



WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT US 101

Schneider Creek Biofiltration Swales and Vegetated Filter Strip



SUMMARY

Property Type: WSDOT Median and Shoulders	Total Estimated Cost: \$618,000		
Receiving Water: Schneider Creek	Design and Permitting Cost: \$183,500	Construction Cost: \$361,400	Construction Management Costs: \$72,300
Facility Type(s): Biofiltration Swales and Vegetated Filter Strip			

PROJECT DESCRIPTION

Stormwater retrofits will manage and treat highway runoff from US-101 from milepost 359.4 to 359.8:

- The median between northbound and southbound lanes of US-101 will be retrofitted with a 1,100 LF compost amended biofiltration swale (CI-CABS) north of Steamboat Island Rd, and a 550 LF CI-CABS to the south. An outlet structure will discharge to Schneider Creek with energy dissipation to reduce the bank erosion that is occurring.
- The outside shoulder of the southbound lane will be retrofitted with two CI-CABSs, 1,100 LF and 550 LF in length.
- The outside shoulder of the northbound lane will be retrofitted with a 900 LF vegetated filter strip.

These retrofits in combination will provide treatment of approximately 4 acres of high-traffic roadway. The treated stormwater will be conveyed to an outlet structure with energy dissipation to reduce the bank erosion that is occurring. The outlet will discharge to Schneider Creek.

DRAINAGE AREA (~4 Acres)

Pervious Areas	0 Ac
Impervious Areas	4.0 Ac
Percent WSDOT Contributing Impervious Area	100 %
Percent Non-WSDOT Contributing Impervious Area	0 %
WSDOT Contributing Area	4.0 Ac

DESIGN CONSIDERATIONS

Facility Size: 3,300 LF of CI-CABS and 900 LF of Vegetated Filter Strip
Infiltration Potential: Low
WSDOT ROW: Yes
Site Constraints/Challenges: Environmental permitting required for outfall below ordinary high water mark (OHWM)
Potential Utility Conflicts: No known utility conflicts
Potential Permit and Documentation Requirements: JARPA (Corps Nationwide Permit No. 43, Ecology Individual 401, and WDFW HPA), SEPA, WSDOT (General Permit, Roadside Vegetation Permit), and Local Permits (e.g. Critical Areas)

BENEFITS

Improve water quality through collection and treatment of runoff from a high traffic (27,000 AADT) highway currently draining directly to the creek without treatment. Schneider Creek is a high value natural resource on the 303(d) list for bacteria in the lower reach. Monitoring conducted at the downstream end of Schneider Creek, at Pneumonia Gulch Ln. NW, from 2006-2009 shows an average B-IBI index score between moderate and high for biological integrity. Monitoring at the project location indicated water quality standard failures for fecal coliform and dissolved oxygen (Thurston County Water Resources Monitoring Report). Surface flow is not typically present at this creek during the summer.

AVERAGE POLLUTANT LOAD REDUCTION

Pollutant	Reduction	Units	Source
Fecal Coliform:	NA	MPN in billions/yr	NA
Total Suspended Solids:	2,121	kg/yr	Ecology TAPE Testing
Dissolved Zinc:	2.9	kg/yr	Ecology TAPE Testing
Dissolved Copper:	0.2	kg/yr	Ecology TAPE Testing

Pollutant load reductions were calculated using event mean concentrations by land use (as documented in Table 2 of Ecology's Municipal Stormwater Permits Fact Sheet, August 2018) and by using mean percentage removal data as documented in the source listed, and average annual runoff volume treated.

PROJECT PRIORITIZATION CRITERIA

Flooding and Flow Control Benefit Score:	Med
Community Benefit Score:	Low
Habitat Score:	Med
Water Quality Score:	High
Implementation Score:	High
Cost and Maintenance Score:	Med









