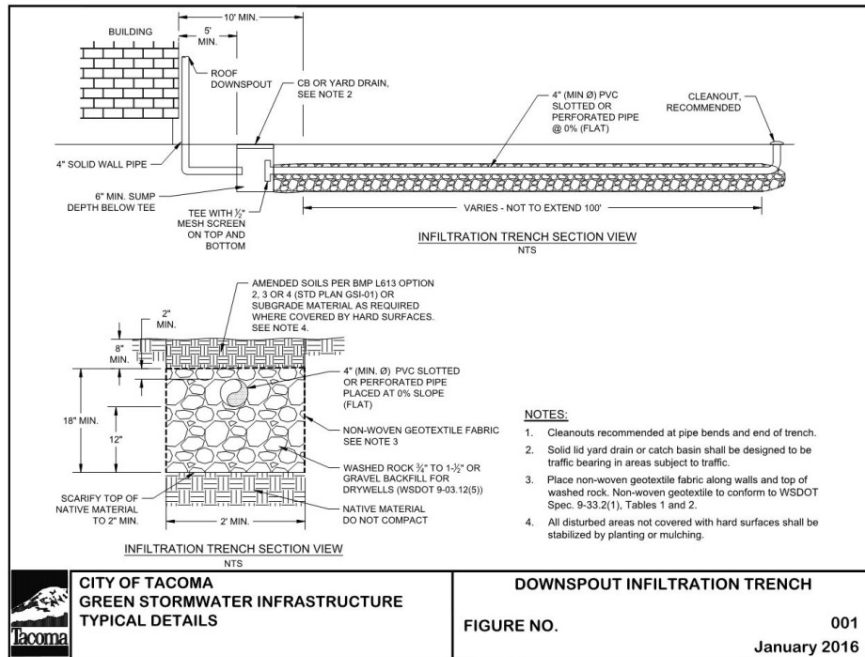
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- ▶ **Must preserve at least 65% of the site in a forest or native condition.**
- ▶ **For residential development, full dispersion can be used as long as the developed areas draining to dispersion area do not have impervious surfaces that exceed 10% of the site.**
- ▶ **The preserved area may be previously cleared but replanted with native landscape.**
- ▶ **Wetlands, streams, lakes do not count toward 65% forest coverage.**



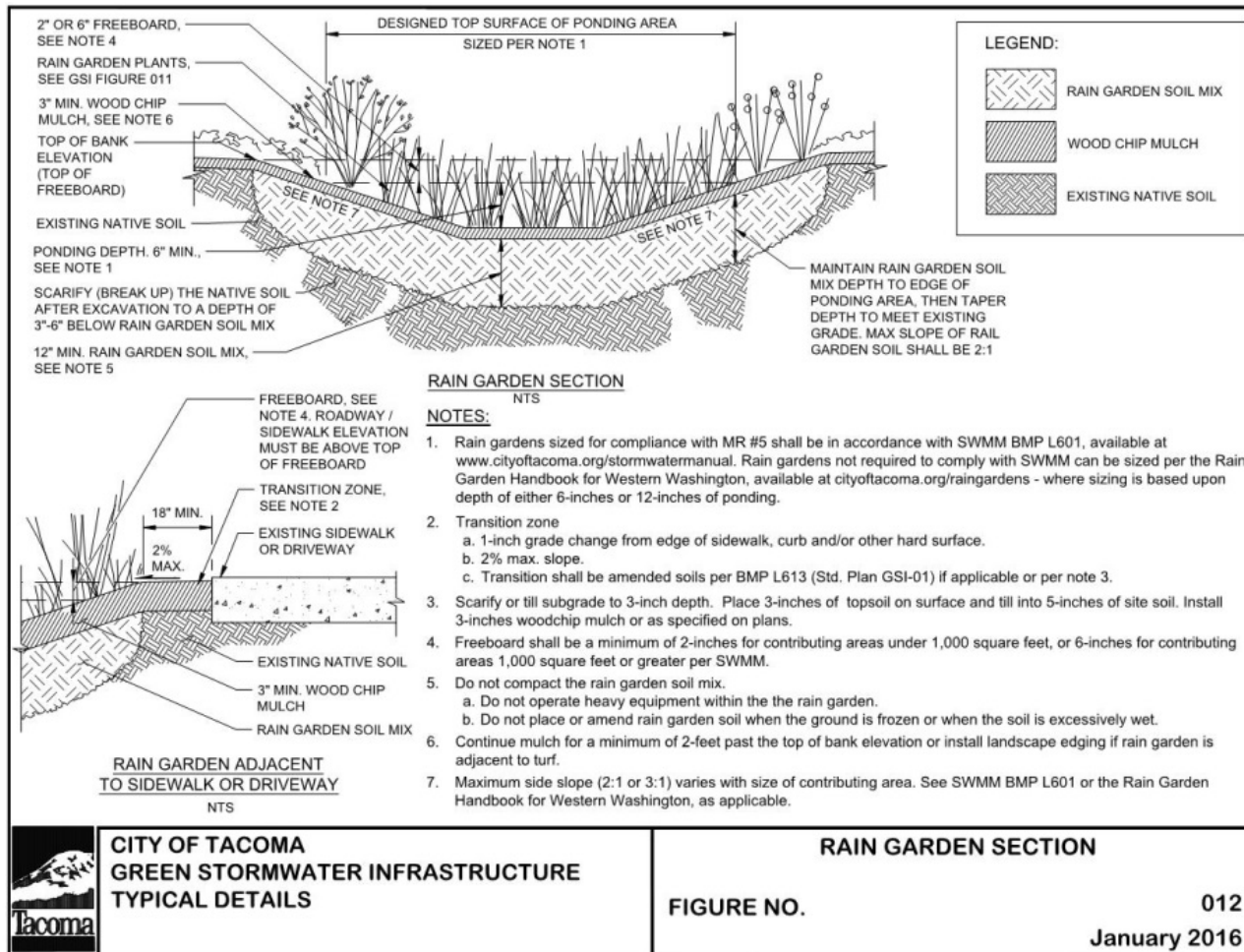


# MR #5 BMPs – BMP L602: Downspout Infiltration – Trench and Drywell



- ▶ **Infeasibility Criteria:**
  - ▶ **Setbacks cannot be met.**
  - ▶ **Soil Type not conducive to infiltration.**
  - ▶ **Depth from final grade to seasonal high groundwater is less than 3 feet.**

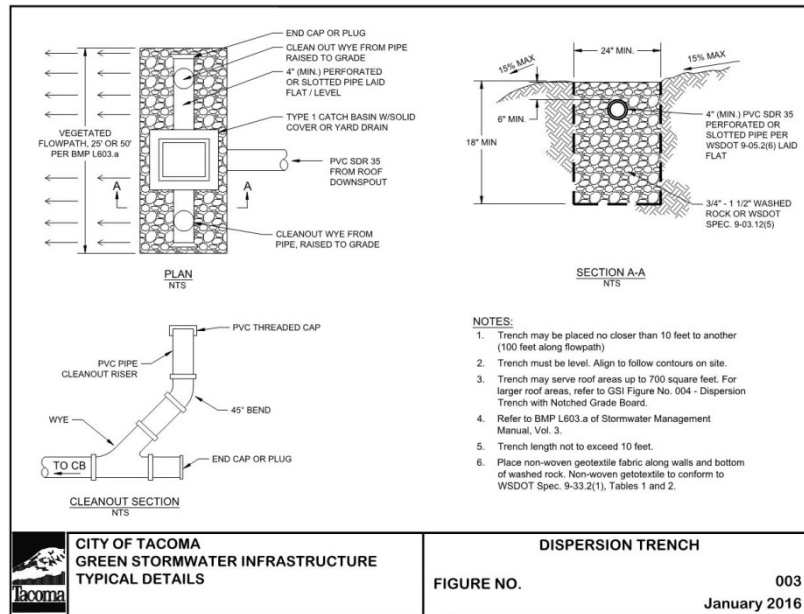
# BMP L601 – Rain Garden/ BMP L630: Bioretention



