PROJECT MEMO

TO:	Pat Allen, Thurston County Department of Resource Stewardship, Water Resources Division	**DATE:**	August 26, 2014
FROM:	Doreen Gavin, AHBL	**PROJECT NO.:**	2130555.10
TELEPHONE:	(253) 383-2422	**PROJECT NAME:**	Woodard Creek Stormwater Retrofit
SUBJECT:	Draft Summary Memo, Task 4 - Evaluate Stormwater Retrofit Sites		

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Thurston County contracted with AHBL and Northwest Hydraulic Consultants (NHC) to identify and rank potential stormwater retrofit sites that may ultimately become retrofit projects and have a positive impact on the water quality of the Woodard Creek Basin. Through Task 3, a GIS Desktop Analysis, NHC identified and mapped 26 potential retrofit sites, as described in their February 24, 2014, Technical Memorandum. The potential 26 sites were selected from a field of 66 sites based on their connectivity to the creek, runoff potential, and pollution generation potential.

The purpose of Task 4, Evaluate Stormwater Retrofit Sites, was to further analyze the 26 potential retrofit sites, determine a list of the ten most promising projects, and finally, through a targeted assessment, develop a list of the preferred five sites. The evaluation tools used to refine the list of potential sites from 26 to 10 included: stakeholder and public input, reconnaissance investigation, qualitative ranking based on 12 criteria, and identification of candidate projects with each project's tributary area. Once the top ten sites were identified, they were prioritized based on a targeted assessment using stormwater models and basin specific criteria, the area treated by each project, and the readiness of each site for implementation.

This memo summarizes the evaluation process used to select the top five sites for preliminary design.

1. Stakeholder and Public Input

A public outreach plan was developed to solicit input from stakeholder groups and the public on stormwater problems and potential stormwater retrofit locations within the Woodard Creek Basin. Two existing public stakeholder organizations, the Henderson Inlet Shellfish Protection District (HISPD) and the Thurston County Storm and Surface Water Advisory Board (SSWAB), were briefed on the project and solicited for input and guidance on the project. Other interested stakeholders were consulted on the project and included the Squaxin Island Tribe, Cities of Olympia and Lacey, and the South Puget Sound Salmon Enhancement Group. Additionally two public meetings were scheduled.

The first public workshop was held during Task 4. At this point, 26 potential retrofit sites had been identified. The Consultant delivered a brief presentation on the purpose of the project, explained the workshop meeting format, described the opportunity to provide input into the identification of retrofit sites, and identified how to follow the project progress. The attendees were invited to provide written comments on existing problems within the basin and on possible retrofit sites. We received reports of flooding due to high groundwater and undersized culverts along NE Lemon Road in the north end of the Woodard Creek basin. The second public meeting is planned to occur during Task 5 and will present the five most promising projects proceeding into the predesign phase.

2. Field Reconnaissance Investigation and Qualitative Ranking

Experienced stormwater engineers visited each of the 26 potential retrofit sites to evaluate the site based on pre-established feasibility criteria. The engineer's site observations were used to evaluate the drainage basin area tributary to the retrofit site, drainage flow patterns, high ground water, connectivity to Woodard Creek, land use within the drainage area, and existing uses and utilities that may impact the feasibility of implementing a stormwater project at the retrofit site. A reconnaissance investigation report was completed for each site.

Twelve screening factors were used to evaluate and qualitatively rank the 26 project sites. The 12 screening factors are described in Table 1. Each screening factor scores a value between 1 and 5. The lower the screening factor, the more promising the retrofit site. Of the 26 potential sites, one site scored an overall 1, the best score, eight sites scored a 2, and nine sites scored a 3. The remaining eight sites scored either a 4 or 5 and were no longer considered in the project prioritization process.

3. Identification of Candidate Projects

The projects with the lowest (best) ranking from the qualitative screening were then assessed in more detail. A target project was identified for each one of the most promising sites. Because water quality is the primary goal of the Woodard Creek Retrofit Project, water quality BMP projects were selected instead of flow control or habitat enhancement. Four different types

of water quality projects were considered. These included constructed wetland, bioretention with infiltrative soils, bioretention with underdrains (non-infiltrative soils), and compost amended vegetated filter strips (CAVFS).