PROJECT RENDERINGS

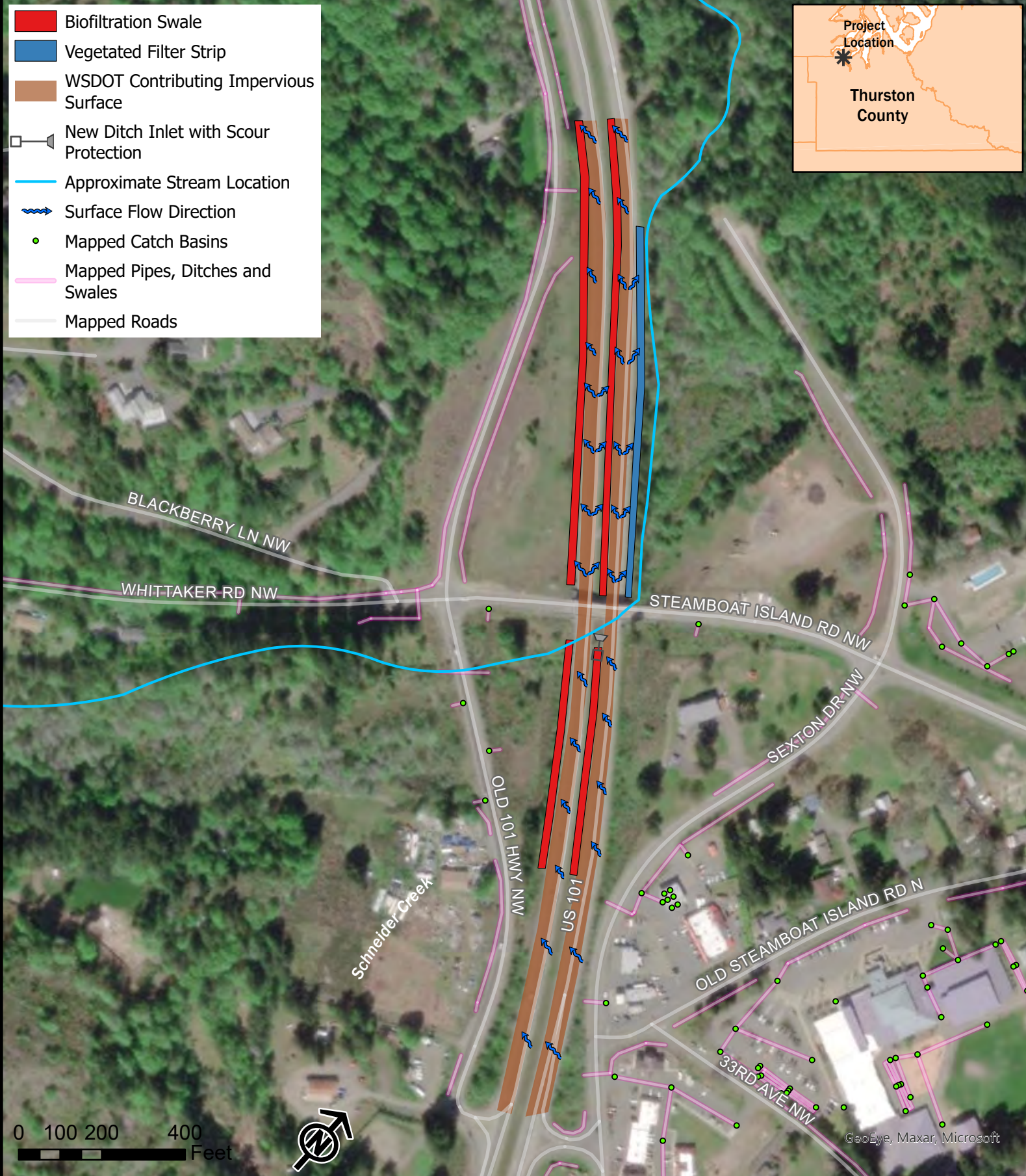


Vegetated filter strip adjacent to highway, draining directly to Schneider Creek.



Biofiltration swale retrofit within US 101-27 median.

-  Biofiltration Swale
-  Vegetated Filter Strip
-  WSDOT Contributing Impervious Surface
-  New Ditch Inlet with Scour Protection
-  Approximate Stream Location
-  Surface Flow Direction
-  Mapped Catch Basins
-  Mapped Pipes, Ditches and Swales
-  Mapped Roads



Schneider Creek Biofiltration Swales and Vegetated Filter Strip



Engineering Construction Cost Estimate for Concept Design of Site US101 Schneider Creek Biofiltration Swales and Vegetated Filter Strip

Project Name: County/WSDOT Stormwater Retrofits
 Project Number: 16-06459-013
 Client: Thurston County



QA Review

Completed/Updated By: Adam Lee
 Last Updated On: 3/30/2021
 Approved By: Joy Michaud
 Approved On.: 3/30/2021

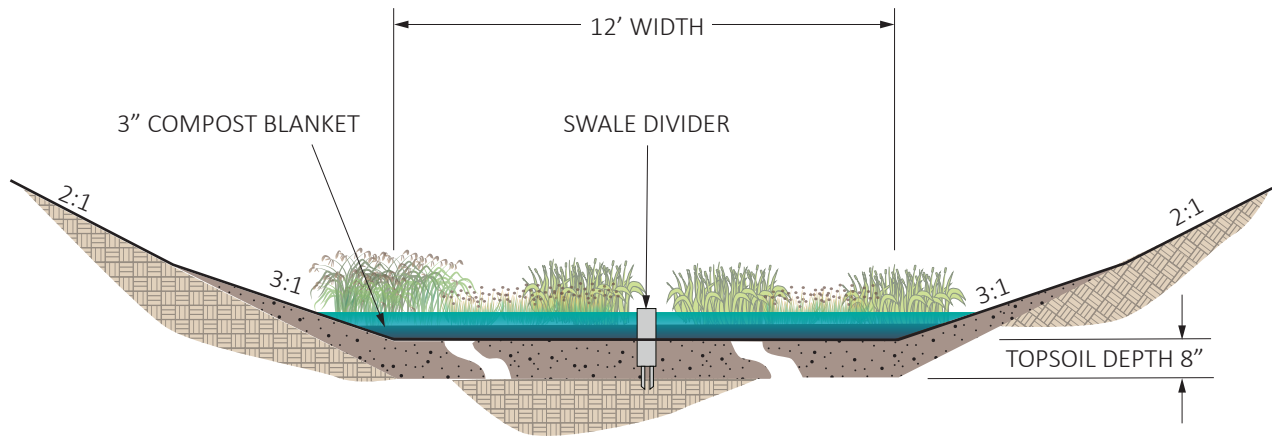
Item No.	Spec Sect. / Std. Item No.	Spec Division	Item Description	Qty	Unit	Unit Cost	Total Cost
		Part 100	General Conditions				
		Part 200	Temporary Features and Appurtenances				
1	0001		Mobilization	1	L.S.	10%	\$ 19,370.00
2	6490		Erosion/Water Pollution Control	1	L.S.	\$ 15,000.00	\$ 15,000.00
3			Temporary Work Zone Traffic Control, Complete	1	L.S.	\$ 15,000.00	\$ 15,000.00
4			Construction Survey	1	L.S.	\$ 15,000.00	\$ 15,000.00
		Part 300	Roadwork				
5	0050		Removal of Structures and Obstructions	1	L.S.	5%	\$ 9,230.00
6	0025		Clearing and Grubbing	1.72	Acre	\$ 4,500.00	\$ 6,720.00
7	1030		Ditch Excavation Including Haul	819	C.Y.	\$ 30.00	\$ 24,570.00
		Part 400	Drainage and Sewers				
8	7014		Gravel Backfill for Drain	6	C.Y.	\$ 65.00	\$ 370.00
9	3541		Schedule A Storm Sewer Pipe 12 IN. DIA.	10	L.F.	\$ 75.00	\$ 750.00
10	4005		Structure Excavation Class B Incl. Haul	9	C.Y.	\$ 50.00	\$ 450.00
11			Energy Dissipator Tee	1	Each	\$ 4,000.00	\$ 4,000.00
12	1046		Concrete Ditch Inlet	1	Each	\$ 3,000.00	\$ 3,000.00
		Part 1000	Right of Way Development and Control				
13	6453		Compost Blanket	5,200	S.Y.	\$ 10.00	\$ 52,000.00
14			Stormwater Plantings and Plant Establishment	1.72	Acre	\$ 30,000.00	\$ 51,660.00
15	6407		Topsoil Type A	0.91	Acre	\$ 45,000.00	\$ 40,910.00
			Construction Subtotal				\$ 258,100
			Construction Contingency	40%			\$ 103,300
			Construction Subtotal (with +40% Contingency)				\$ 361,400
			Design Engineering	30%			\$ 108,500
			Permitting and Required Documentation	1	L.S.		\$ 75,000
			Construction Management	20%			\$ 72,300
			Total (with Contingency and Design)				\$ 618,000