## ► Infeasibility Criteria:

- Setbacks cannot be met.
- No safe overflow pathway.
- Soils not conducive to infiltration.
- Threat to below ground structures.
- Etc. (see manual for more)

# BMP L603: Downspout Dispersion

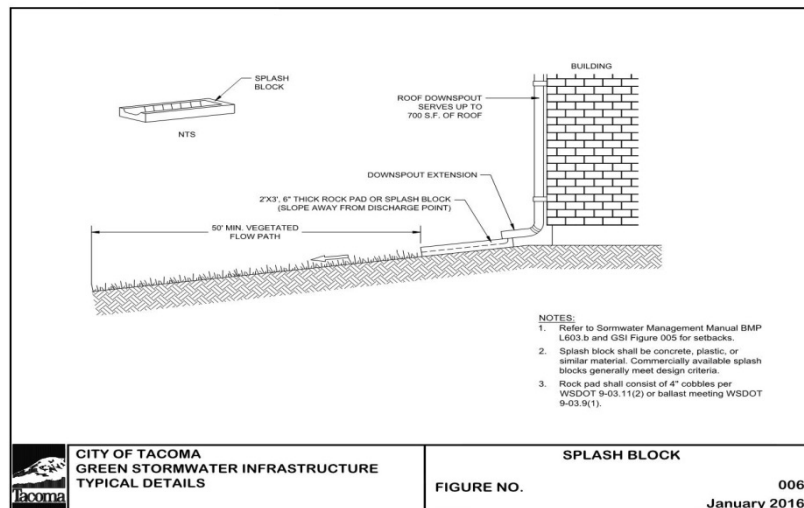


## ► Infeasibility Criteria – Trenches

► Vegetated flowpath is less than 25 feet between trench outlet and property line, structure, stream, etc.

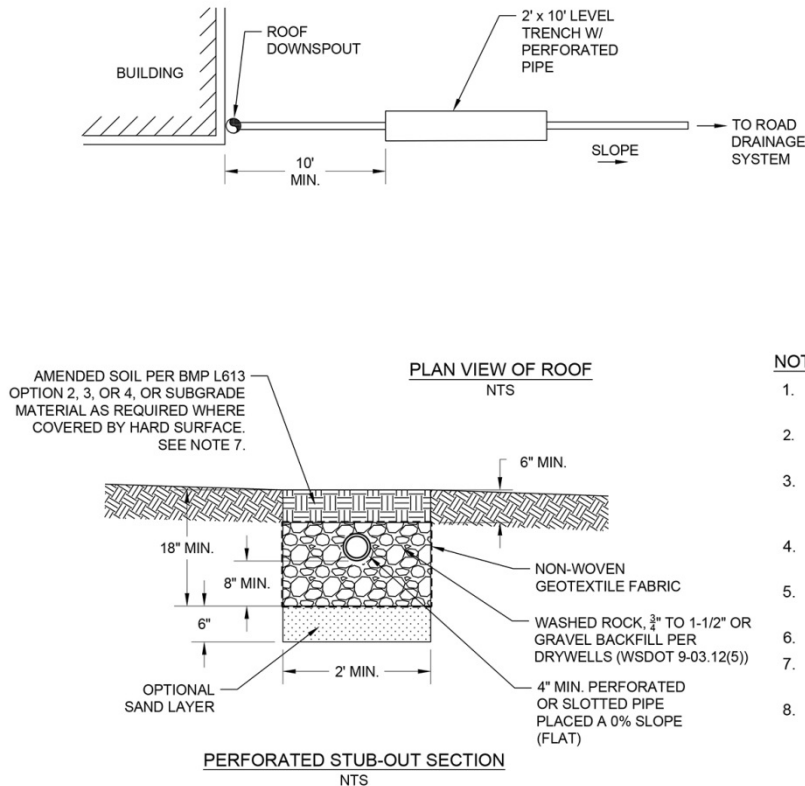
## ► Infeasibility Criteria – Splashblocks

► Vegetated flowpath is less than 50 feet between discharge point and property line, structure, stream, etc.



# BMP L604: Perforated Stub-out Connections

- ▶ **Infeasibility Criteria:**
  - ▶ **Setbacks cannot be met.**
  - ▶ **One foot of separation required between seasonal high groundwater and bottom of trench.**