The criteria used to select a type of project was the area available for the retrofit project, the soil type at the project site as determined from the SCS Soil Survey Maps, and site observations. Detailed survey information was not available at this step in the process because it was not cost effective to survey all ten sites. Instead, site photos, the Thurston County GIS, aerial images, Google Earth street view, and site observations were used to determine the sub-basin area and drainage flows that could be effectively collected and conveyed to the treatment projects. Similarly, the same site analysis tools were used to determine the available footprint of the facility and the discharge point. For many sites, the treatment area contributing to a specific BMP was much smaller than the tributary area identified through the Desktop Analysis. WWHM-Version 2012 was used to calculate a preliminary size of the recommended BMP.

A constructed wetland was the BMP selected for one retrofit site, FLA 89. This project type was preferred because of the relatively large tributary area, high flow and volume of the water quality design event, and the available footprint for the facility. Two retrofit sites potentially have infiltrative soils, Publically Owned Parcel 2 (POP 2) and Right-of-Way 11 (ROW 11). The BMP proposed for these two sites is bioretention with infiltrating soil. The remaining seven sites will have bioretention with underdrains or CAVFS. The bioretention facility is preferred to a CAVFS; however, a CAVFS is proposed if the drainage is not channelized into a roadside ditch. The total area contributing to the BMP, the effective impervious area, and the concept-level BMP are provided in Table 2 for each of the ten retrofit sites.

4. Detailed Analysis and Comparison of Projects

The next step in the retrofit project prioritization process was to evaluate each of the top ten sites based on impervious area treated, the pollutant load reduction, and land ownership.

The retrofit project data was incorporated into the Woodard Creek HSPF hydrology and water quality model for the purpose of assessing the pollutant reduction capacity of each of the ten projects. The HSPF model developed by NHC tracks three pollutants: fecal coliform, nitrate, and total phosphorous. Because fecal coliform is the primary pollutant of concern in Woodard Creek, its rank is weighted twice as much as the other pollutants. The pollutant load reduction ranking developed by NHC is presented in Table 3.

The final ranking factor for the ten sites was property ownership. The property ownership is an indication of the readiness of the retrofit site for implementation of a water quality project. Thurston County ownership was considered an indication of the opportunity for near term funding, design, permitting, and construction. The Stormwater Retrofit Ranking Criteria used to compare the top ten projects are listed in Table 4, and the final Stormwater Retrofit Prioritization is listed in Table 5.

Five Pre-Design Project Sites

The five retrofit sites were renamed Project Sites 1 to 5, with the southernmost project site labeled as Site 1 and the numbers increasing to the north. The five highest priority projects are shown on Figure 1. Each retrofit site location is described below.

- Site 1 consists of former ROW 11 and ROW 20. It is located on South Bay Road NE between Pleasant Glade Road and 27th Lane NE.
- Site 2 is former ROW 23. It is located on Libby Road NE, approximately 300 feet south of 46th Avenue NE.
- Site 3 is former ROW 19. It is also located on Libby Road NE, approximately 150 feet south of 46th Avenue NE.
- Site 4 is former ROW 1. It is located at the easterly intersection of 46th Avenue NE and Lemon Road NE.
- Site 5 is former ROW 12. It is located on Lemon Road NE, approximately 2,200 feet north of 46th Avenue NE.

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Attachments: Tables 1 through 5
Figure 1

