LERVIK ENGINEERING

CIVIL DESIGN, CONSULTING
AND CONSTRUCTION
MANAGEMENT

STORMWATER SITE PLAN DRAINAGE REPORT

H E N R I Q U E Z
5 - L O T   S H O R T   P L A T

149TH PLACE SE

MONROE, WASHINGTON

PARCELS

270602 0011 0300

AND

270602 0011 0400

21 MARCH 2024

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REGIONAL LOCATION & VICINITY MAPS

A.   EXECUTIVE SUMMARY

This project involves the removal of several buildings and associated improvements (driveways, patios, etc.) and development of the properties into a 5-lot Short Plat.

The project encompasses two parcels with a combined area of 71,681 SF (1.646 acre) located in the City of Monroe.

The site ground cover is typical urban residential ground cover.

The terrain is essentially flat with minimum elevation of roughly 36.0 and a maximum elevation of 37.5.

Drainage Plan Description:

The existing site contains 45% hard surface coverage, and is thus considered a Redevelopment Project. Based on the flow-chart, it is required to address Minimum Requirements 1-9 for "new and replaced hard surfaces and converted vegetation."

Roadways:

The roadway improvements (paving and sidewalks) result in a <u>decrease</u> <u>of impervious area</u> of approximately 700 square feet.

The DOE Manual defines Replaced Hard Surfaces as "*the removal down to bare soil or base course and replacement.*" While the remainder of the existing roadway will only be subject to an overlay, there is an 1,860 square foot area north of the existing cul-de-sac that may qualify as "replaced hard surface."

However, the compacted gravel area in question has functioned similarly to the adjacent paved roadway since the neighborhood was developed. Further it would be exceedingly difficult to segregate this minor area (6.6% of the roadway area) from the surrounding pavement for treatment and attenuation.

Therefore, we submit this drainage analysis with the assumption that this small area is substantially similar to the adjacent driving surfaces and – like the rest of the roadway – is not considered "new or replaced hard surface" for the purposes of Minimum Requirements 5, 6 and 7.

As discussed below, the existing roadway will be retained and improved with paving fabric, a 2-inch lift of asphalt treated base and a 2-inch lift of hot-mix asphalt, per the City's requirement for roadway structural strength. As such, the roadway is largely exempt from stormwater mitigation.

Sidewalks

BMP T5.18 (Reverse Slope Sidewalks) will be employed to manage runoff from the sidewalks. The site is ideally suited for this approach as the adjacent terrain is flat and the near-surface soils are amenable to infiltration of the minor amount of runoff generated by the 5-foot sidewalks.

Driveways

BMP T5.15 (Permeable Pavements) will be employed on the driveways.

Roofs

Stormwater from the roofs of the new homes will be managed by MAGIC!

Pervious Areas

Stormwater mitigation for pervious areas (lawns and landscaping) will be achieved through dispersion and infiltration. The site has a ridge running east-west through the center of the lots that keeps roughly half the site contained on-site where it is forced to infiltrate rather than run off.

No detention is proposed.

<u>*Water Quality Measures:*</u>

The drainage plan is required to address "new and replaced hard surfaces." As discussed above, the only remaining hard surfaces to be addressed for Water Quality is the driveways. BMP T5.15 (Permeable Pavements) will be applied to these surfaces.

<u>*Drainage Basins:*</u>

The development area of the site is relatively flat.

There is only one Threshold Discharge Area for the site.

DRAINAGE INFORMATION SUMMARY FORM

Project Total Area: 1.646 acres
Number of Existing Lots: 2
Number of Proposed Lots: 5 lots + 1 tract

Summary Table

	A	
On-Site Sub-basin area (acres)	1.646	
Type of Storage	None	
Approx. Live Storage Volume (cu. ft.)	N/A	
Approx. Dead Storage Volume (cu. ft.)	N/A	
Soil Types	Sulsavar gravelly loam 0 to 8 percent slopes	
	EXST (Acres)	PROPOSED (Acres)

Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment

Does the Project result in 2,000 square feet, or more, of new plus replaced hard surface area?
OR
Does the land disturbing activity total 7,000 square feet or greater?

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

No → **Minimum Requirement #2 applies.**

Next Question

Does the Project add 5,000 square feet or more of new hard surfaces?
OR
Convert ¾ acres or more of vegetation to lawn or landscaped areas?
OR
Convert 2.5 acres or more of native vegetation to pasture?

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

Next Question

No → **Is this a road related project?**

No →

Yes → **Does the Project add 5,000 square feet or more of new hard surfaces?**

Yes → **Do the new hard surfaces add 50% or more to the existing hard surfaces within the Site?**

No → **No additional requirements.**

No →

Is the total of new plus replaced hard surfaces 5,000 square feet or more, AND does the value of the proposed improvements - including interior improvements - exceed 50% of the assessed value (or replacement value) of the:
- **existing Project Site improvements (for commercial or industrial projects) OR**
- **existing Site improvements (for all other projects)**