**CITY OF TACOMA  
GREEN STORMWATER INFRASTRUCTURE  
TYPICAL DETAILS**

## PERFORATED STUB-OUT CONNECTION

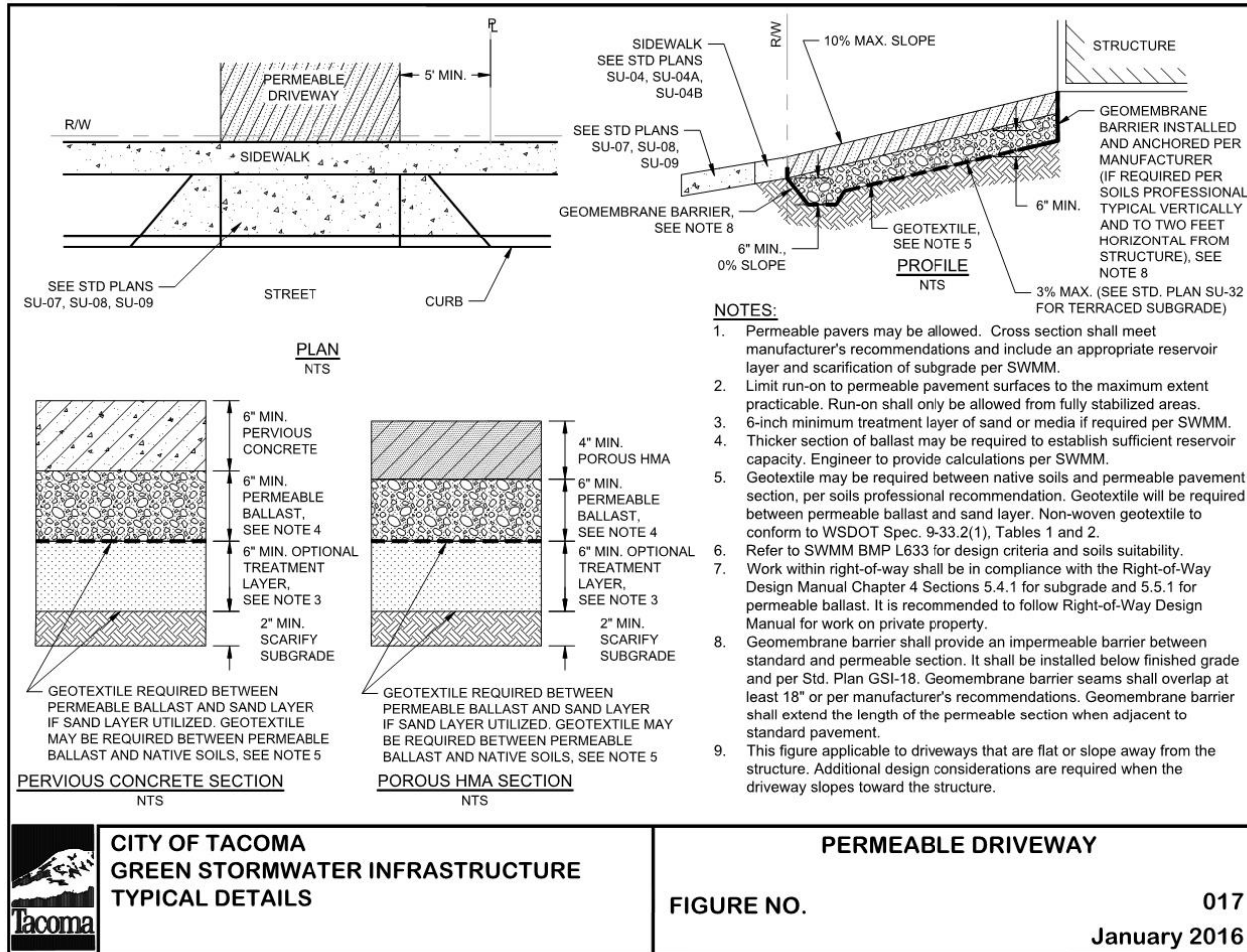
**FIGURE NO.**

**007**

**January 2016**



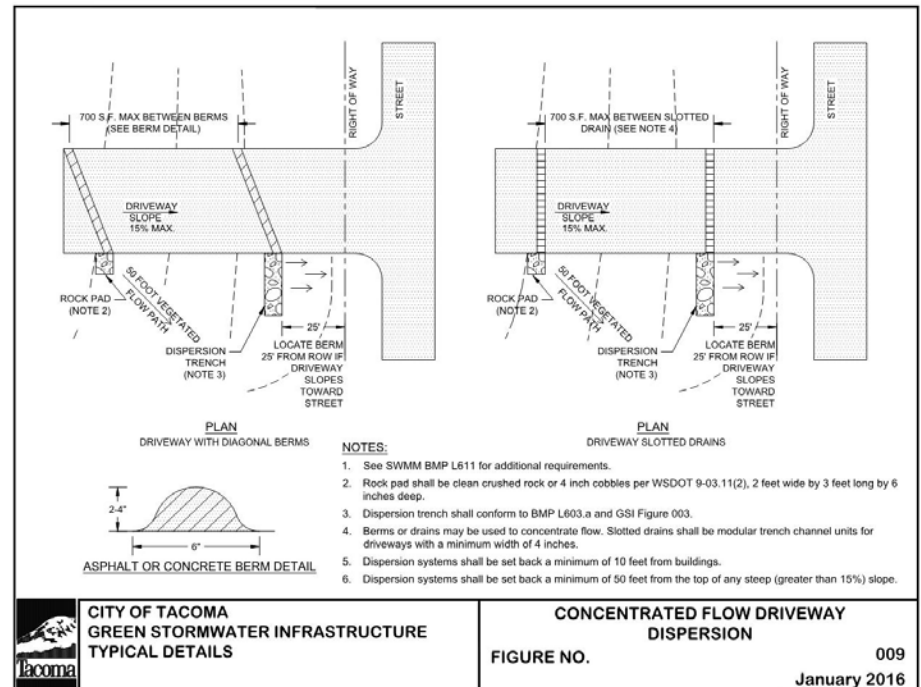
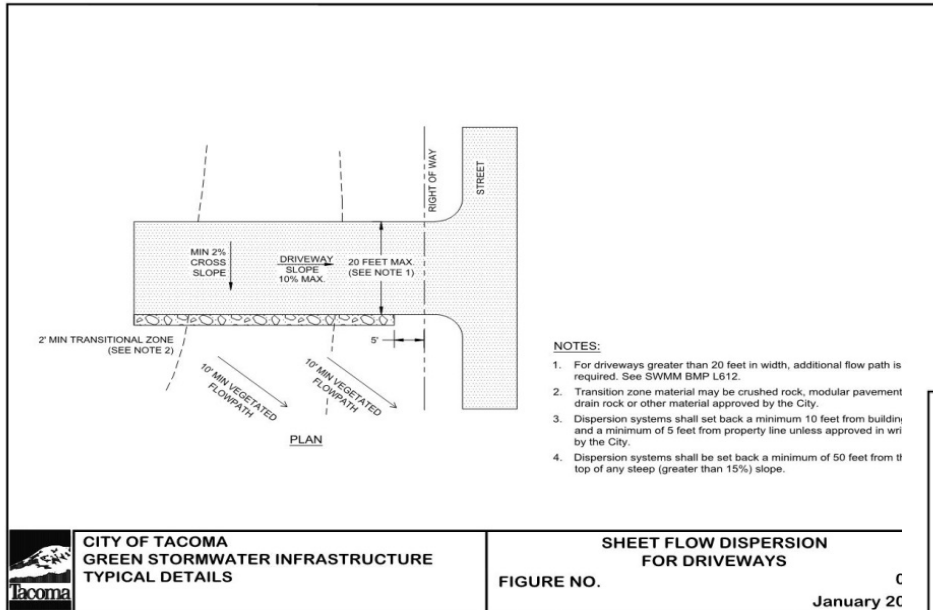
# BMP L633 – Permeable Pavements



- ▶ **Infeasibility Criteria**
  - ▶ **Setbacks cannot be met.**
  - ▶ **Soils are not conducive to infiltration.**
  - ▶ **Where infiltration would compromise adjacent surfaces.**
  - ▶ **Where underlying soils are unstable.**
  - ▶ **Etc.**

# BMP L611/BMP L612 – Sheet Flow and Concentrated Flow Dispersion

- Infeasibility Criteria
- Setbacks cannot be met.
- Insufficient vegetated flowpath.



## BMP L605: Collect and Convey

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- ▶ If infiltration and dispersion are not feasible, connection to the City system may be allowed. Connection shall be to curb and gutter or to actual pipe and structure conveyance system.
- ▶ Connections to curb only allowed if catch basins exist within 350 feet of site. If not, storm extension may be required.
- ▶ Analysis of the downstream system may be required per Minimum Requirement #10 before any connection will be allowed.

## **MR #5 – When is a soils report required?**

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- ▶ **Required for the design of all infiltration facilities.**
- ▶ **If infiltration BMPs are being used to meet MR#6, #7, #8, soils report is required.**
- ▶ **If infiltration BMPs are used to obtain flow credits, a soils report is required.**
- ▶ **Required if citing infeasibility due to infiltration capacity of soil or depth to groundwater.**
- ▶ **Volume 3, Appendix B contains soils report requirements for all infiltration BMPs.**





# The List Approach and Infeasibility Criteria - List #1

---

## ▶ Lawn and Landscaped Areas

### ▶ BMP L613: Post Construction Soil Quality and Depth

#### ▶ Infeasibility Criteria:

#### ▶ Slopes greater than 33%

#### ▶ Competing Needs Criteria Are Met – onsite stormwater BMP requirements can be superseded or reduced where they are in conflict with:

- Requirements of following federal or state laws, rules and standards, Historic Preservation Laws and Archaeology Laws, Federal Superfund or Washington State Model Toxics Control Acts, Federal Aviation Administration requirements for airports, ADA
- In conflict with special zoning districts design criteria
- Public health and safety
- Transportation regulations to maintain the option for future expansion or multi-modal use of public rights-of-way
- A local Critical Area Ordinance that provides protection of tree species or other critical areas.



# The List Approach and Infeasibility Criteria - List #1

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## ▶ Roofs

### ▶ 1. Either (evaluate both for feasibility)

#### ▶ a. BMP L614: Full Dispersion, OR

##### □ Infeasibility Criteria

- For residential development, developed areas draining to the native vegetation have impervious surfaces that exceed 10% of the entire site.
- For other sites, site does not retain 65% or more in a forested or native condition.