WSDOT - THURSTON COUNTY STORMWATER RETROFITS

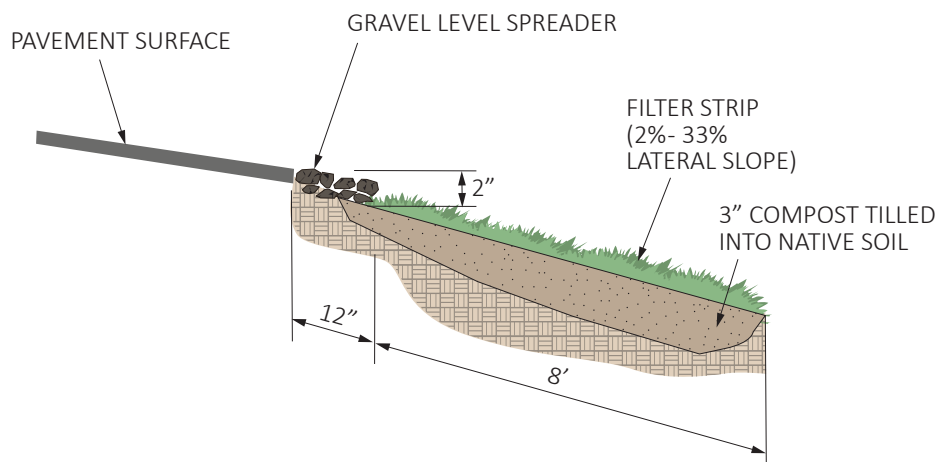
Site Name - WSDOT US 101

Schneider Creek Biofiltration Swale and Vegetated Filter Strip

Cross Sections Used for Cost Estimate



BIOFILTRATION SWALE SECTION
NTS



FILTER STRIP SECTION
NTS

NOTE: TYPICAL SECTION(S) ARE PROVIDED.
ENGINEERING DESIGN WILL BE IN ACCORDANCE
WITH THE WASHINGTON STATE DEPARTMENT OF
TRANSPORTATION HIGHWAY RUNOFF MANUAL.



WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT SR 8

Kennedy Creek Biofiltration Swales and Vegetated Filter Strips



SUMMARY

Property Type: WSDOT Median, Shoulders, and County Roadway Receiving Water: Tributary to Kennedy Creek Facility Type(s): Biofiltration Swale and Vegetated Filter Strip	Total Estimated Cost: \$638,000		
	Design and Permitting Cost: \$187,600	Construction Cost: \$375,200	Construction Management Costs: \$75,100

PROJECT DESCRIPTION

Stormwater retrofits will manage and treat highway runoff from SR8 between mileposts 13.4 to 13.7, as well as runoff from Summit Lake Road and an adjacent park-and-ride:

- The median between northbound and southbound lanes will be retrofitted with 270 LF of compost-amended biofiltration swale (CI-CABS).
- The shoulders of both the northbound and southbound lanes will be retrofitted with vegetated filter strip (4,200 LF total).
- Vegetated filter strips will manage runoff from a portion of Summit Lake Road (350 LF) and the adjacent park-and-ride (150 LF).
- An earthen berm will be constructed to direct runoff away from the creek to a biofiltration swale in the median and vegetated filter strips along the roadway shoulders.

Combined, these retrofits will provide treatment of approximately 2.4 acres of impervious area. The treated stormwater will be conveyed to a culvert that discharges to Kennedy Creek. There is opportunity for educational signage at the park-and-ride regarding stormwater management and Kennedy Creek.

DRAINAGE AREA (~2 Acres)

Pervious Areas	0 Ac
Impervious Areas	2.4 Ac
Percent WSDOT Contributing Impervious Area	96 %
Percent Non-WSDOT Contributing Impervious Area	4 %
WSDOT Contributing Area	2.3 Ac

DESIGN CONSIDERATIONS

Facility Size: 270 LF of CI-CABS and 4,700 LF of Vegetated Filter Strip
Infiltration Potential: Low
WSDOT ROW: Yes
Site Constraints/Challenges: Construction access to median is limited
Potential Utility Conflicts: No known utility conflicts
Potential Permit and Documentation Requirements: JARPA (Corps Nationwide Permit No. 43, Ecology Individual 401), SEPA, WSDOT (General Permit, Roadside Vegetation Permit), and Local Permits (e.g. Critical Areas, Clearing and Grading)

BENEFITS

Protect high value sensitive area by treating highway runoff from a high traffic roadway (18,000 AADT). There is currently no known stormwater treatment or flow control at this location. There appears to be a wetland downslope of the park-and-ride, which would be protected with a vegetated filter strip. Monitoring at the project location indicated water quality standard failures for fecal coliform, and a TMDL "Water Quality Implementation Plan" for tributaries to Totten, Eld, and Little Skookum Inlets identifies fecal coliform bacteria concentrations in late summer as a problem (Thurston County Water Resources Monitoring Report).