Yes → **All Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas.** ← **Yes**

DEPARTMENT OF ECOLOGY
State of Washington

Flow Chart for Determining Requirements for Redevelopment

Revised March 2019

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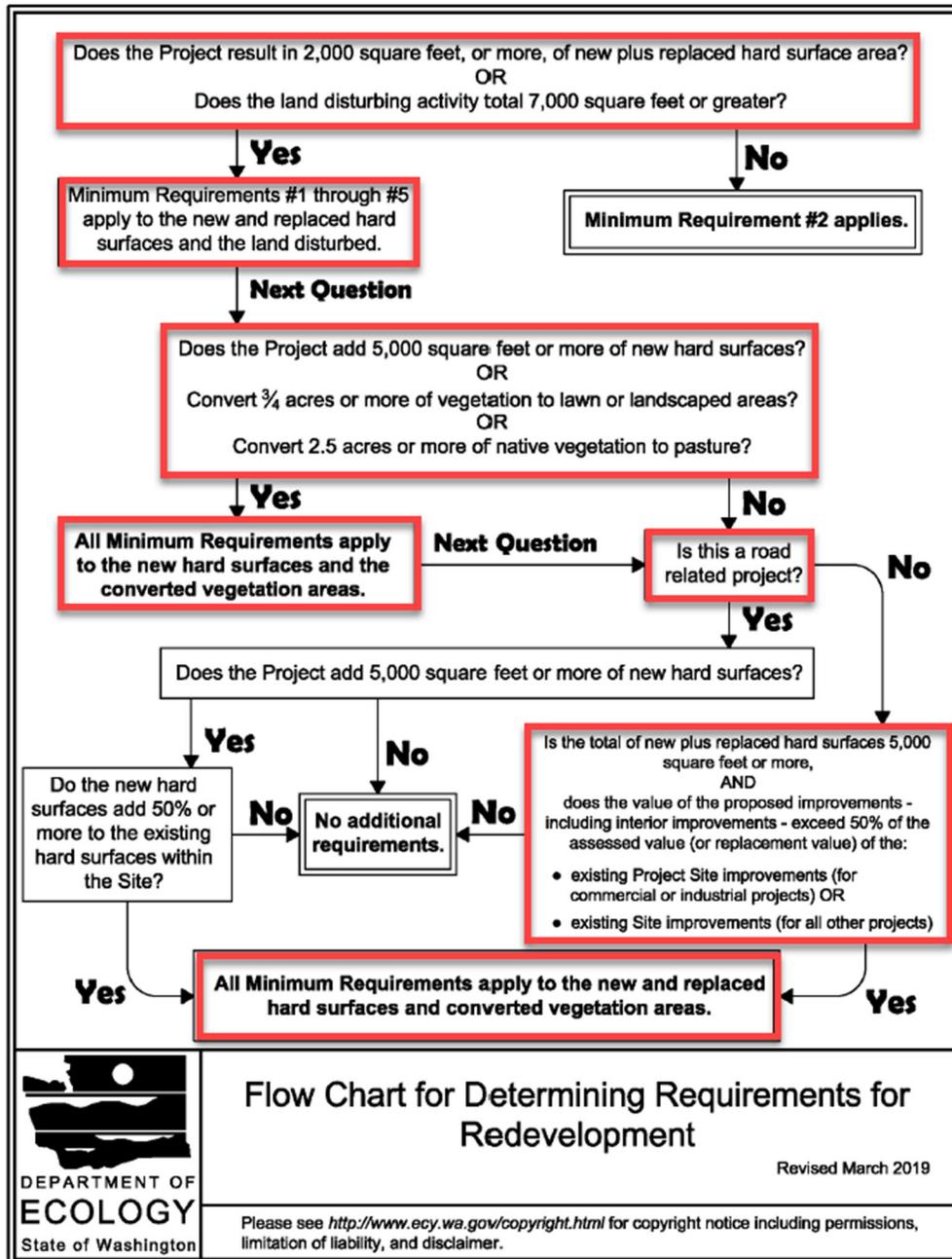
Figure 1 - Minimum Requirement Flow-Chart

As shown above, the project must meet MRs 1-9.

DRAINAGE REPORT

This Drainage Report contains a summary, analysis, maps and calculations to confirm that the proposed development complies with Monroe Municipal Code and the 2019 DOE Manual.

A.   Existing Conditions & Drainage Patterns

The site consists of two parcels, one of which contains a long panhandle with a private access road easement that serves the eight lots that abut it.

Currently all runoff – from the roadway, roofs, driveways, etc. – sheet flows onto adjacent, flat landscaped areas. There are no visible drainage courses or evidence of erosion/water movement.

On-Site Basins

The development area is relatively flat trending generally north.

There is only one Threshold Discharge Area for the site.

Off-Site Basins

There are no "upstream" or off-site basins tributary to the site.

B.   Developed Conditions & Drainage Patterns

No significant re-grading of the site is proposed.

The existing roadway is a 20-foot wide pavement ending in a sub-standard cul-de-sac. There are numerous pot holes and some areas of alligator cracking.

The City requires the access roadway for this 5-lot short plat to be 20 feet wide with curb/sidewalk on the north side, and that the pavement be improved to support emergency vehicles. The proposed roadway section is 3" of Crushed Surfacing Top Course (CSTC), 4" Asphalt Treated Base (ATB) and 2" of Hot-mix Asphalt (HMA) wearing course. The proposed design assumes the existing pavement and its sub-base will suffice as the base; to complete the roadway section, paving fabric will be placed over the existing pavement along with 2" of ATB and 2" of HMA.

The existing roadway is situated in the exact location of the required 20-foot access road and proposed 45-foot cul-de-sac. Retaining this pavement as part of the road section means this area is not classified as a "New or Replaced Hard Surface" for the purposes of stormwater design.

However, there is a small area – approximately 1,850 SF in size – of compacted crushed rock driveway and parking. Although this is similar in character to the adjacent asphalt pavement, the "excavating to subgrade" required to build the new roadway may trigger its delineation as a "new plus replaced hard surface."

Therefore, all paved area of the roadway are excluded from stormwater analysis, with the exception of the 1,860 SF at the cul-de-sac.

The City has also required a 5-foot sidewalk along the north side of the roadway. The design includes application of BMP T5.18 - Reverse Slope Sidewalks to mitigate runoff from the sidewalks.

Lastly, the existing structures and associated improvements will be demolished as part of the short plat. This Report has designed the stormwater management tools based on the assumption that each lot will reach the 50% maximum lot coverage listed in the Development Code.

Driveways and walkways will be allowed to sheet flow onto the adjacent landscaped areas, and the roofs will be routed to infiltration trenches along the property lines.

C.   On-Site Soils

Based upon information found on the NRCS On-Line Soil Data Survey, the site consists primarily of "Sulsavar Gravelly Loam, 0 to 8 percent slopes," which is classified as a Hydrologic Group "B" (Outwash) soil.