#### ▶ b. BMP L602: Downspout Full Infiltration

##### □ Infeasibility Criteria

- Setback criteria cannot be met.
  - ▶ 10 feet from any building and 5 feet from other structures or property lines
  - ▶ 50 feet from top of steep (15% slope).
  - ▶ 10 feet from septic
- Particle size distribution of soil is classified according to USDA textural triangle as clay, sandy clay, silty clay, clay loam, silty clay loam, sandy clay loam, or silt
- Depth from final grade to seasonal high groundwater table or other impermeable layer is less than 3 feet.
- Competing needs criteria are met.
- If smallest trench or drywell cannot fit on facility and meet setbacks, a soils report is not needed – most sites will require a soils report.



# The List Approach and Infeasibility Criteria - List #1

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- ▶ Roofs

- ▶ 2. Either (choose either a or b to evaluate for feasibility)

- ▶ a. BMP L601: Rain Gardens, OR

- ▶ b. BMP L630: Bioretention

- Infeasibility Criteria

- Setback criteria cannot be met.

- ▶ 10 feet from any building and 5 feet from other structures or property lines

- ▶ 50 feet from top of steep (15% slope).

- ▶ 10 feet from septic

- Competing Needs Criteria

- The following require evaluation of site specific conditions and a written recommendation from a Washington state licensed engineer or geologist

- ▶ Infiltration not recommended because of concerns about erosion, slope failure, or down gradient flooding

- ▶ Groundwater would drain into an erosion hazard or landslide hazard area

- ▶ Infiltration would threaten existing below grade basements

- ▶ Infiltration would threaten shoreline structures (bulkheads)

- ▶ Infiltration would threaten safety or reliability of preexisting: underground utilities, storage tanks, structures, road or parking lot surfaces

- The following do not require written recommendation from an engineer or geologist but may require information from professional

- ▶ No safe overflow pathway

- ▶ Lack of usable space onsite for rain garden facilities at redevelopment sites

- ▶ Insufficient space within right of way

- ▶ Not compatible with surrounding drainage (existing system elevation does not allow connection)

- ▶ Land for rain garden is within an area designated as an erosion hazard or landslide hazard

- ▶ Site cannot be designed to locate rain garden on slopes less than 8%

- ▶ Properties with known soil or groundwater contamination

- ▶ Within 100 feet of closed or active landfill

- ▶ Within 100 feet of a drinking water well, or spring used for drinking water supply

- ▶ Within 10 feet of underground storage tank

- ▶ Where field testing indicates potential rain gardens sites have a measured native soil saturated hydraulic conductivity less than 0.3 inches per hour.



# The List Approach and Infeasibility Criteria - List #1

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## ▶ Roofs

### ▶ 3. BMP L603: Downspout Dispersion

#### ▶ Infeasibility Criteria

- Competing Needs Criteria

- Dispersion Trenches

- Vegetated flowpath is less than 25 feet between the trench outlet and any property line, structure, stream, wetland, other infiltration or dispersion system, or impervious surface.

- Vegetated flowpath is less than 50 feet between the trench outlet and any slope 15% or greater.

- Splashblocks

- Vegetated flowpath is less than 50 feet between the discharge point and any property line, structure, slope over 15%, stream, wetland, other infiltration or dispersion system, or impervious surface.



# The List Approach and Infeasibility Criteria - List #1

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## ▶ Roofs

### ▶ 4. BMP L604: Perforated Stub-Out Connections

#### ▶ Infeasibility Criteria

- Setback Criteria cannot be met
  - 10 feet from building, 5 feet from other structures
  - Slopes greater than 20%
  - 10 feet from septic systems.
- Depth from bottom of trench to seasonal high groundwater table or other impermeable layer is less than one foot.
- Competing needs criteria.



# The List Approach and Infeasibility Criteria - List #1

## ▶ Other Hard Surfaces

- ▶ 1. Full Dispersion (see previous slide)
- ▶ 2. Either (Choose a, b, or c to evaluate for feasibility) – b. rain garden (previous slide), c. bioretention (previous slide)
  - ▶ a. BMP L633: Permeable pavement, OR
    - Infeasibility Criteria
      - Setback Criteria
      - Competing Needs Criteria
      - The following require evaluation of site specific conditions and a written recommendation from a Washington state licensed engineer or geologist
        - ▶ Infiltration not recommended because of concerns about erosion, slope failure, or down gradient flooding
        - ▶ Groundwater would drain into an erosion hazard or landslide hazard area
        - ▶ Infiltration and ponded water below new permeable pavement would compromise existing adjacent impervious pavements.
        - ▶ Infiltration would threaten basements
        - ▶ Downslope of steep, erosion prone areas that are likely to erode sediment.
        - ▶ Fill soils are used that can become unstable when saturated.
        - ▶ Excessively steep slopes where water within the aggregate base layer or at the subgrade cannot be controlled by detention structures.
        - ▶ Permeable pavement cannot provide sufficient strength to support the anticipated loads.
        - ▶ Underlying soils are unsuitable for supporting traffic loads when saturated.
        - ▶ Where installation would threaten reliability of preexisting structures.
      - The following do not require written recommendation from an engineer or geologist but may require information from professional
        - ▶ Area designated as erosion hazard or landslide area.
        - ▶ Not compatible with surrounding drainage (existing system elevation does not allow connection)
        - ▶ Properties with known soil or groundwater contamination
        - ▶ Where field testing indicates potential sites have a measured native soil saturated hydraulic conductivity less than 0.3 inches per hour.
        - ▶ Multi-level parking garages
        - ▶ Design cannot have a porous asphalt surface at less than 5% slope, pervious concrete at 10% slope, interlocking at 12% slope.
        - ▶ Where native soils below pollution generating do not meet soil suitability criteria.
        - ▶ Where road receives more than very low traffic volumes and more than very low truck traffic. Very low traffic volumes are those with a projected average daily traffic volume of 400 vehicles or less.
        - ▶ When replacing existing impervious surfaces unless the existing surface is a non-PGIS over outwash with saturated hydraulic conductivity of 4 inches/hour or greater
        - ▶ High use sites.
  - ▶ In areas with industrial activity.

# The List Approach and Infeasibility Criteria - List #1

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## ▶ Other Hard Surfaces

### ▶ 3. Either (evaluate a. and b.)

#### ▶ a. Sheet Flow Dispersion

- Setback/Design Criteria cannot be met
  - Vegetated flowpath of 10 feet for up to 20 foot width of paved surface required
- Competing Needs

#### ▶ b. Concentrated Flow Dispersion

- Setback/Design Criteria cannot be met
  - 25 foot vegetated flowpath between discharge point and property line, structure, steep slope, stream, lake, wetland, other hard surface for concentrating flow into a dispersion trench
  - 50 foot vegetated flowpath between discharge point and any property line, structure, steep slope, stream, lake, wetland, other hard surface for concentrating flows onto a rock pad



# Minimum Requirement #6 – Water Quality Treatment

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- ▶ **The following require construction of stormwater treatment facilities:**
  - ▶ **Projects in which the total of pollution-generating hard surface (PGHS) is 5,000 sf or more in a threshold discharge area**
  - ▶ **Projects in which the total of pollution-generating pervious surfaces (PGPS), not including permeable pavements, is  $\frac{3}{4}$  acre or more in a threshold discharge area and where there is a surface discharge.**
- ▶ **Stormwater facilities shall be sized for entire area that drains to them.**
- ▶ **Special considerations for treatment within the South Tacoma Groundwater Protection District**
- ▶ **In-lieu of treatment option not currently available but may become available in future.**



# Minimum Requirement #6 – Water Quality Treatment

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- ▶ **Flows requiring treatment:**
  - ▶ If runoff from non-pollution generating surfaces flows into a runoff treatment BMP, flows from those areas must be included in the sizing calculations for the facility.
  - ▶ Stormwater treatment facilities installed to provide treatment of PG surfaces for street sections within the ROW shall size those facilities for fully developed conditions to include existing onsite drainage which may connect to the City system even if it is not currently connected. The onsite fully developed conditions assumed to reach the facility shall be derived from the following percentage of impervious area:
    - ▶ In commercial areas: 85%
    - ▶ In industrial areas: 70%
    - ▶ In residential areas: 60%
    - ▶ If an applicant proposes to connect and convey onsite stormwater discharges to the City system the applicant shall ensure that any existing stormwater facilities are appropriately sized for the additional flow.