AVERAGE POLLUTANT LOAD REDUCTION

Pollutant	Reduction	Units	Source
Fecal Coliform:	NA	MPN in billions/yr	NA
Total Suspended Solids:	1,766	kg/yr	Ecology TAPE Testing
Dissolved Zinc:	2.4	kg/yr	Ecology TAPE Testing
Dissolved Copper:	0.2	kg/yr	Ecology TAPE Testing

Pollutant load reductions were calculated using event mean concentrations by land use (as documented in Table 2 of Ecology's Municipal Stormwater Permits Fact Sheet, August 2018) and by using mean percentage removal data as documented in the source listed, and average annual runoff volume treated.

PROJECT PRIORITIZATION CRITERIA

Flooding and Flow Control Benefit Score:	Med
Community Benefit Score:	Med
Habitat Score:	Med
Water Quality Score:	Med
Implementation Score:	High
Cost and Maintenance Score:	Med

PROJECT RENDERINGS

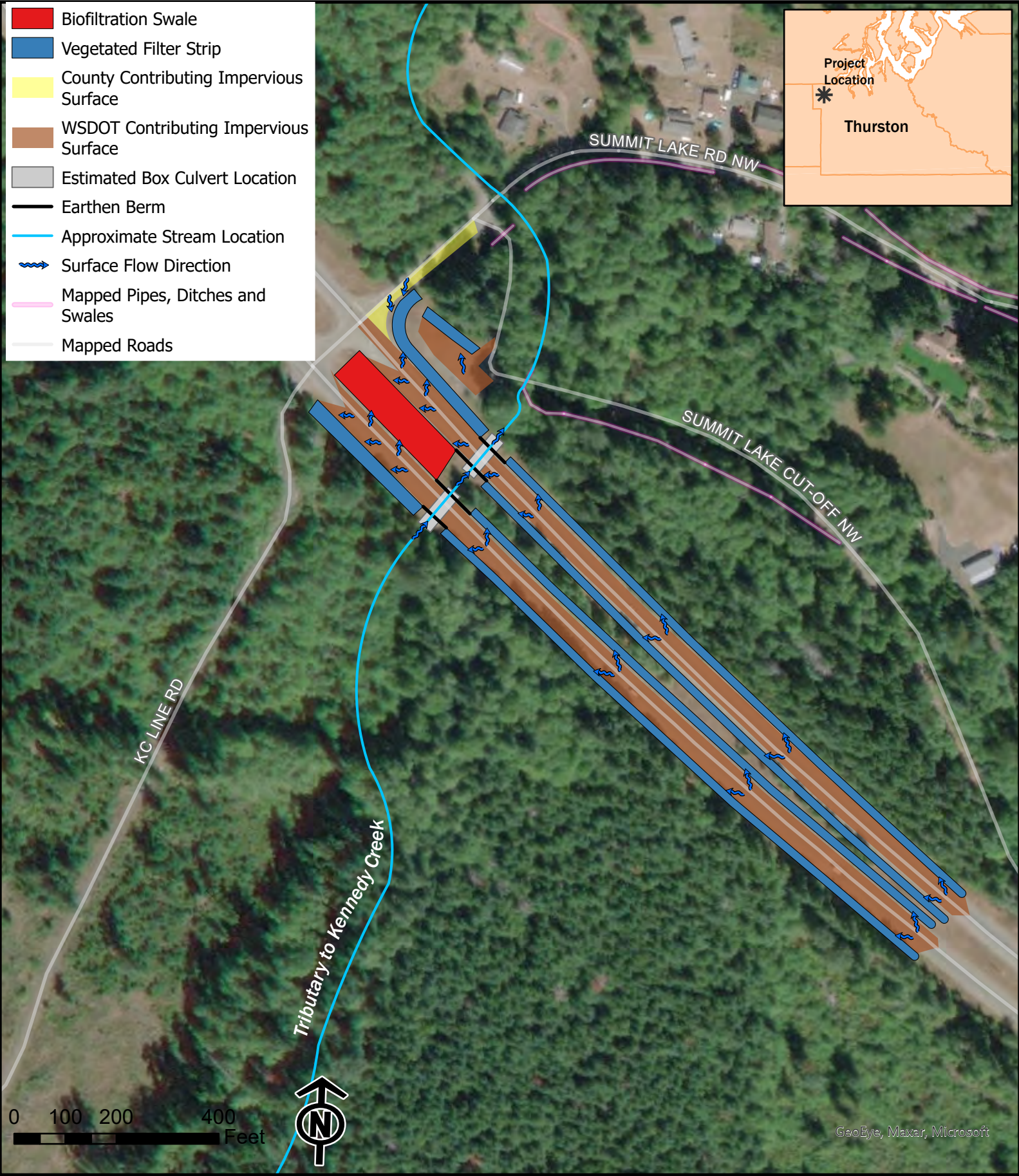


Biofiltration swale in SR 8 median.



Vegetated Filter strip (rendered in background) adjacent to existing gravel park-and-ride lot.