The following is an excerpt from the geotechnical report prepared by Cobalt Geotechnical addressing Stormwater Management Feasibility

* * * * * Begin Excerpt * * * * *

> ### Stormwater Management Feasibility
>
> *The site is underlain by possible areas of alluvium and more likely, weathered to unweathered glacial drift. Local sands were observed in TP-1 to 4 feet below grade. Local infiltration trenches are feasible in this area only assuming required vertical clearance above the restrictive layer is achieved/maintained (4 feet in depth). The other test pits were underlain by very fine grained silts which have very low permeability.*
>
> *Because the upper deposits have not been overridden by glacial ice, this soil unit is considered normally-consolidated. The Washington State Department of Ecology Stormwater Management Manual for Western Washington allows determination of infiltration rates of this soil unit by Soil Particle Size Distribution testing. This method involves using a logarithmic equation and grain size values along with correction factors for testing type, soil homogeneity, and influent control.*
>
> *The equation in conjunction with sieve analysis results yields a design infiltration rate of 4.5 inches per hour at the TP-1 location at 2 to 3 feet in depth (clean sands with less than 4 percent silt only). These rates reflect application of correction factors for variability (0.4 used), influent control (0.9), and testing analysis type (0.4).*
>
> *Infiltration rates (as factored above) for very shallow bioretention systems located in the areas of TP-2 and TP-3 were 0.2 inches per hour at 1.5 feet in depth.*
>
> *Detention systems, bioretention, permeable pavements, dispersion, or other shallow systems may be feasible depending on their locations and elevations. We can provide additional recommendations once a civil plan has been prepared.*
>
> *Any fine grained soils or interbeds of fine grained soils must be removed prior to rock placement for systems near TP-1. We should verify soil conditions during excavation work.*

* * * * * End Excerpt * * * * *

D.   Wetlands

There are no wetlands in proximity to the site.

E.   Upstream Analysis

Not applicable. There are no upstream tributaries to the development areas of the site.

F.   Downstream Analysis:

Currently, the site drains to groundwater with minor areas along the northern property line draining to the City's stormwater channel, that drains westerly to Lake Tye.

There is only a minor change in runoff volume generated by the roadway overlay and its minor expansion.

Runoff from the new residences will be infiltrated on-site.

G.   Detention Sizing & Storage Volumes:

Not applicable. No detention is proposed.

H.   Conveyance Sizing:

Not applicable. The drainage areas are relatively small and are handled easily by the minimum pipe size.

I.   Stormwater Quality Calculations

Runoff Treatment facilities are not required. The analysis is limited to the areas north of the proposed curb line; the roadway is excluded from analysis because it is not "new or replaced hard surfaces." The sidewalk and roofs are non-pollutant generating surfaces, and the permeable pavers in the driveways are a form of treatment.

J.   Stormwater Conveyance System Analysis

No significant conveyance systems are constructed or employed in this project. An existing culvert will be intercepted to help collect roadway runoff at 171st Avenue SE, and a short length of storm drain will convey runoff from the eastern end (cul-de-sac) to the City-owned canal.

The conveyed volume is significantly below the capacity of the minimum pipe sizes.

STORMWATER MANAGEMENT BMPs

The following Elements outlined in the DOE Manual.

MR #1:   PREPARATION OF STORMATER SITE PLAN

Step 1: Collect and analyze information on existing conditions

> *See attached map.*

Step 2: Prepare preliminary development layout;

> *See attached map.*

Step 3: Perform off-site (upstream and downstream) analysis

> *There are no significant upstream areas tributary to the site.*

> *Runoff generated on-site will generally be infiltrated on-site, with some entering the City-owned canal to the north.*

Step 4: Determine applicable minimum requirements

> *The project is required to meet MRs 1-9.*

Step 5: Prepare a permanent stormwater control plan

> *See Civil Site Plan.*

STORMWATER BMPs APPLIED TO THIS PROJECT

SIDEWALKS:

> BMP T5.18: REVERSE SLOPE SIDEWALKS

ROOFS:

> BMP T5.10A: DOWNSPOUT FULL INFILTRATION

Step 6: Prepare a stormwater pollution prevention plan (SWPPP) (SCC 30.63A.435)

> *See "Minimum Requirement #2" below. This information is also included on the Stormwater Site Plans.*

Step 7: Complete the stormwater site plan (SCC 30.63A.440).

> *See attached drawings and exhibits.*

CONSTRUCTION STORMWATER BMPs

Volume II, Chapter 3 of the DOE Manual contains standards and specifications for temporary BMPs, used as appropriate during the construction phase of a project.

The standards and specifications are not intended to limit innovative efforts to effectively control erosion and sedimentation. Construction SWPPPs can contain experimental BMPs or make minor modifications to standard BMPs. However, the permitting authority (state, local, or both) must approve such practices before use. Experimental and modified BMPs must achieve the same or better performance than the BMPs listed below.

Construction stormwater BMPs are divided into two categories: Construction Source Control BMPs and Construction Runoff BMPs.

The following table lists BMPs _available_ for use on the site. These may be applied as needed in lieu of the BMPs listed in the Elements section below.

Construction Storm-water BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
Construction Source Control BMPs													
BMP C101: Preserving Natural Vegetation	✔												
BMP C102: Buffer Zones	✔												✔
BMP C103: High-Visibility Fence	✔												✔
BMP C105: Stabilized Construction Access		✔											
BMP C106: Wheel Wash		✔											
BMP C107: Construction Road / Parking Area Stabilization		✔											
BMP C120: Temporary and Permanent Seeding					✔	✔							
BMP C121: Mulching					✔	✔							
BMP C122: Nets and Blankets					✔	✔		✔					

Construction Storm-water BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
BMP C123: Plastic Covering					✓	✓							
BMP C124: Sodding					✓	✓							
BMP C125: Topsoiling / Composting					✓								
BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection					✓								
BMP C130: Surface Roughening					✓	✓							
BMP C131: Gradient Terraces					✓	✓							
BMP C140: Dust Control					✓								
BMP C150: Materials on Hand											✓	✓	
BMP C151: Concrete Handling									✓				
BMP C152: Sawcutting and Surfacing Pollution Prevention									✓				
BMP C153: Material Delivery, Storage, and Containment									✓				
BMP C154: Concrete Washout Area									✓				
BMP C160: Certified Erosion and Sediment Control Lead											✓	✓	
BMP C162: Scheduling												✓	
Construction Runoff BMPs													
BMP C200: Interceptor Dike and Swale						✓							✓

Construction Storm-water BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
BMP C201: Grass-Lined Channels						✔							✔
BMP C202: Riprap Channel Lining								✔					
BMP C203: Water Bars			✔			✔				✔			
BMP C204: Pipe Slope Drains						✔							
BMP C205: Subsurface Drains						✔							
BMP C206: Level Spreader						✔				✔			
BMP C207: Check Dams			✔			✔		✔					✔
BMP C208: Triangular Silt Dike						✔							✔
BMP C209: Outlet Protection			✔					✔					
BMP C220: Inlet Protection							✔						
BMP C231: Brush Barrier				✔									✔
BMP C232: Gravel Filter Berm				✔									
BMP C233: Silt Fence				✔									✔
BMP C234: Vegetated Strip				✔									✔
BMP C235: Wattles			✔	✔									
BMP C236: Vegetative Filtration										✔			
BMP C240: Sediment Trap			✔	✔									

Construction Storm-water BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
BMP C241: Sediment Pond (Temporary)			✓	✓									
BMP C250: Construction Stormwater Chemical Treatment				✓					✓				
BMP C251: Construction Stormwater Filtration				✓					✓				
BMP C252: Treating and Disposing of High pH Water									✓				

TESC Element #1: Preserve Vegetation / Mark Clearing Limits

Prior to beginning earth-disturbing activities, including clearing and grading, all clearing limits will be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

Recommended BMPs

BMP C101: Preserving Native Vegetation

Silt fence

Orange construction fencing.