# MR #6 – Treatment Types

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- ▶ **Pretreatment**
  - ▶ Targets larger suspended solids (sand - sized)
  - ▶ Required before water quality infiltration BMPs and sand filters to protect from excessive siltation
    - ▶ Presettling Basin
    - ▶ Emerging Technologies (swirl separators)
- ▶ **Basic Treatment**
  - ▶ Targets total suspended solids (silt - sized)
  - ▶ Required for projects not needing additional enhanced, phosphorus, or oil treatment
  - ▶ Required for projects that discharge to the ground unless existing soils are suitable for treatment
    - ▶ Infiltration with treatment, sand filters, biofiltration swales, CAVFS, wetpond, wetvault, stormwater treatment wetland, combined detention – wetpool facilities, bioretention, emerging technologies, media filter drain.
- ▶ **Enhanced Treatment – targets metals**
  - ▶ Targets metals
  - ▶ Required for industrial sites, commercial sites, multi-family sites and high AADT roads that discharge stormwater directly or indirectly to fresh waters designated for aquatic life use or have an existing aquatic life use or use infiltration strictly for flow control and discharge within ¼ mile from a fresh water designated for aquatic life use.
  - ▶ The Puyallup River and Puget Sound are considered basic treatment receiving waters – enhanced treatment is not required.
    - ▶ Infiltration with treatment, large sand filter, stormwater treatment wetland, two facility treatment train, CAVFS, bioretention, media filter drain, emerging technologies.

# MR #6 – Treatment Types

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## ▶ Phosphorus Treatment

- ▶ Targets total phosphorus
- ▶ Required for Direct and indirect discharges to Wapato Lake (not those that infiltrate)
  - ▶ Infiltration with treatment, large sand filter, large wetpond, emerging technologies, two facility treatment train, media filter drain

## ▶ Oil Control

- ▶ Targets oil
- ▶ Required for commercial or industrial sites subject to expected ADT of 100 vehicles or more per 1000 sf of gross building area
- ▶ Required for commercial or industrial sites subject to petroleum storage and transfer in excess of 1500 gallons per year
- ▶ Required for commercial or industrial sites subject to parking, storage, or maintenance of 25 or more motorized vehicles that are over 10 tons gross weight
- ▶ Required for a road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway
  - ▶ API or coalescing plate oil water separators, linear sand filters, emerging technologies



## Minimum Requirement #7 – Flow Control

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- ▶ **Projects meeting or exceeding the flow control thresholds must provide flow control to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.**
- ▶ **Freshwater Protection Requirement**
- ▶ **Infrastructure Protection Requirement**

# MR #7 – Freshwater Protection

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- ▶ Projects that meet or exceed the following thresholds and stormwater directly or indirectly through a conveyance system into a freshwater body required compliance with MR#7.
  - ▶ Projects in which the total of effective impervious surfaces is 10,000 sf or more in a threshold discharge area, or
  - ▶ Projects that convert  $\frac{3}{4}$  acres or more of vegetation to lawn/landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area
  - ▶ Projects that through a combination of hard surfaces and converted vegetation areas, cause a 0.15 cfs increase in the 100-year return period flowrate from a threshold discharge area as estimated using WWHM. Compare existing and proposed site conditions.

# MR #7 – Freshwater Protection Mitigation – Forested Conditions

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- ▶ Applies to projects meeting or exceeding the thresholds with discharges to freshwater bodies located in Flett Creek, Leach Creek, Northeast Tacoma, and Western Slopes
- ▶ Using WWHM, stormwater discharges shall match developed discharge durations to predeveloped discharge durations for the range of predeveloped discharge rates from 50% of the 2-year return period flowrate up to the full 50-year return period flowrate. The predeveloped condition to be matched shall be a forested land cover.
- ▶ In-lieu of flow control option currently being developed for Flett Creek Watershed. Check website for updates: [www.cityoftacoma.org/stormwatermanual](http://www.cityoftacoma.org/stormwatermanual)

# MR #7 – Freshwater Protection Mitigation – Existing Conditions

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- ▶ Applies to projects meeting or exceeding the thresholds with discharges to freshwater bodies located in North Tacoma, Thea Foss Waterway, Tideflats, and Lower Puyallup Watershed (except as noted in Section 3.4.7.4)
- ▶ Using WWHM, stormwater discharges shall match developed discharge durations to existing discharge durations for the range of existing discharge rates from 50% of the 2-year return period flowrate up to the full 50-year return period flowrate. The predeveloped condition to be matched shall be existing condition.

# MR #7 – Infrastructure Protection

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- ▶ **Projects that discharge stormwater directly or indirectly to one of the following require compliance with MR #7 – Infrastructure Protection:**
  - ▶ To a conveyance system without capacity to convey the fully developed design event as determined through a full backwater analysis and/or inlet and gutter capacity analysis.
  - ▶ To a capacity problem downstream of the project as determined by ES using City-Wide Capacity Modeling
  - ▶ To a manmade conveyance system which has not been adequately stabilized as determined by the downstream qualitative analysis or as determined by ES.



# MR #7 – Infrastructure Protection

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- ▶ **Infrastructure Protection is satisfied and no further mitigation is required if:**
  - ▶ Projects do not trigger any thresholds, or
  - ▶ Projects that trigger mitigation per the Freshwater Protection Requirement (they already have to provide flow control to forested conditions), or
  - ▶ Projects that increase the surface area contributing to the downstream system by less than 5,000 square feet, or
  - ▶ Projects that increase the surface area contributing to the downstream system by less than 10,000 sf and discharge to a pipe system that is 12" in diameter or greater within  $\frac{1}{4}$  miles from the discharge location.