- Biofiltration Swale
- Vegetated Filter Strip
- County Contributing Impervious Surface
- WSDOT Contributing Impervious Surface
- Estimated Box Culvert Location
- Earthen Berm
- Approximate Stream Location
- Surface Flow Direction
- Mapped Pipes, Ditches and Swales
- Mapped Roads



WSDOT SR 8 Kennedy Creek Biofiltration Swale and Vegetated Filter Strips



Engineering Construction Cost Estimate for Concept Design of Site SR8 Kennedy Creek Biofiltration Swales and Vegetated Filter Strips

Project Name: County/WSDOT Stormwater Retrofits
Project Number: 16-06459-013
Client: Thurston County



QA Review

Completed/Updated By: Adam Lee
 Last Updated On: 3/30/2021
 Approved By: Joy Michaud
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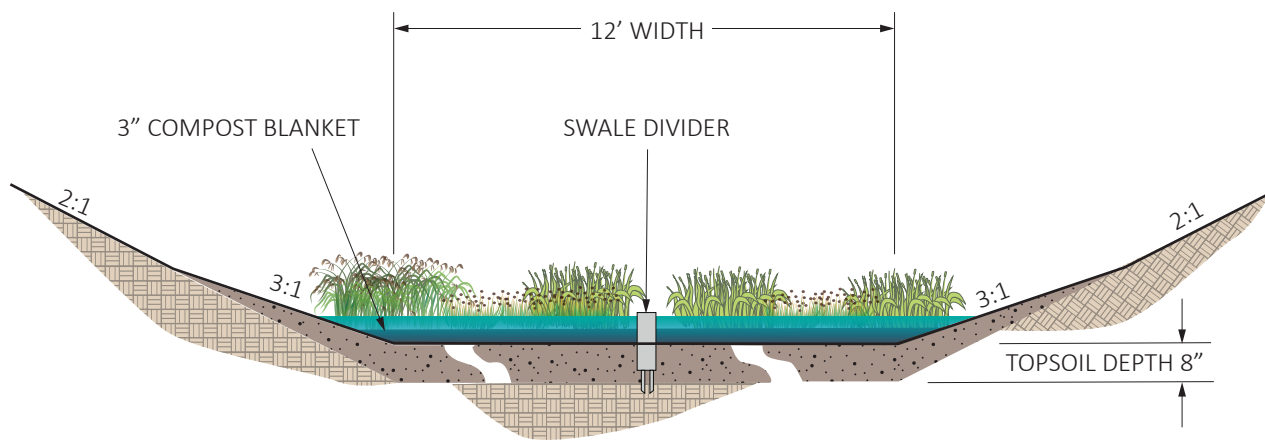
Item No.	Spec Sect. / Std. Item No.	Spec Division	Item Description	Qty	Unit	Unit Cost	Total Cost
		Part 100	General Conditions				
		Part 200	Temporary Features and Appurtenances				
1	0001		Mobilization	1	L.S.	10%	\$ 14,360.00
2	6490		Erosion/Water Pollution Control	1	L.S.	\$ 15,000.00	\$ 15,000.00
3			Temporary Work Zone Traffic Control, Complete	1	L.S.	\$ 20,000.00	\$ 20,000.00
4			Construction Survey	1	L.S.	\$ 15,000.00	\$ 15,000.00
		Part 300	Roadwork				
5	0050		Removal of Structures and Obstructions	1	L.S.	5%	\$ 9,700.00
6	0025		Clearing and Grubbing	1.54	Acre	\$ 4,500.00	\$ 6,950.00
7	1030		Ditch Excavation Including Haul	109	C.Y.	\$ 30.00	\$ 3,260.00
8	6727		Compacted Earthen Berm	400	L.F.	\$ 30.00	\$ 12,000.00
		Part 400	Drainage and Sewers				
9	7014		Gravel Backfill for Drain	7	C.Y.	\$ 65.00	\$ 440.00
		Part 1000	Right of Way Development and Control				
10	6453		Compost Blanket	5,378	S.Y.	\$ 10.00	\$ 53,780.00
11			Stormwater Plantings and Plant Establishment	1.54	Acre	\$ 30,000.00	\$ 46,290.00
12	6407		Topsoil Type A	0.25	Acre	\$ 45,000.00	\$ 11,160.00
13			Project Signage	1	L.S.	\$ 60,000.00	\$ 60,000.00
			Construction Subtotal				\$ 268,000
			Construction Contingency	40%			\$ 107,200
			Construction Subtotal (with +40% Contingency)				\$ 375,200
			Design Engineering	30%			\$ 112,600
			Permitting and Required Documentation	1	L.S.		\$ 75,000
			Construction Management	20%			\$ 75,100
			Total (with Contingency and Design)				\$ 638,000

WSDOT - THURSTON COUNTY STORMWATER RETROFITS

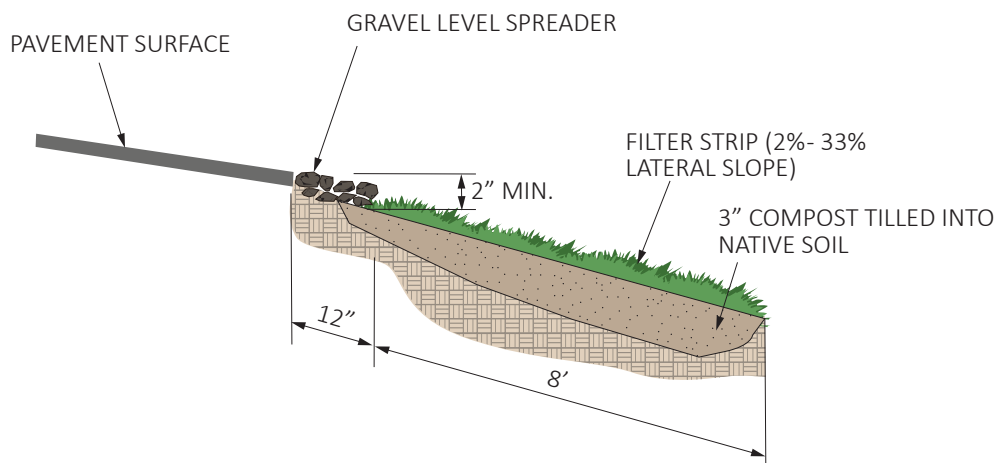
Site Name - WSDOT SR 8

Kennedy Creek Biofiltration Swales and Vegetated Filter Strips

Cross Sections Used for Cost Estimate



BIOFILTRATION SWALE SECTION
NTS



FILTER STRIP SECTION
NTS

NOTE: TYPICAL SECTION(S) ARE PROVIDED.
ENGINEERING DESIGN WILL BE IN ACCORDANCE
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WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - US 101