c: David Hartley, Northwest Hydraulic Consultants

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Table 1. Retrofit Screening Factors	
Ease of Permitting	This screening factor identified the jurisdiction, zoning, likelihood of critical areas review, and the number of environmental permits likely required. The permits were separated into local construction permits, local use permits, local critical areas review, state permits and federal permits.
Site Constraints	Utilities within the retrofit site can make the development of a project difficult or cost prohibitive. During the site visit, the following utilities were noted if they were observed near the retrofit site: overhead and underground power, sanitary sewer, water main, fire hydrants, gas mains and underground telephone and communication lines, septic systems and water wells.
Ownership	The parcels ownership was determined whether private ownership, Thurston County, another governmental organization, or a homeowner's association.
Access	The accessibility of the site for construction access and maintenance was evaluated in this screening criterion.
No. of Parcels	The number of parcels within the identified retrofit was determined with one parcel being considered easier to development than a retrofit site which involved numerous parcels.
Impact on Site Uses	This criterion rates the impact of the project on the current site use and operations. The rater considered impacts during construction as well as long-term impacts to site usage in scoring this criterion.
Adequate Space	This screening factor evaluates if the site appears to have adequate space to provide the retrofit goals and meet all setback requirements of a stormwater retrofit facility.
Gravity Flow	Many BMPs that might be used for a retrofit require some change in grade to function properly. This criterion evaluated the site's potential for gravity flow to the facility, the grade change required across the desired BMP and the grade change need to convey the outflow to its discharge point.
Infrastructure	Where stormwater is already collected in piping systems and other conveyances it becomes important to evaluate whether the existing system can be reasonably modified to route flows to new BMPs without major system modification.
Existing WQ & FC	A retrofit project may be identified for an area that already receives some level of runoff treatment or flow control. The level of existing treatment and flow control may be based on an old standard that is not considered adequate under current standards or the treatment may be inadvertent as a result of conveyance systems that provide treatment, but were not designed to provide treatment, such as grass-lined channels or sheet flow across vegetated surfaces.
High Use or ADT	If the tributary area meets the Ecology SWMMWW for a high use site, includes storage of petroleum products, stores diesel vehicles or includes large industrial or commercial parking lots it is screened more favorably.

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Table 2. Top Ten Stormwater Retrofit Projects			
Site ID	**Proposed BMP(s)**	**Total Area**	**Effective Impervious Area**
FLA 89	Constructed Wetland	34.0	0.9
ROW 23	Bioretention swale with underdrain	30.3	2.1
ROW 12	Bioretention swale with underdrain	17.1	1.9
POP 2	Bioretention swale (infiltrating soil)	11.3	7.5
ROW 1	Bioretention swale with underdrain	6.7	.5
ROW 19	Bioretention swale with underdrain and CAVFS	6.0	0.8
ROW 11	3 Bioretention swales (infiltrating soil) and CAVFS	8.5	4.7
ROW 13	Bioretention swale with underdrain	10.1	0.3
ROW 18	Bioretention swale with underdrain and CAVFS	5.2	0.4
ROW 20	Bioretention swale with underdrain	3.0	1.0

Table 3. Load Reduction Ranking (NHC)					
Site ID	**Proposed BMP(s)**	**Load Reduction Scores**			
		Fecal Coliform	**NO_3**	**TP**	**Aggregate**
FLA 89	Constructed Wetland	10	10	10	40
ROW 23	Bioretention swale with underdrain	9	9	9	36
ROW 12	Bioretention swale with underdrain	8	8	8	32
POP 2	Bioretention swale (infiltrating soil)	7	2	4	20
ROW 1	Bioretention swale with underdrain	6	3	7	22
ROW 19	Bioretention swale with underdrain and CAVFS	5	6	6	22
ROW 11	3 Bioretention swales (infiltrating soil) and CAVFS	4	4	3	15
ROW 13	Bioretention swale with underdrain	3	5	5	16
ROW 18	Bioretention swale with underdrain and CAVFS	2	7	2	13
ROW 20	Bioretention swale with underdrain	1	1	1	4

Table 4. Stormwater Retrofit ranking Criteria	
Stormwater Retrofit Ranking Criteria (35 Total Points Possible)	**Points**
1. **Area Treated** Less than 10 acres 11-30 acres Greater than 30	5 (1) (3) (5)
2. **Pollutant Load Reduction Aggregate Score** Less than 12 12 – 31 31- 40	5 (1) (3) (5)
3. **Ownership** Non- County County	5 (0) (5)

Table 5. Stormwater Retrofit Prioritization

		Ranking Factors						
Site ID	**Proposed BMP(s)**	**Area Treated (ac)**	**Pts**	**Pollutant Load Reduction**	**Pts**	**Ownership**	**Pts**	**Total Points**
ROW 23	Bioretention swale with underdrain	30.3	5	36	5	County	5	15
ROW 12	Bioretention swale with underdrain	17.1	3	32	5	County	5	13
ROW 18	Bioretention swale with underdrain and CAVFS	33.5	5	13	2	County	5	12
ROW 1	Bioretention swale with underdrain	26	3	22	3	County	5	11
ROW 11+20	Bioretention swale with underdrain and CAVFS	13.1	3	15	3	County	5	11
FLA 89	Constructed Wetland	34	5	40	5	Private	0	10
ROW 19	Bioretention swale with underdrain and CAVFS	5.6	1	22	3	County	5	9
ROW 11	3 Bioretention swales (infiltrating soil) and CAVFS	8.2	1	15	3	County	5	9
ROW 13	Bioretention swale with underdrain	10.1	1	16	3	County	5	9
ROW 20	Bioretention swale with underdrain	3	1	4	2	County	5	8
POP 2	Bioretention swale (infiltrating soil)	11.5	3	20	3	Private	0	6