## MR #7 – Infrastructure Protection Mitigation

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- ▶ **Projects required to comply with MR#7 – IP, may resolve the downstream capacity problem (upsize the downstream system or provide additional inlets) or provide onsite infiltration or detention. Where infiltration is provided, stormwater discharges for the developed condition shall not exceed the discharges under existing conditions. The applicant is not required to match flow durations but can match flowrates for all flow frequencies analyzed by WWHM. If onsite detention or infiltration is proposed instead of upsizing the downstream system, the owner must provide a signed letter stating that they understand the proposal and accept the operation and maintenance of the onsite system.**

## MR #7 – Flow Control Exempt Waterbodies

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- ▶ If all the following are met, flow control – freshwater protection is not required for projects that discharge directly or indirectly to Puyallup River or First Creek. If stormwater discharges to First Creek the analysis does not need to extend to the Puyallup River. First Creek shall be considered the entire First Creek system including the gulch, First Creek waterway, and City-owned conveyance piping within the First Creek system. If any of the following are not met, mitigation for flow control per the Freshwater Protection Requirement – Existing Condition is required:



# MR #7 – Flow Control Exempt Waterbodies

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- ▶ Direct discharge to the Puyallup River or First Creek does not result in the diversion of drainage from any perennial stream classified as Types 1, 2, 3, or 4 in the State of Washington Interim Water Typing System or Types “S”, “F”, or “Np” in the Permanent Water Typing System, or from any category I, II, or III wetland; and
- ▶ Flow splitting devices or drainage BMPs are applied to route natural runoff volumes from the project site to any downstream Type 5 stream or category IV wetland;
  - ▶ Design of flow splitting devices or drainage BMPs will be based on continuous hydrologic modeling analysis. The design will assure that flows delivered to Type 5 stream reaches will approximate, but in no case exceed, durations ranging from 50% of the 2-year to the 50-year return period flowrate.
  - ▶ Flow splitting devices or drainage BMPs that deliver flow to category IV wetlands will also be designed using continuous hydrologic modeling to preserve existing wetland hydrologic conditions unless specifically waived or exempted by the City of Tacoma, and
- ▶ The project site must discharge through a conveyance system that is comprised entirely of manmade conveyance elements (e.g., pipes, ditches, outfall protection, dispersion BMPs above or at high water line, etc.) and extends to the ordinary high water line of the Puyallup River or First Creek; and
- ▶ The conveyance system between the project site and the Puyallup River or First Creek shall have sufficient hydraulic capacity to convey discharges from future build-out conditions of the site, and the existing conditions from non-project areas from which runoff is or will be collected.

This section requires a downstream analysis of the entire conveyance system between the project site and the flow control exempt waterbody.
- ▶ Any erodible elements of the manmade conveyance system must be adequately stabilized to prevent erosion under the conditions noted above.

# MR #7 – Modeling Requirements

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- ▶ **Design of flow control facilities including detention systems and infiltration requires use of WWHM.**
- ▶ **Single event models shall be used to model the conveyance system.**

# MR #7 – Offsite Inflow and Bypass

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- ▶ Flow control facilities shall be sized for the entire flow that is directed to them, however bypass may be allowed:
- ▶ Offsite inflow may be bypassed around the facility provided the existing 100-year return period flowrate from any upstream offsite areas is no greater than 50% of the 100-year developed return period flowrate (undetained) from the project site. The bypass of offsite inflow shall be designed to achieve the following:
  - ▶ Any existing contribution of flows to onsite wetlands must be maintained.
  - ▶ Offsite inflows that are naturally attenuated by the project site under predeveloped or existing conditions must remain attenuated, either by natural means or by providing additional onsite detention so that flows do not increase.
  - ▶ Bypassed stormwater shall not cause damage to downstream systems or properties and shall meet the requirements of MR #4
- ▶ Stormwater runoff created by surfaces that require detention may bypass the flow control facility provided all the following conditions are met:
  - ▶ Runoff from both the bypass area and the flow control facility shall converge within  $\frac{1}{4}$  mile downstream from the project site discharge point.
  - ▶ The flow control facility shall be designed to compensate for the uncontrolled bypass area such that the net downstream discharge is the same with or without bypass.
  - ▶ The 100-year return period flowrate from the bypass area will not exceed 0.4 cfs.
  - ▶ Runoff from the bypass area will not create a significant adverse impact to downstream systems or drainage.
- ▶ Water quality is applied to the bypass area as applicable.

# MR #8 – Wetlands Protection

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- ▶ **Stormwater discharges to wetlands may require a City of Tacoma “wetland permit” under TMC 13.11.**
- ▶ **When either MR #6 or MR#7 thresholds are met, MR #8 must be complied with for direct and indirect discharges to wetlands.**
- ▶ **Projects shall comply with Guide Sheets #1-#3 in Appendix D.**
  - ▶ **The hydrologic analysis shall use the existing land cover unless directed otherwise.**
  - ▶ **Model calibration may be required.**



## **MR #8 – Guide Sheet 1 – Criteria that excludes wetlands from serving as a treatment or flow control BMP**

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- ▶ **The following are not suitable as stormwater treatment or flow control facilities:**
  - ▶ **Category I wetland**
  - ▶ **Wetland provides a high level of many functions (Category I and II)**
  - ▶ **Wetland provides habitat for threatened or endangered species.**
- ▶ **If a wetland type listed above needs to be included in a stormwater system, the activity is an impact and needs to be appropriately mitigated. Wetlands cannot receive flow unless the criteria is Guide Sheet #3B and #3C are met.**





## MR #8 – Guide Sheet 2 – Criteria for including wetlands as a treatment or flow control BMP/facility

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- ▶ A wetland can be altered to meet the requirements of a treatment or flow control BMP/facility if ALL the following are met:
  - ▶ It is classified as a Cat. IV or Cat. III wetland with a habitat score of 19 points or less.
  - ▶ You can demonstrate “no net loss” of functions and values of the wetland as a result of the modification, including impacts from machinery.
    - ▶ Modifications that alter the structure of a wetland or its soils will require permits.
    - ▶ A wetland will usually sustain fewer impacts if the required storage capacity can be met through a modification of the outlet rather than through raising the existing overflow.
  - ▶ The wetland does not contain a breeding population of any native amphibian species.
  - ▶ The hydrologic functions of the wetland can be improved using a watershed approach or the wetland is part of a priority restoration plan that achieves restoration goals identified in a regional plan.
  - ▶ The wetland lies in the natural routing of the runoff, and the discharge follows the natural routing.

# MR #8 – Guide Sheet #3A – General guidelines for protecting functions and values of wetlands

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## ▶ Guide Sheet 3A

- ▶ Consult federal and state regulations
- ▶ Maintain required wetland buffers
- ▶ Retain native vegetation connecting wetland to its buffer
- ▶ Avoid soil compaction
- ▶ Avoid general urban impacts (discourage vehicular access, plants outside buffer zones)
- ▶ Carefully use fences
- ▶ If wetland inlet will be modified use a diffuse flow method



# MR #8 – Guide Sheet #3B – Protecting wetlands from impacts of changes in water flows

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## ▶ Guide Sheet #B

### ▶ Maintaining wetland hydroperiod

- ▶ Maintaining annual fluctuation in water depth and its timing as closely as possible.
- ▶ Use WWHM to estimate the increases or decreases in total flows in a wetland that can result from development projects. Using the following criteria.
  - Criterion 1 : total volume of water in a wetland during a single precipitation event should not be more than 20% higher or lower than the pre-project volumes.
  - Criterion 2: total volume of water into a wetland on a monthly basis should not be more than 15% higher or lower than the pre-project volumes.



# MR #8 – Guide Sheet #3C – Guidelines for protecting wetlands from pollutants

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- ▶ **Use effective erosion control at construction sites**
- ▶ **Institute source control BMPs**
- ▶ **For wetlands that are being used for as a stormwater treatment or flow control facility (Guide Sheet #1)**
  - ▶ **Provide water quality treatment**
  - ▶ **If wetland is category I, use BMPs with nutrient removal capabilities.**



## MR #9 – Operation and Maintenance

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- ▶ **O&M manual shall be provided for all proposed stormwater BMPs at the time construction plans are submitted for review.**
- ▶ **A copy of the O&M shall be retained onsite or within reasonable access to the site and be made available to City staff and shall be transferred with property to new owner.**
- ▶ **A covenant and easement agreement will be required for stormwater facilities to ensure proper maintenance.**

# MR #10 – Offsite Analysis and Mitigation

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## ▶ Qualitative Analysis

- ▶ All project applicants required to submit a SSP shall perform and submit a qualitative analysis of each upstream system entering a site (runon) and each downstream system leaving a site (runoff). The analysis shall extend downstream for the entire flowpath from the project site to the receiving water or up to  $\frac{1}{4}$  mile whichever is less.
- ▶ Upstream analysis describes where water enters the site and defines the tributary area.