Madrona Beach Vicinity Retrofits



SUMMARY

Property Type: Primarily County Roadway, Coordination with WSDOT Required Receiving Water: Mud Bay Facility Type(s): Biofiltration Swale, Rolled Curb, and Energy Dissipator	Total Estimated Cost: \$213,000		
	Design and Permitting Cost: \$66,600	Construction Cost: \$121,700	Construction Management Costs: \$24,400

PROJECT DESCRIPTION

Stormwater retrofits will manage and treat highway runoff from US-101 at two sites located between mileposts 360.6 and 360.7 as well as runoff from Madrona Beach Road, while addressing known flooding issues:

- The existing roadway ditch will be retrofitted as a 100 LF compost-amended biofiltration swale (CI-CABS) with check dams and will be conveyed along the existing path to Mud Bay near Madrona Beach (Site 1).
- A 100 LF asphalt rolled curb and catch basin replacements will help direct runoff overtopping the ditch away from private properties (Site 1).
- A corrugated half-pipe chute located to the north of Site 1 will be replaced and an outfall diffuser tee will be added to stabilize the outfall and prevent runoff from discharging onto the roadway (Site 2).

These retrofits in combination will provide treatment of approximately 0.47 acres of high-traffic roadway and 0.12 acres of county road. The stormwater will continue to be conveyed to Mud Bay.

DRAINAGE AREA (~1/2 Acre)

Pervious Areas	0.14 Ac
Impervious Areas	0.58 Ac
Percent WSDOT Contributing Impervious Area	79 %
Percent Non-WSDOT Contributing Impervious Area	21 %
WSDOT Contributing Area	0.59 Ac

DESIGN CONSIDERATIONS

Facility Size: 100 LF of CI-CABS and 100 LF of Rolled Curb
Infiltration Potential: Low
WSDOT ROW: No
Site Constraints/Challenges: Swale width constrained by adjacent steep hillside
Potential Utility Conflicts: No known utility conflicts
Potential Permit Requirements: Local Permits expected only (e.g. Critical Areas (due to geologic hazard), Clearing and Grading)

BENEFITS

Treat WSDOT highway and Madrona Beach road runoff while addressing known local flooding issues. Corroded half-pipe replacement will stabilize the outfall and eliminate the roadway hazard. Traffic on US 101 at this location has an AADT of 34,000.

Funding from WSDOT for regular swale maintenance may be possible.

AVERAGE POLLUTANT LOAD REDUCTION

Pollutant	Reduction	Units	Source
Fecal Coliform:	NA	MPN in billions/yr	NA
Total Suspended Solids:	275	kg/yr	Ecology TAPE Testing
Dissolved Zinc:	0.4	kg/yr	Ecology TAPE Testing
Dissolved Copper:	0.03	kg/yr	Ecology TAPE Testing

Pollutant load reductions were calculated using event mean concentrations by land use (as documented in Table 2 of Ecology's Municipal Stormwater Permits Fact Sheet, August 2018) and by using mean percentage removal data as documented in the source listed, and average annual runoff volume treated.

PROJECT PRIORITIZATION CRITERIA

Flooding and Flow Control Benefit Score:	High
Community Benefit Score:	High
Habitat Score:	Med
Water Quality Score:	Low
Implementation Score:	Med
Cost and Maintenance Score:	High

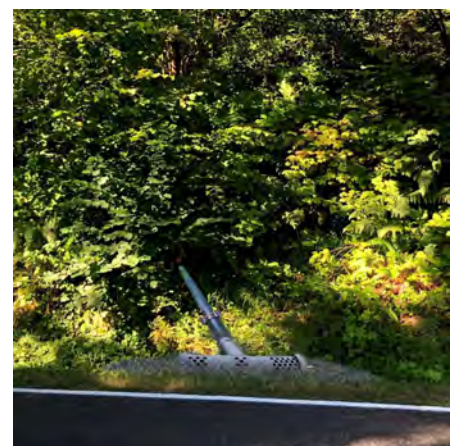
PROJECT RENDERINGS















Site 1. Existing ditch to be retrofitted for water quality.



Site 1. New rolled curb and catch basin construction at 2330 Madrona Beach Rd.