TESC Element #2: Establish Construction Access Route

Construction vehicle access will be limited to one route at each driveway. The access point will be stabilized with quarry spalls or crushed rock to minimize the tracking of sediment onto public roads.

Public roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed from roads by shoveling or sweeping and shall be returned to the project site or hauled away.

Recommended BMPs

BMP C105: Stabilized Construction Entrance

BMP C107: Construction Road/Parking Stabilization

NOTE: Most work on this project will occur immediately adjacent to the existing roadway. Excavated material can be loaded into the haul vehicle without extensively traversing the site.

TESC Element #3: Flow Rate Controls

Properties and waterways downstream from the proposed site development will be protected from erosion due to increases in the volume, velocity, and peak flow rate of storm water runoff from the project site, by meeting or exceeding the DOE mandated runoff quantity and quality requirements.

Recommended BMPs

None proposed. Runoff will flow to adjacent grass areas that are essentially flat.

TESC Element #4: Sediment Controls

Prior to leaving a construction site, storm water runoff from disturbed areas will pass through an appropriate sediment removal BMP.

Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of TESC Element #3.

Skagit County will inspect and approve areas stabilized by means other than pavement or quarry spalls.   Vegetated buffer strips, sediment barriers or filters, dikes, and other BMPs intended to trap sediment on-site will be constructed as one of the first steps in grading. These BMPs will be functional before other land disturbing activities take place

Recommended BMPs

BMP C232: Silt Fence, and/or
BMP C235: Straw Wattles

Other Available BMPs:

BMP C208: Triangular Silt Dike, and/or
BMP C240: Sediment Trap

TESC Element #5: Soil Stabilization

All exposed and un-worked soils will be stabilized by application of effective BMPs, which will protect the soil from the erosive forces of raindrop impact, flowing water and wind erosion.

From October 1 to March 31, no soils will remain exposed and un-worked for more than 2 days. This condition applies to all soils on site, whether at final grade or not.

Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, the early application of gravel base on areas to be paved or graveled, and dust control.

Soil stabilization measures selected should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or ground water.

Soil stockpiles must be stabilized and protected with sediment trapping measures.

Recommended BMPs

BMP C120: Temporary and Permanent Seeding, and/or
BMP C121: Mulching, and/or
BMP C123: Plastic Covering

TESC Element #6: Slope Protection & Stabilization

Cut and fill slopes will be designed, constructed and maintained in a manner that will minimize erosion.

NOTE: No significant slopes are present within the development area of the project, nor are there significant cut banks or fill areas are anticipated for this site.

Recommended BMPs:

None proposed.

TESC Element #7: Drain Inlet Protection

Drain inlets installed by this project will be protected from sediment-laden flows, and directed to sediment trapping facilities.

BMP C220:   Inlet Protection

TESC Element #8: Stabilize Channels and Outlets

All temporary on-site conveyance channels and sheetflow surfaces shall be constructed and stabilized to prevent erosion from the expected velocity of flow from a 2 year, 24-hour frequency storm for the developed condition. Stabilization, including armoring material, adequate to prevent erosion of slopes and downstream reaches will be provided for all designed conveyance systems and sheetflow surfaces.

Note: There are no existing or proposed channels on the site. The adjacent drainage canal is heavily vegetated and slow-moving with no risk of erosion from site runoff contributions.

Recommended BMPs:

None proposed.

TESC Element #9: Control Pollutants

All pollutants, including construction waste materials and demolition debris, that occur on-site during construction will be handled and disposed of in a manner that does not cause contamination of storm water. Cover, containment, and protection from vandalism will be

provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste).

Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into storm water runoff must be conducted using spill prevention measures, such as drip pans.

Contaminated surfaces will be cleaned immediately following any discharge or spill incident. Emergency repairs shall employ temporary plastic sheeting placed beneath and, if raining, over the vehicle.

Application of agricultural chemicals, including fertilizers and pesticides, will be conducted in a manner and at application rates that will not result in the conveyance of chemical into storm water runoff. Manufacturers' recommendations will be followed for application rates and procedures. Management of pH-modifying sources will prevent contamination of runoff and storm water collected on the site. These sources include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters.

Recommended BMPs

BMP C154: Concrete Washout Area

TESC Element #10: Control De-Watering

All turbid de-watering water, which has similar characteristics to storm water runoff at the site, will be discharged into a controlled environment. Highly turbid or otherwise contaminated dewatering water, such as from the washing of construction equipment operation will be handled separately from storm water at the site. Disposal options may include: 1) infiltration by pumping to vegetated areas for dissipation 2) transport off-site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters, or 3) on-site treatment using chemical treatment or other suitable treatment technologies.

Recommended BMPs

No de-watering is proposed for this project.

TESC Element #11: Maintain BMPs

All temporary and permanent erosion and sediment control BMPS will be maintained and repaired as needed to assure continued performance of their intended function.

All maintenance and repair will be conducted in accordance with BMPs. Sediment control BMPs will be inspected after a runoff-producing storm event during the dry season and daily during the wet season. All temporary erosion and sediment control BMPS will be removed within 30 days after final site stabilization is achieved or after the temporary BMPS are no longer needed.

Trapped sediment will be removed or stabilized on site.

Disturbed soil areas resulting from removal of BMPs or vegetation will be permanently stabilized.

TESC Element #12: Manage the Project

The project will be conducted to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of vegetation will be an integral part of the clearing activities.

Based on the information provided, and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance. If, during the course of any construction activity or soil disturbance during the seasonal limitation period, silt-laden runoff leaving the construction site causes a violation of the surface water quality standard or if clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained, the local permitting authority may take enforcement action, including, but not limited to a notice of violation, administrative order, penalty, or stop-work order.

