



## TECHNICAL MEMORANDUM

**TO:** City of Port Orchard  
**FROM:** Whitney Holm, PE  
**DATE:** October 10, 2018  
**SUBJECT:** Sedgwick and Bethel Stormwater Concept Plan

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### 1. PROJECT OVERVIEW

#### 1.1 Introduction

The City of Port Orchard is proposing major corridor improvements along Bethel Road, between Sedgwick Road (SR 160) and Mile Hill Drive (SR 166), and Sedgwick Road, between SR 16 and Bethel Road. The improvements include roundabouts, roadway widening, nonmotorized facilities, and stormwater facilities. The improvements stretch for roughly 3 miles. This memorandum summarizes the hydraulic features required to treat, store, and discharge stormwater associated with the proposed roadway improvements. While construction is expected to be phased over time, this analysis considered the full build-out. Eight basins were identified for the project area. A basin map is attached.

#### 1.2 Design Criteria

All stormwater improvements proposed have been designed per the Port Orchard Municipal Code Section 20.150 (POMC). Port Orchard has adopted the 2012 Edition (as amended in December 2014) of the Washington State Department of Ecology Stormwater Manual for Western Washington (SWMMWW), and the 2012 Edition of the Puget Sound Partnership Low Impact Development Technical Guidance Manual for Puget Sound. Western Washington Hydrology Model 2012 (WWHM) was used to model the ponds.

### 2. STORMWATER MANAGEMENT

#### 2.1 Overview

For the preliminary design, it was assumed the runoff from the roadway would sheet into bioretention swales abutting the roadway on both sides. There will be curb cuts every 30 feet to allow the runoff to enter the bioretention swale. The stormwater will be treated through the bioretention swale and then be conveyed by pipes and catch basins to an infiltration pond. The ponds have been designed to either release at the predeveloped rate, per the SWMMWW, or infiltrate 100% of stormwater.



## 2.2 Modeling

The project is broken up into eight basins. Each basin has been designed to flow to an infiltration pond. Basins 2 and 3 as well as Basins 6 and 7 share a pond.

The basins were determined by analyzing the contours of the area. For the predeveloped scenario the land cover was modeled 100% as forested. The developed impervious area was determined by using Googlemap images dating back to 1990. The developed scenario was modeled using the proposed impervious area from the roadway project as well as all the impervious areas that existed prior to 1990. The rest of the area was assumed to be forested. Any post-1990 development was most likely required to be managed and discharged at predeveloped rates.

**Table 1. Drainage Basin Areas**

Areas	Basin 1	Basin 2	Basin 3	Basin 4	Basin 5	Basin 6	Basin 7	Basin 8
<b>Impervious (ac)</b>	52	7	3	88	39	15	5	104
<b>Pervious (ac)</b>	179	72	49	80	71	82	63	158
<b>Total (ac)</b>	231	79	52	168	110	97	68	262

## 2.3 Soils

USDA Soil Survey was used to evaluate the soils in the pond areas. Types A, B, and C were found. See Table 2 for each pond's soil type. Additional soil testing will be required during the design phase. We assumed an infiltration rate based off the USDA Soil Survey information and assumed that groundwater was not an issue.

## 2.4 Ponds

An infiltration rate of two inches per hour was assumed for all the ponds. They were designed with seven feet of depth, which includes one foot of freeboard and three-to-one slopes on all the pond sides. WWHM was used to model the ponds per SWMMWW requirements. All the ponds, except Pond D, are designed to release the runoff at the predeveloped rate. It was assumed that all the ponds will discharge into Blackjack Creek. For Pond D, which does not have easy access to Blackjack Creek, 100% infiltration was assumed.

**Table 2. Pond Areas**

Pond	Pond A	Pond B	Pond C	Pond D	Pond E	Pond F
<b>Basin</b>	5	4	2 & 3	1	6 & 7	8
<b>Soil</b>	C	C	A/B	A/B	A/B	A/B
<b>Infiltrative area</b>	250,000 sf	200,000 sf	100,000 sf	122,500 sf	38,800 sf	250,000 sf

For the concept plan we identified possible locations for each pond, however they are subject to change. For this phase of the project we just found undeveloped parcels that could potentially be used. In the design phase for each segment we recommend reevaluating the pond locations.



### 3. MINIMUM REQUIREMENTS

Per the POMC, the improvements must meet all nine minimum requirements.

*Minimum Requirement #1 – Plans and Reports* – This drainage memo and associated plans serve as the stormwater site plan. A full drainage report will be completed with each phase submittal.

*Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plans (SWPPP)* – An SWPPP will be completed with each phase submittal.

*Minimum Requirement #3 – Source Control of Pollution* – The intent of source control is to prevent pollutants from coming into contact and mixing with stormwater. Source control is not anticipated to be needed after the project has been completed. However, during the construction phase of the project, source control BMPs shall be onsite at all times in the event of a spill or other hazardous situation.

*Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls* – Natural drainage patterns are maintained, and discharge is designed to match historic rates. There will be no negative impacts on downstream areas.

*Minimum Requirement #5 – Onsite Stormwater Management*: See Section 2.1 of this memo.

*Minimum Requirement #6 – Runoff Treatment* – Runoff treatment will be provided using bioretention swales abutting the roadway. Due to the high annual average daily traffic of over 15,000, enhanced treatment will most likely be required. Bioretention facilities are categorized as enhanced treatment. The bioretention swales have been designed with a perforated pipe below the amended soils to help disperse the stormwater once it is in the swale.

*Minimum Requirement #7 – Flow Control* – Ponds and bioretention facilities will be used for flow control. All the ponds except for Pond D will release the runoff at the predeveloped condition durations for the range of predeveloped discharge rates from 50% of the two-year peak flow up to the full 50-year peak flow. Pond D was sized to infiltrate 100% of the runoff.

*Minimum Requirement #8 – Wetlands Protection* – Surface water runoff will be collected, treated, and conveyed to the detention pond. It will then be released at historic rates prior to reaching the wetland.

*Minimum Requirement #9 – Operation and Maintenance* – An operation and maintenance manual will be completed in final design for each phase and will be in accordance with POMC 20.150.260.

### 4. CONCLUSION

The stormwater for this project was designed to be compliant with the current manuals. Depending on when each phase goes to further design for permit, revising the model and design may be required if the manuals are no longer current. When each phase goes to the next design level, additional studies and modeling will need to be done. Verifying the pond location, infiltration rates at specific depths, groundwater level and grades will all be critical for the final design.