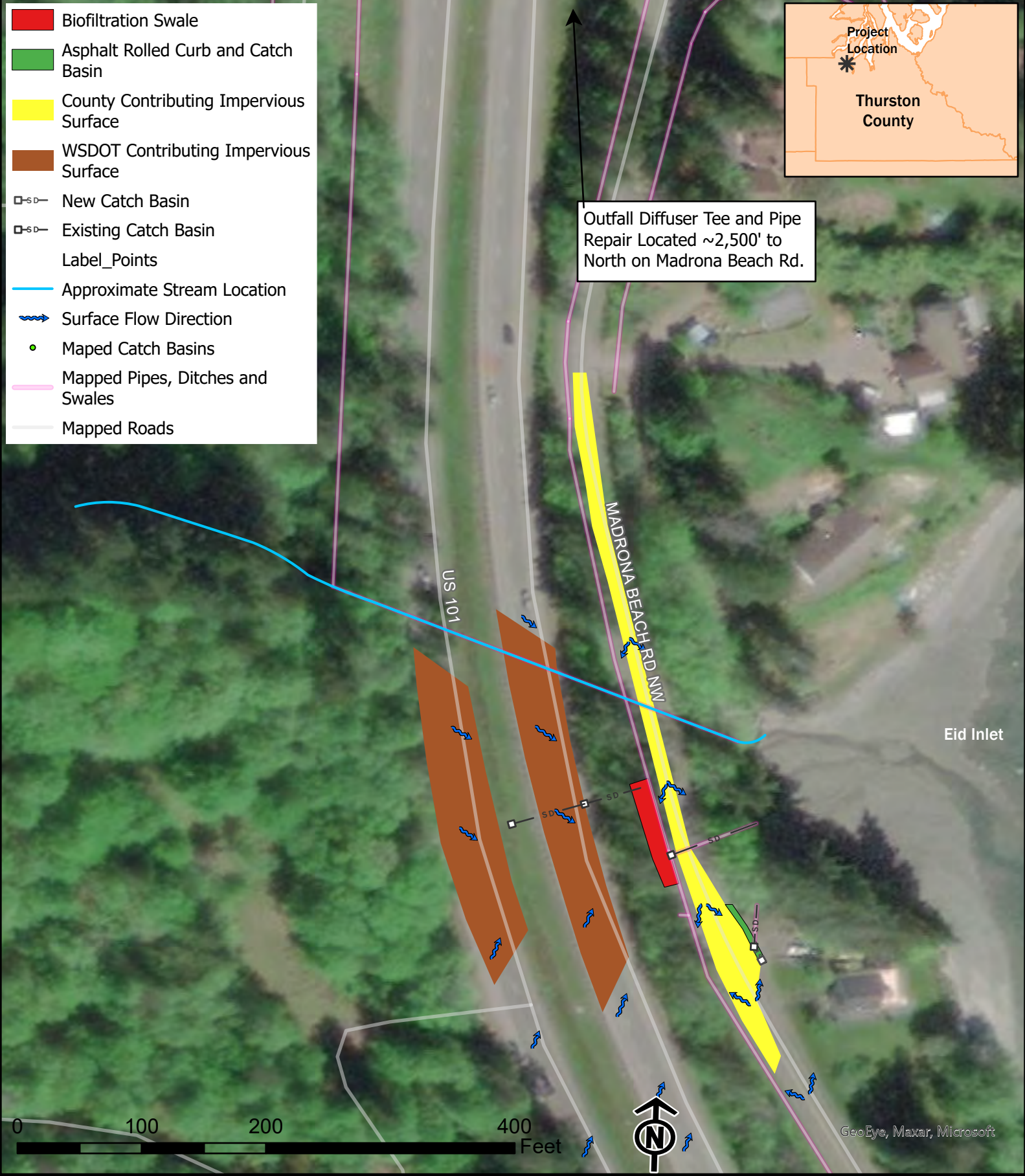


Site 2. Pipe replacement and outfall diffuser tee prevents runoff from shooting across Madrona Beach Rd.

-  Biofiltration Swale
-  Asphalt Rolled Curb and Catch Basin
-  County Contributing Impervious Surface
-  WSDOT Contributing Impervious Surface
-  New Catch Basin
-  Existing Catch Basin
-  Label_Points
-  Approximate Stream Location
-  Surface Flow Direction
-  Mapped Catch Basins
-  Mapped Pipes, Ditches and Swales
-  Mapped Roads



Outfall Diffuser Tee and Pipe Repair Located ~2,500' to North on Madrona Beach Rd.



US 101 Madrona Beach Vicinity Retrofits



Engineering Construction Cost Estimate for Concept Design of Site US101 Madrona Beach Vicinity Retrofits

Project Name: County/WSDOT Stormwater Retrofits
 Project Number: 16-06459-013
 Client: Thurston County