The following activities are exempt from the seasonal clearing and grading limitations:

1. Routine maintenance and necessary repair of erosion and sediment control BMPs and;

2. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

All BMPS will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Whenever inspection and/or monitoring reveals that the BMPS identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, the SWPPP will be modified, as appropriate, in a timely manner.

This Construction SWPPP will be retained on-site or within reasonable access to the site. The Construction SWPPP will be modified whenever there is a significant change in the design, construction, operation, or maintenance of any BMP.

Element 13: Protect Low Impact Development BMPs

- Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.
- Prevent compacting Bioretention and rain garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base

material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.

- ▪ Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer's procedures.
- ▪ Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

Recommended BMPs

No Rain Gardens, Bioretention or similar LID elements are proposed. Downspout Infiltration Trenches will be constructed as part of the individual lot development.

MR #3:   WATER POLLUTION SOURCE CONTROL

No pollution-generating activities are anticipated on this project. The project constructs a single-family residence and driveway and, as such, Operational BMPs and/or Structural Source Control BMPs are not appropriate or necessary.

MR #4:   PRESERVATION OF DRAINAGE SYSTEMS

The site is a single Threshold Discharge Area. No re-routing of stormwater is proposed.

MR #5:   ON-SITE STORMWATER MANAGEMENT

The project proposes to employ Downspout Infiltration (BMP T5.10A) to manage stormwater.

As shown in the attached WWHM output, the project meets the requirements for the LID Performance Standard.

Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or
Projects outside the UGA, on a parcel smaller than 5 acres	• Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

FEASIBLE?		
Yes	No	
LAWN AND LANDSCAPED AREAS:		
✓		Post-Construction Soil Quality and Depth in accordance with BMP T5.13 in Volume V, Chapter 5 of this manual

MR #6:   RUNOFF TREATMENT

The existing roadway that will be overlaid is not included in the requirements for Runoff Treatment because it is not "new or replaced" surface and is therefore not addressed herein.

The only other Pollutant-Generating Surface is the driveways which are treated with BMP T5.15 (Permeable Pavements).

MR #7:   FLOW CONTROL

The existing roadway that will be overlaid is not included in the requirements for Flow Control because it is not "new or replaced" surface and is therefore not addressed herein.

The remainder of the site is effectively fully infiltrated. The site is effectively flat, with a the south half of the lots draining toward the roadway and the northern half draining at a very slight gradie toward the northern property line.

Driveways are infiltrated via Pervious Pavers, Reverse Grade Sidewalks discharge to the southern lawn areas for infiltration. Roofs are routed to Infiltration Trenches.

MR #8:   WETLANDS PROTECTION

There are no wetlands on the site.

MR #9:   OPERATIONS & MAINTENANCE

There are no facilities that require maintenance proposed for this project.

WWHM2012

PROJECT REPORT

General Model Information

Project Name: HENRIQUEZ WWHM

Site Name:

Site Address:

City:

Report Date: 3/22/2024

Gage: Everett

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 1.200

Version Date: 2021/08/18

Version: 4.2.18

POC Thresholds

Low Flow Threshold for POC1:   50 Percent of the 2 Year

High Flow Threshold for POC1:   50 Year

Landuse Basin Data
Predeveloped Land Use

EXST DEVEL AREA

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	1.15
Pervious Total	1.15

Impervious Land Use	acre
Impervious Total	0
Basin Total	1.15

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DSGN LAWNI

Bypass: No

GroundWater: No

| Pervious Land Use | acre |
| A B, Lawn, Flat | .4 |

Element Flows To:

| Surface | Interflow | Groundwater |

Mitigated Routing

Analysis Results
POC 1
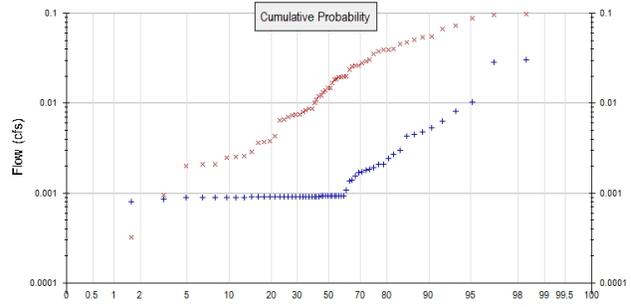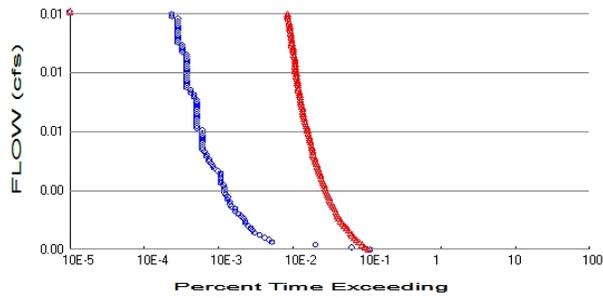
+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.15
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.4
Total Impervious Area: 0

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.00132
5 year	0.002863
10 year	0.004592
25 year	0.00802
50 year	0.011852
100 year	0.017192

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.014044
5 year	0.037519
10 year	0.058546
25 year	0.089587
50 year	0.114922
100 year	0.141416

Annual Peaks
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.001	0.000
1950	0.003	0.030
1951	0.002	0.020
1952	0.001	0.013
1953	0.001	0.019
1954	0.006	0.096
1955	0.005	0.067
1956	0.001	0.009
1957	0.001	0.040
1958	0.001	0.026

1959	0.002	0.019
1960	0.002	0.019
1961	0.004	0.054
1962	0.001	0.002
1963	0.001	0.048
1964	0.003	0.026
1965	0.001	0.002
1966	0.001	0.004
1967	0.002	0.018
1968	0.001	0.012
1969	0.001	0.026
1970	0.001	0.007
1971	0.004	0.035
1972	0.001	0.017
1973	0.001	0.007
1974	0.002	0.039
1975	0.001	0.009
1976	0.002	0.020
1977	0.001	0.001
1978	0.001	0.004
1979	0.002	0.088
1980	0.001	0.015
1981	0.001	0.015
1982	0.001	0.012
1983	0.001	0.038
1984	0.001	0.003
1985	0.002	0.039
1986	0.008	0.056
1987	0.005	0.024
1988	0.001	0.010
1989	0.001	0.028
1990	0.001	0.014
1991	0.001	0.008
1992	0.001	0.008
1993	0.001	0.006
1994	0.001	0.003
1995	0.001	0.008
1996	0.010	0.050
1997	0.028	0.097
1998	0.001	0.004
1999	0.001	0.007
2000	0.002	0.031
2001	0.001	0.000
2002	0.001	0.004
2003	0.001	0.002
2004	0.001	0.003
2005	0.001	0.007
2006	0.031	0.074
2007	0.001	0.046
2008	0.001	0.011
2009	0.001	0.002