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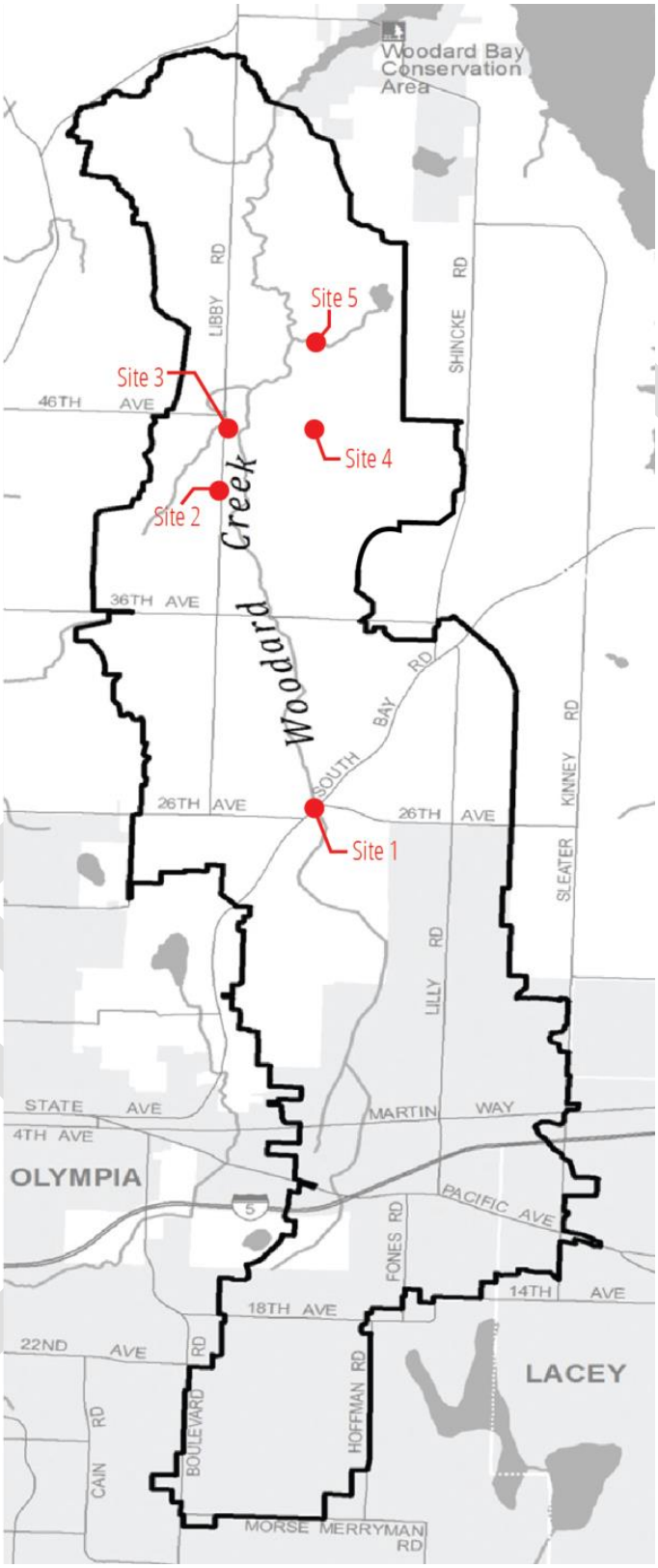
Figure 1


Woodard Bay Conservation Area
Site 5
Site 3
Site 4
Site 2
Site 1
Woodard Creek
LIBBY RD
SHINCKE RD
46TH AVE
36TH AVE
SOUTH BAY RD
26TH AVE
26TH AVE
KINNEY RD
SLEATER
LILLY RD
STATE AVE
4TH AVE
MARTIN WAY
OLYMPIA
PACIFIC AVE
5
FONES RD
14TH AVE
18TH AVE
22ND AVE
BOULEVARD RD
HOFFMAN RD
LACEY
CAIN RD
MORSE MERRYMAN RD