## MR #10 – Quantitative Analysis

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- ▶ **Projects that impact the downstream system by increasing the amount of stormwater runoff to the downstream private or public stormwater system may be required to complete a quantitative downstream analysis of the system to ensure capacity before a connection to the system will be allowed.**

<b>Increase in Surface Area Contributing to Downstream System</b>	<b>Pipe Size within ¼ mile downstream of the project</b>	<b>Required Analysis</b>
<b>&lt;5,000 SF</b>	<b>Any Size</b>	<b>None</b>
<b>≥5,000 SF and &lt;10,000 SF</b>	<b>≥12" φ</b>	<b>None</b>
<b>≥5,000 SF and &lt;10,000 SF</b>	<b>&lt;12" φ</b>	<b>Single Segment Capacity Analysis and Inlet and Gutter Capacity Analysis OR City-Wide Capacity Model and Inlet and Gutter Capacity Analysis</b>
<b>≥10,000 SF</b>	<b>≥12" φ</b>	<b>Single Segment Capacity Analysis and Inlet and Gutter Capacity Analysis OR City-Wide Capacity Model and Inlet and Gutter Capacity Analysis</b>
<b>≥10,000 SF</b>	<b>&lt;12" φ</b>	<b>Full Backwater Analysis and Inlet and Gutter Capacity Analysis OR City-Wide Capacity Model and Inlet and Gutter Capacity Analysis</b>
<b>Any Size</b>	<b>Connecting to a City-owned and identified trunk main (≥36" and installed at a min. slope of 0.5%)</b>	<b>None</b>



# Single Segment Capacity Analysis

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- ▶ The discharge rate from the increase in impervious surface coverage from a 25-year, 24-hour storm event shall be less than 5% of the discharge capacity in the most constrained pipe segment or channel of the existing downstream system within  $\frac{1}{4}$  mile from the site's discharge location at 90% full. This analysis is not required for trunk mains.
  - ▶ The most constrained pipe segment or channel shall be considered the pipe or channel segment with the least capacity (typically the smallest diameter pipe segment or the pipe segment with the least slope) within  $\frac{1}{4}$  mile from the site's discharge location.
  - ▶ The most constrained pipe or channel segment capacity shall be calculated assuming 90% full conditions.
  - ▶ Flowrates shall be calculated using the SBUH method.
- ▶ If it is determined that the discharge rates from the increased impervious surfaces will be equal to or greater than 5% of the capacity of the most constrained downstream pipe or channel segment, a Full Backwater Analysis is required.

# City-Wide Capacity Modeling

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- ▶ **The City is modeling the entire stormwater system for capacity.**
- ▶ **If a capacity analysis is available, the applicant is not required to complete a quantitative downstream analysis.**
- ▶ **If there is a capacity issue, the applicant is responsible for determining the required upgrade size per a Full Backwater Analysis**

# Full Backwater Analysis

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- ▶ **Compute single backwater profile for the system.**
- ▶ **Modeled:**
  - ▶ **No onsite detention**
  - ▶ **For fully developed conditions applied to both onsite and offsite basins.**
    - ▶ **Commercial: 85% Impervious**
    - ▶ **Industrial: 70% Impervious**
    - ▶ **Residential: 60% Impervious**
- ▶ **Pipe Systems:**
  - **Privately maintained systems, for the 10-year, 24-hour design storm, minimum of 0.5 feet of freeboard between water surface and top of manhole**
  - **Publically maintained systems, for the 25-year, 24-hour design storm, minimum of 0.5 feet of freeboard between water surface and top of manhole.**
  - **For private and public, for the 100-year, 24-hour design storm, overtopping of the pipe conveyance system may occur, however additional flow shall not extend beyond half the lane width of the outside lane of the traveled way and shall not exceed 4 inches in depth at its deepest point.**
  - **For the 100-year, 24-hour design storm, if overtopping of the system occurs, the applicant shall show the extents of the impacts on neighboring properties and the right-of-way. The applicant may be required to provide mitigation for localized flooding.**

# Inlet Grate Capacity and Gutter Capacity

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- ▶ **Capacity of Inlets on a continuous grade**
  - ▶ Equations in manual.
  - ▶ City of Tacoma has spreadsheet available for Continuous Grade analysis
  - ▶ 25-Year, 24-Hour Storm Event Needed for Analysis
  - ▶ Bypass of last inlet cannot exceed 0.28 cfs
  - ▶ Velocities cannot exceed 5 ft/s
- ▶ **Capacity of Inlets in Sag Locations**
  - ▶ 25-Year, 24-Hour Storm Event needed for analysis
  - ▶ WSDOT spreadsheet available but will have to be altered for City of Tacoma
- ▶ **Gutter Capacity Analysis**
  - ▶ Equations in manual.
  - ▶ Amount of flow at point of zero super elevation shall be limited to 0.28 cfs

# Example #1 – Residential Lot

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## Existing

- ▶ 6,000 Square Foot Lot
- ▶ 100% Vegetation Cover
- ▶ Thea Foss Waterway

## Proposed

- ▶ 1500 Square House (Roof Footprint Area)
- ▶ 200 Square Foot Driveway
- ▶ 80 Square Foot Patio
- ▶ 40 Square Foot Walkway
- ▶ No offsite improvements
  - no sidewalks necessary,
  - no street paving needed.

**Project creates less than 2,000 square feet of new hard surface and disturbs less than 7,000 square feet. MR #2 applies to every project. No submittal required.**

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# Example #2 – Residential Lot

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## Existing

- ▶ 7,500 Square Foot Lot
- ▶ 100% Vegetation Cover
- ▶ Thea Foss Waterway

## Proposed

- ▶ 1500 Square House (Roof Footprint Area)
- ▶ 200 Square Foot Driveway
- ▶ 80 Square Foot Patio
- ▶ 40 Square Foot Walkway
- ▶ No offsite improvements – no sidewalks necessary, no street paving needed.
- ▶ Complete strip and rebuild of property.

**Project creates less than 2,000 square feet of new hard surface but disturbs more than 7,000 square feet. MR #1-#5, #9, #10 apply to project.**

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# Example 2 – Residential Lot

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- ▶ **MR#1-#5 Apply to Project**
  - ▶ **Short Form SSP and Short Form SWPPP can be used.**
- ▶ **MR#5: Employ the following BMPs as feasible:**
  - ▶ **Roofs**
    - ▶ Downspout Full Infiltration, OR
    - ▶ Downspout Dispersion, OR
    - ▶ Perforated Stubouts Connections, OR
    - ▶ Collect and Convey (only if infiltration, dispersion, perforated stubouts are not feasible).
  - ▶ **Other Hard Surfaces**
    - ▶ Concentrated Flow Dispersion, OR
    - ▶ Sheet Flow Dispersion, OR
    - ▶ Collect and Convey (if concentrated flow dispersion or sheet flow dispersion are not feasible)
  - ▶ **Lawn and Landscaped Areas**
    - ▶ Soil Quality BMP – BMP L613
- ▶ **MR #9: Applies if facilities are installed.**
- ▶ **MR#10: does not apply because there is less than 5,000 square feet of hard surface being sent to stormwater system.**



# Example #3 – Residential Lot

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## Existing

- ▶ 7,500 Square Foot Lot
- ▶ 100% Vegetation Cover
- ▶ Flett Creek Watershed

## Proposed

- ▶ 2000 Square House (Roof Footprint Area)
- ▶ 200 Square Foot Driveway
- ▶ 80 Square Foot Patio
- ▶ 40 Square Foot Walkway
- ▶ No offsite improvements – no sidewalks necessary, no street paving needed.
- ▶ Complete strip and rebuild of property.