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0306	0.0974
2	0.0285	0.0964
3	0.0104	0.0876

4	0.0081	0.0736
5	0.0063	0.0668
6	0.0053	0.0559
7	0.0048	0.0542
8	0.0045	0.0503
9	0.0043	0.0478
10	0.0030	0.0456
11	0.0027	0.0402
12	0.0024	0.0394
13	0.0021	0.0393
14	0.0021	0.0376
15	0.0019	0.0351
16	0.0018	0.0308
17	0.0018	0.0295
18	0.0017	0.0282
19	0.0017	0.0265
20	0.0015	0.0262
21	0.0014	0.0256
22	0.0014	0.0239
23	0.0011	0.0201
24	0.0009	0.0199
25	0.0009	0.0193
26	0.0009	0.0193
27	0.0009	0.0187
28	0.0009	0.0182
29	0.0009	0.0168
30	0.0009	0.0149
31	0.0009	0.0147
32	0.0009	0.0139
33	0.0009	0.0134
34	0.0009	0.0123
35	0.0009	0.0119
36	0.0009	0.0109
37	0.0009	0.0102
38	0.0009	0.0087
39	0.0009	0.0087
40	0.0009	0.0083
41	0.0009	0.0080
42	0.0009	0.0075
43	0.0009	0.0075
44	0.0009	0.0074
45	0.0009	0.0070
46	0.0009	0.0066
47	0.0009	0.0065
48	0.0009	0.0043
49	0.0009	0.0038
50	0.0009	0.0037
51	0.0009	0.0037
52	0.0009	0.0029
53	0.0009	0.0026
54	0.0009	0.0025
55	0.0009	0.0025
56	0.0009	0.0021
57	0.0009	0.0021
58	0.0009	0.0020
59	0.0009	0.0010
60	0.0008	0.0003
61	0.0006	0.0003

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0007	2355	2216	94	Pass
0.0008	1322	1992	150	Fail
0.0009	433	1816	419	Fail
0.0010	112	1664	1485	Fail
0.0011	102	1533	1502	Fail
0.0012	89	1437	1614	Fail
0.0013	77	1350	1753	Fail
0.0015	66	1274	1930	Fail
0.0016	61	1202	1970	Fail
0.0017	58	1132	1951	Fail
0.0018	54	1065	1972	Fail
0.0019	50	996	1992	Fail
0.0020	49	943	1924	Fail
0.0021	47	894	1902	Fail
0.0022	43	862	2004	Fail
0.0024	40	838	2095	Fail
0.0025	36	812	2255	Fail
0.0026	36	782	2172	Fail
0.0027	32	752	2350	Fail
0.0028	31	718	2316	Fail
0.0029	31	690	2225	Fail
0.0030	29	672	2317	Fail
0.0031	29	654	2255	Fail
0.0033	27	631	2337	Fail
0.0034	26	617	2373	Fail
0.0035	26	599	2303	Fail
0.0036	26	581	2234	Fail
0.0037	25	568	2272	Fail
0.0038	23	550	2391	Fail
0.0039	23	537	2334	Fail
0.0041	23	521	2265	Fail
0.0042	23	510	2217	Fail
0.0043	23	495	2152	Fail
0.0044	21	481	2290	Fail
0.0045	19	471	2478	Fail
0.0046	18	456	2533	Fail
0.0047	17	445	2617	Pass
0.0048	16	434	2712	Fail
0.0050	16	427	2668	Fail
0.0051	15	415	2766	Fail
0.0052	15	403	2686	Fail
0.0053	14	398	2842	Fail
0.0054	13	394	3030	Fail
0.0055	13	388	2984	Fail
0.0056	13	381	2930	Fail
0.0057	13	373	2869	Fail
0.0059	13	362	2784	Fail
0.0060	13	359	2761	Fail
0.0061	13	353	2715	Fail
0.0062	13	345	2653	Fail
0.0063	13	339	2607	Fail
0.0064	11	334	3036	Fail
0.0065	11	326	2963	Fail
0.0067	11	319	2900	Fail

0.0068	11	313	2845	Fail
0.0069	11	305	2772	Fail
0.0070	11	300	2727	Fail
0.0071	11	295	2681	Fail
0.0072	11	292	2654	Fail
0.0073	11	291	2645	Fail
0.0074	11	286	2600	Fail
0.0076	11	278	2527	Fail
0.0077	11	277	2518	Fail
0.0078	11	273	2481	Fail
0.0079	10	269	2690	Fail
0.0080	10	265	2650	Fail
0.0081	9	262	2911	Fail
0.0082	9	258	2866	Fail
0.0083	8	254	3175	Fail
0.0085	8	250	3125	Fail
0.0086	8	248	3100	Fail
0.0087	8	247	3087	Fail
0.0088	8	242	3025	Fail
0.0089	8	240	3000	Fail
0.0090	8	239	2987	Fail
0.0091	8	233	2912	Fail
0.0093	8	232	2900	Fail
0.0094	8	232	2900	Fail
0.0095	8	231	2887	Fail
0.0096	8	230	2875	Fail
0.0097	8	228	2850	Fail
0.0098	8	226	2825	Fail
0.0099	8	222	2775	Fail
0.0100	7	218	3114	Fail
0.0102	7	217	3100	Fail
0.0103	7	216	3085	Fail
0.0104	7	210	3000	Fail
0.0105	6	208	3466	Fail
0.0106	6	207	3450	Fail
0.0107	6	205	3416	Fail
0.0108	6	204	3400	Fail
0.0109	6	202	3366	Fail
0.0111	6	197	3283	Fail
0.0112	6	196	3266	Fail
0.0113	6	194	3233	Fail
0.0114	6	192	3200	Fail
0.0115	6	190	3166	Fail
0.0116	6	185	3083	Fail
0.0117	5	182	3640	Fail
0.0119	5	182	3640	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 3

POC #3 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes
 No PERLND changes have been made.

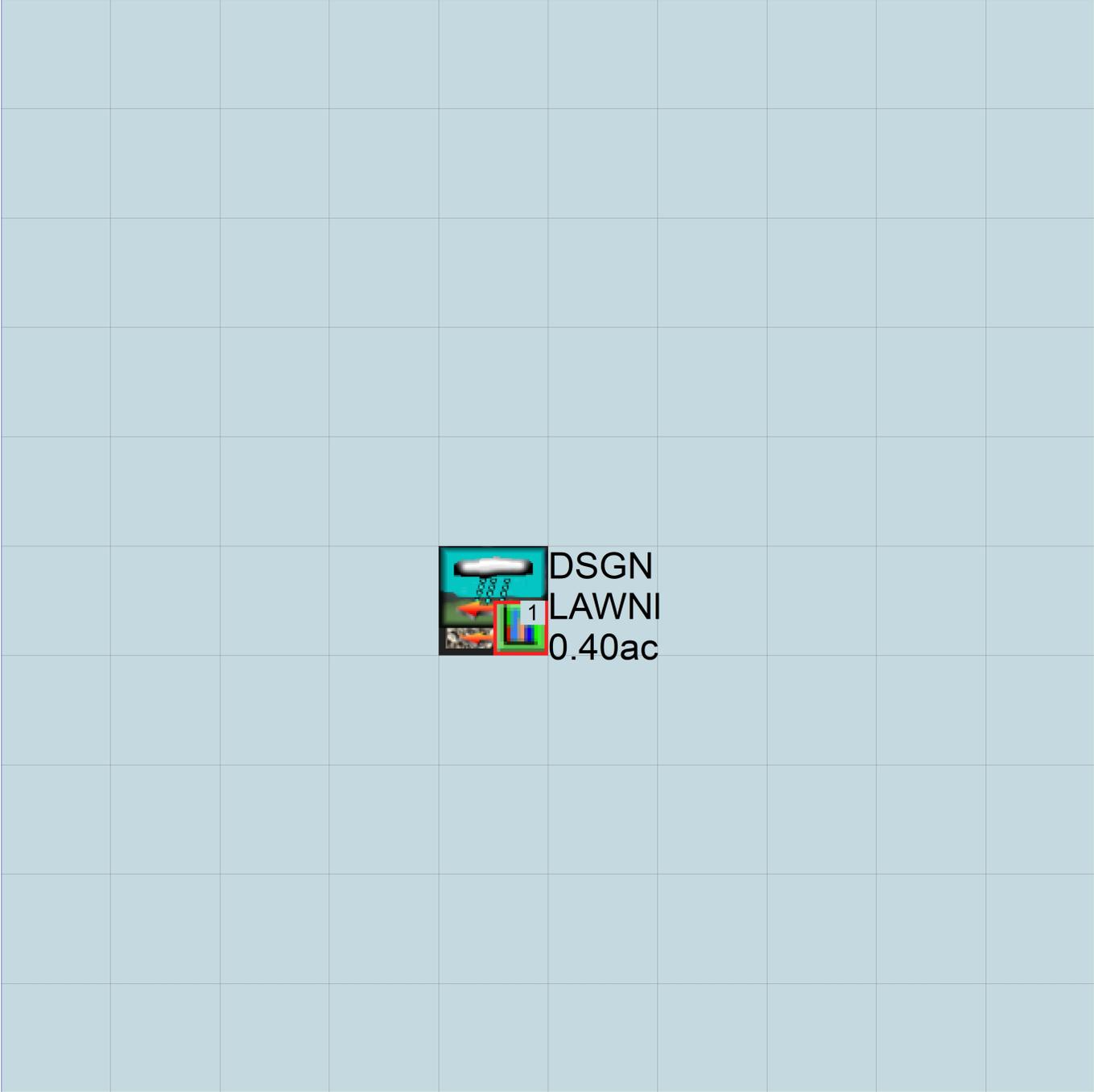
IMPLND Changes
No IMPLND changes have been made.

EXST
DEVEL
AREA
1.15ac

DSGN
LAWNI
0.40ac

```
RUN

GLOBAL
  WWHM4 model simulation
  START      1948 10 01        END     2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name----------------------------->***
<-ID->                                                            ***
WDM       26    HENRIQUEZ WWHM.wdm
MESSU     25    PreHENRIQUEZ WWHM.MES
          27    PreHENRIQUEZ WWHM.L61
          28    PreHENRIQUEZ WWHM.L62
          30    POCHENRIQUEZ WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP             INDELT 00:15
      PERLND      1
      COPY      501
      DISPLY      1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1       EXST DEVEL AREA          MAX                  1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1        1    1
  501        1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #        K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                     in   out              ***
    1    A/B, Forest, Flat      1     1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    1        0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > **************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC *********
    1        0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # - # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  1       0    0    0    0    0    0    0    0    0    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >        PWATER input info: Part 2         ***
  # - # ***FOREST     LZSN    INFILT    LSUR    SLSUR    KVARY    AGWRC
  1          0        5        2       400     0.05      0.3     0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS >        PWATER input info: Part 3         ***
  # - # ***PETMAX    PETMIN    INFEXP   INFILD   DEEPFR   BASETP   AGWETP
  1          0        0        2        2        0        0        0
END PWAT-PARM3
PWAT-PARM4
  <PLS >        PWATER input info: Part 4                      ***
  # - #    CEPSC     UZSN      NSUR     INTFW      IRC    LZETP ***
  1         0.2      0.5      0.35       0        0.7      0.7
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
          ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # ***  CEPS     SURS      UZS      IFWS      LZS      AGWS     GWVS
  1         0        0        0        0        3        1        0
END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name-------->  Unit-systems   Printer ***
    # - #                        User  t-series Engl Metr ***
                                  in   out            ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************** Active Sections ****************************
    # - # ATMP SNOW IWAT  SLD  IWG IQAL    ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # - # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # - # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >        IWATER input info: Part 2        ***
    # - # ***  LSUR     SLSUR     NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >        IWATER input info: Part 3        ***
    # - # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # - # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                      <--Area-->     <-Target->   MBLK    ***
<Name>    #                     <-factor->     <Name>   #   Tbl#    ***
EXST DEVEL AREA***
PERLND    1                         1.15       COPY     501     12
PERLND    1                         1.15       COPY     501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->   ***
<Name>    #         <Name> # #<-factor->strg <Name>   #    #         <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4         DISPLY   1      INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->   ***
<Name>    #         <Name> # #<-factor->strg <Name>   #    #         <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES        Name          Nexits  Unit Systems   Printer                 ***
    # -  #<------------------><--->  User T-series   Engl Metr LKFG            ***
                                     in   out                                  ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ***************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                       ***
    # -  # VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit *** possible  exit       possible  exit
            *  *  *  *    *  *  *  *  *     *  *  *  *  *           ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO      LEN     DELTH     STCOR       KS      DB50      ***
    <------><-------->  <-------><-------->  <-------->  <-------->  <-------->      ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND    Initial  value  of OUTDGT
        *** ac-ft    for each possible exit      for each possible exit
    <------><-------->    <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <-Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->   ***
<Name>    # <Name> # tem strg<-factor->strg <Name>   #    #         <Name> # #  ***
WDM       2 PREC       ENGL     1.2            PERLND   1 999 EXTNL  PREC
WDM       2 PREC       ENGL     1.2            IMPLND   1 999 EXTNL  PREC
```