**Project adds greater than 2,000 square feet of new hard surface and disturbs more than 7,000 square feet. MR #1-#5, #9, #10 apply to project.**

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# Example #3 – Residential Lot

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- ▶ **MR#1-#5 Apply to Project**
  - ▶ **Short Form SSP and Short Form SWPPP can be used.**
- ▶ **MR#5: Employ BMPs in order listed for each surface category (List #1):**
  - ▶ **Lawn and Landscaped Areas**
    - ▶ BMP L613: Post Construction Soil Quality and Depth
  - ▶ **Roofs**
    - ▶ 1. Either (evaluate both for feasibility)
      - a. BMP L614: Full Dispersion, OR
      - b. BMP L602: Downspout Full Infiltration
    - ▶ 2. Either (choose either a or b to evaluate for feasibility)
      - a. BMP L601: Rain Gardens, OR
      - b. BMP L630: Bioretention

\*Rain Garden or Bioretention must have minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.
    - ▶ 3. BMP L603: Downspout Dispersion
    - ▶ 4. BMP L604: Perforated Stub-Out Connections
    - ▶ 5. BMP L605: Collect and Convey
  - ▶ **Other Hard Surfaces**
    - ▶ 1. BMP L614: Full Dispersion
    - ▶ 2. Either (Choose a, b, or c to evaluate for feasibility)
      - a. BMP L633: Permeable pavement, OR
      - b. BMP L601: Rain Garden, OR
      - c. BMP L630: Bioretention
    - ▶ 3. Either (evaluate both for feasibility)
      - a. BMP L612: Sheet Flow Dispersion
      - b. BMP L611: Concentrated Flow Dispersion
    - ▶ 4. BMP L605: Collect and Convey
- ▶ **MR #9: Applies if facilities are installed.**
- ▶ **MR#10: does not apply because there is less than 5,000 square feet of hard surface being sent to stormwater system.**



# Example #4 – Commercial Lot

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## Existing

- ▶ 15,000 SF Gravel Lot
- ▶ Flett Creek Watershed

## Proposed

- ▶ 3500 SF Building
- ▶ 6500 SF Driving Surface



# Example #4 – Commercial Lot

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- ▶ **MR#1-#10 apply to project.**
- ▶ **MR #5 - Employ BMPs in order listed (List #2)**
  - ▶ **Lawn and Landscaped Areas**
    - ▶ **BMP L613: Post Construction Soil Quality and Depth**
  - ▶ **Roofs**
    - ▶ 1. Either (evaluate both for feasibility)
      - a. BMP L614: Full Dispersion, OR
      - b. BMP L602: Downspout Full Infiltration
    - ▶ 2. BMP L630: Bioretention (with a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.)
    - ▶ 3. BMP L603: Downspout Dispersion
    - ▶ 4. BMP L604: Perforated Stub-Out Connections
    - ▶ 5. BMP L605: Collect and Convey
  - ▶ **Other Hard Surfaces**
    - ▶ 1. BMP L614: Full Dispersion
    - ▶ 2. BMP L633: Permeable Pavement
    - ▶ 3. BMP L630: Bioretention (with a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.)
    - ▶ 4. Either (evaluate both for feasibility)
      - a. BMP L612: Sheet Flow Dispersion
      - b. BMP L611: Concentrated Flow Dispersion
    - ▶ 5. BMP L605: Collect and Convey
- ▶ **MR #6 – Water Quality – Enhanced Treatment, Possible Oil Treatment, Consider STGPD**
- ▶ **MR#7 – Flow Control to Forested Conditions**



# Example #5 – Commercial Lot

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## Existing

- ▶ 20,000 SF Lot
- ▶ 12,000 SF Building
- ▶ 7,000 SF Asphalt Parking Lot
- ▶ 1,000 Landscaping
- ▶ Thea Foss Watershed
- ▶ Built prior to Jan 2000

## Proposed

- ▶ 3,000 SF Building Addition → 15,000 SF Building
- ▶ Replace Remaining Parking Lot with New Parking Lot → 4,000SF
- ▶ Existing Landscape to remain



# Example 5 – Commercial Lot

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- ▶ **Redevelopment Site**
  - ▶ **New Building and Replaced Parking Lot are considered replaced hard surfaces (previous parking lot did not remain in place for construction of new building).**
  - ▶ **MR#1-#5 apply to new plus replaced hard surfaces.**
    - ▶ **Roofs**
      - ▶ BMP L602: Downspout Full Infiltration, OR
      - ▶ BMP L603: Downspout Dispersion, OR
      - ▶ BMP L604: Perforated Stubouts Connections, OR
      - ▶ BMP L605: Collect and Convey (only if infiltration, dispersion, perforated stubouts are not feasible).
    - ▶ **Other Hard Surfaces**
      - ▶ BMP L611: Concentrated Flow Dispersion, OR
      - ▶ BMP L612: Sheet Flow Dispersion, OR
      - ▶ BMP L605: Collect and Convey (if concentrated flow dispersion or sheet flow dispersion are not feasible)
    - ▶ **Lawn and Landscaped Areas**
      - ▶ Soil Quality BMP – BMP L613
  - ▶ **Replaced surfaces not required to comply with MR#6, 7, 8 because valuation of proposed improvements is less than 50% of existing improvements.**
  - ▶ **MR#10 – quantitative analysis does not apply because no increase in surface area contributing to downstream system.**
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# Example #6 – Commercial Lot

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## Existing

- ▶ 20,000 SF Lot
- ▶ 12,000 SF Building
- ▶ 7,000 SF Asphalt Parking Lot
- ▶ Flett Creek Watershed
- ▶ Constructed in 2001

## Proposed

- ▶ 1,000 SF Building Addition
- ▶ Grind and Overlay

**1,000 SF Replaced Hard Surface. MR#2 only applies. Applicant not required to complete SSP or SWPPP. If applicant elects to install LID facilities a rate break reduction will likely apply per TMC 12.08.560 and MR#9 will apply.**

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# Example #7 – Minimum Requirement #10

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## Existing

- ▶ 20,000 SF Lot
- ▶ 12,000 SF Building
- ▶ 8,000 SF Asphalt Parking Lot
- ▶ Thea Foss

## Proposed

- ▶ 12,000 SF Building
- ▶ 8,000 SF Asphalt Parking Lot
- ▶ Upgrading stormwater system which will reroute building runoff to 12" City system.

**Applicant required to complete Single Segment Capacity Analysis and Inlet and Gutter Capacity Analysis. If capacity concerns, Full Backwater Analysis is required and potential upsize of downstream system.**

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- ▶ **Thanks for coming!**
  - ▶ **Available at:**  
**[www.cityoftacoma.org/stormwatermanual](http://www.cityoftacoma.org/stormwatermanual)**
  - ▶ **Contact Us:**
    - ▶ **[swmupdates@cityoftacoma.org](mailto:swmupdates@cityoftacoma.org)**
      - ▶ **General SWMM concerns**
    - ▶ **[stormandsewer@cityoftacoma.org](mailto:stormandsewer@cityoftacoma.org)**
      - ▶ **Permit related questions.**
- 