HENRIQUEZ WWHM   3/22/2024 2:28:45 PM   Page 22

```
WDM        1 EVAP       ENGL       0.76                    PERLND   1 999 EXTNL   PETINP
WDM        1 EVAP       ENGL       0.76                    IMPLND   1 999 EXTNL   PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>     #       <Name> # #<-factor->strg <Name>     # <Name>    tem strg strg***
COPY    501 OUTPUT MEAN   1 1      48.4      WDM      501 FLOW      ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>    <-Grp> <-Member-><--Mult-->      <Target>          <-Grp> <-Member->***
<Name>             <Name> # #<-factor->      <Name>                   <Name> # #***
  MASS-LINK         12
PERLND       PWATER SURO        0.083333      COPY              INPUT  MEAN
  END MASS-LINK     12

  MASS-LINK         13
PERLND       PWATER IFWO        0.083333      COPY              INPUT  MEAN
  END MASS-LINK     13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START      1948 10 01      END     2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN      1                        UNIT SYSTEM      1
END GLOBAL

FILES
<File>  <Un#>   <----------File Name---------------------------->***
<-ID->                                                            ***
WDM       26    HENRIQUEZ WWHM.wdm
MESSU     25    MitHENRIQUEZ WWHM.MES
          27    MitHENRIQUEZ WWHM.L61
          28    MitHENRIQUEZ WWHM.L62
          30    POCHENRIQUEZ WWHM1.dat
END FILES

OPN SEQUENCE
   INGRP           INDELT 00:15
     PERLND      40
     COPY       501
     DISPLY       1
   END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1          DSGN LAWN1                 MAX                  1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT   NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #     # OPCD ***
  END OPCODE
  PARM
    #     #        K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User   t-series Engl Metr ***
                                        in   out             ***
    40      A/B, Lawn, Flat        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ***************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    40       0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC *********
    40       0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # - # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  40         0    0    0    0    0    0    0    0    0    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >       PWATER input info: Part 2        ***
  # - # ***FOREST    LZSN    INFILT    LSUR    SLSUR    KVARY    AGWRC
  40          0       5      0.8     400     0.05      0.3     0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS >       PWATER input info: Part 3        ***
  # - # ***PETMAX   PETMIN    INFEXP   INFILD   DEEPFR   BASETP   AGWETP
  40          0       0        2        2        0        0        0
END PWAT-PARM3
PWAT-PARM4
  <PLS >       PWATER input info: Part 4                      ***
  # - #    CEPSC     UZSN     NSUR     INTFW      IRC   LZETP ***
  40        0.1      0.5     0.25       0       0.7    0.25
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
          ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # ***  CEPS     SURS      UZS      IFWS      LZS     AGWS     GWVS
  40          0        0        0        0        3        1        0
END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name-------->  Unit-systems   Printer ***
    # - #                        User  t-series Engl Metr ***
                                  in   out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # - # ATMP SNOW IWAT  SLD  IWG IQAL    ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # - # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # - # CSNO RTOP  VRS  VNN RTLI      ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2        ***
    # - # ***  LSUR      SLSUR      NSUR      RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3        ***
    # - # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # - # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                    <--Area-->      <-Target->    MBLK    ***
<Name>    #                   <-factor->      <Name>   #   Tbl#    ***
DSGN LAWNl***
PERLND  40                          0.4       COPY    501     12
PERLND  40                          0.4       COPY    501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>    #         <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY    501 OUTPUT MEAN   1 1    48.4         DISPLY   1       INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>    #         <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES        Name          Nexits  Unit Systems   Printer              ***
    # -  #<------------------><--->  User T-series  Engl Metr LKFG          ***
                                      in   out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ***************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ****************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  # VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *          ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO     LEN     DELTH    STCOR      KS      DB50      ***
    <------><-------->,<-------->,<-------->,<-------->,<-------->,<-------->   ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL    Initial  value  of COLIND   Initial  value  of OUTDGT
       *** ac-ft    for each possible exit      for each possible exit
    <------><-------->    <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <-Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>    # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM       2 PREC      ENGL    1.2            PERLND   1 999 EXTNL  PREC
WDM       2 PREC      ENGL    1.2            IMPLND   1 999 EXTNL  PREC
```

```
WDM        1 EVAP      ENGL      0.76            PERLND   1 999 EXTNL   PETINP
WDM        1 EVAP      ENGL      0.76            IMPLND   1 999 EXTNL   PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>     #       <Name> # #<-factor->strg <Name>     # <Name>   tem strg strg***
COPY       1 OUTPUT MEAN   1 1     48.4      WDM      701 FLOW     ENGL      REPL
COPY     501 OUTPUT MEAN   1 1     48.4      WDM      801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>    <-Grp> <-Member-><--Mult-->     <Target>         <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                  <Name> # #***
  MASS-LINK         12
PERLND      PWATER SURO         0.083333     COPY             INPUT  MEAN
  END MASS-LINK     12


  MASS-LINK         13
PERLND      PWATER IFWO         0.083333     COPY             INPUT  MEAN
  END MASS-LINK     13


END MASS-LINK

END RUN
```

Disciaimer

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