QA Review

Completed/Updated By: Adam Lee
 Last Updated On: 3/30/2021
 Approved By: Joy Michaud
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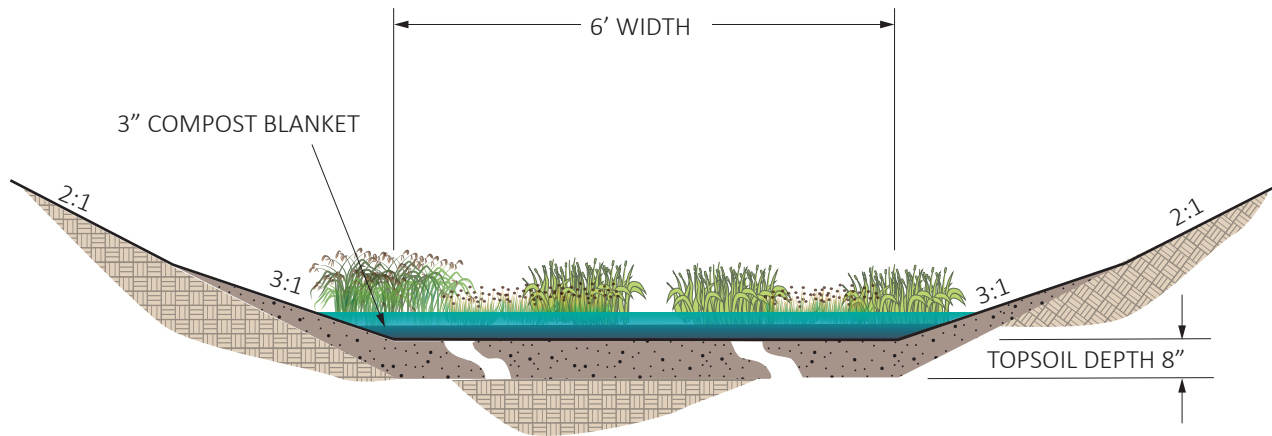
Item No.	Spec Sect. / Std. Item No.	Spec Division	Item Description	Qty	Unit	Unit Cost	Total Cost
		Part 100	General Conditions				
		Part 200	Temporary Features and Appurtenances				
1	0001		Mobilization	1	L.S.	10%	\$ 4,900.00
2	6490		Erosion/Water Pollution Control	1	L.S.	\$ 8,000.00	\$ 8,000.00
3			Temporary Work Zone Traffic Control, Complete	1	L.S.	\$ 15,000.00	\$ 15,000.00
4			Construction Survey	1	L.S.	\$ 10,000.00	\$ 10,000.00
		Part 300	Roadwork				
5	0050		Removal of Structures and Obstructions	1	L.S.	5%	\$ 2,340.00
6	0025		Clearing and Grubbing	0.11	Acre	\$ 8,000.00	\$ 920.00
7	1030		Ditch Excavation Including Haul	67	C.Y.	\$ 30.00	\$ 2,000.00
		Part 400	Drainage and Sewers				
8	3541		Schedule A Storm Sewer Pipe 8 IN. DIA.	10	L.F.	\$ 120.00	\$ 1,200.00
9	3017		HDPE Pipe 18 IN. DIA.	120	L.F.	\$ 200.00	\$ 24,000.00
10	4005		Structure Excavation Class B Incl. Haul	27	C.Y.	\$ 45.00	\$ 1,200.00
11	3091		Catch Basin Type 1	2	Each	\$ 2,000.00	\$ 4,000.00
			Diffuser Tee	1	Each	\$ 5,000.00	\$ 5,000.00
		Part 500	Surface Treatments and Pavements				
12			Asphalt Mountable Curb	100	L.F.	\$ 30.00	\$ 3,000.00
13	5115		Crushed Surfacing Top Course	2	C.Y.	\$ 120.00	\$ 240.00
14	5875		Commercial HMA	2	Ton	\$ 250.00	\$ 430.00
		Part 1000	Right of Way Development and Control				
15	6453		Compost Blanket	133	S.Y.	\$ 15.00	\$ 2,000.00
16			Stormwater Plantings and Plant Establishment	0.05	Acre	\$ 30,000.00	\$ 1,380.00
17	6407		Topsoil Type A	0.03	Acre	\$ 45,000.00	\$ 1,240.00
			Construction Subtotal				\$ 86,900
			Construction Contingency	40%			\$ 34,800
			Construction Subtotal (with +40% Contingency)				\$ 121,700
			Design Engineering	30%			\$ 36,600
			Permitting and Required Documentation	1	L.S.		\$ 30,000
			Construction Management	20%			\$ 24,400
			Total (with Contingency and Design)				\$ 213,000

WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT US 101

Madrona Beach Vicinity Retrofits

Cross Sections Used for Cost Estimate



BIOFILTRATION SWALE SECTION
NTS

NOTE: TYPICAL SECTION(S) ARE PROVIDED.
ENGINEERING DESIGN WILL BE IN ACCORDANCE
WITH THE WASHINGTON STATE DEPARTMENT OF
TRANSPORTATION HIGHWAY RUNOFF MANUAL.



WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT I-5

McAllister Creek Constructed Wetland and Biofiltration Swale



SUMMARY

Property Type: WSDOT Interchange, Median, and County Roadway	Total Estimated Cost: \$1,813,000		
Receiving Water: McAllister (Medicine) Creek	Design & Permitting Cost: \$434,500	Construction Cost: \$1,148,000	Construction Management Costs: \$229,700
Facility Type(s): Constructed Wetland and Biofiltration Swale			

PROJECT DESCRIPTION

Stormwater retrofits will manage and treat highway runoff from I-5 between mileposts 112.6 and 114.0 as well as from a nearby ditch prior to discharge to McAllister (Medicine) Creek:

- The median of I-5 will be retrofitted as a 1,000 LF compost amended biofiltration swale (CI-CABS). This will require boring under the highway to minimize traffic for pipe installation.
- The shoulders of both northbound and southbound lanes will each be retrofit with 27,000 SF constructed wetlands located in the gore area between the highway and offramps to treat runoff from the outer lanes.
- A ditch adjacent to Nisqually Bar & Grill will be retrofitted as a 250 LF CI-CABS to improve treatment function. The facility will treat runoff from the highway off ramp, Brown Farm Road Northeast and Martin Way East.

These retrofits in combination will provide treatment of approximately 16.3 acres of high-traffic highway and 1.6 acres of county road. The treated stormwater will be conveyed to McAllister Creek.

DRAINAGE AREA (~57 Acres)

Pervious Areas	39.2 Ac
Impervious Areas	17.9 Ac
Percent WSDOT Contributing Impervious Area	91 %
Percent Non-WSDOT Contributing Impervious Area	9 %
WSDOT Contributing Area	55.49 Ac

DESIGN CONSIDERATIONS

Facility Size: 1,250 LF of CI-CABS and 54,000 SF Constructed Wetland
Infiltration Potential: Low, testing not conducted due to shallow groundwater
WSDOT ROW: Yes
Site Constraints/Challenges: Shallow groundwater and unknown fill composition
Potential Utility Conflicts: No known utility conflicts
Potential Permit Requirements: JARPA (Corps Nationwide Permit No. 43, Ecology individual 401, WDFW HPA), SEPA, WSDOT (General Permit, Roadside Vegetation Permit, Access Connection), and Local Permits (e.g. Critical Areas, Shoreline, and Clearing and Grading).

BENEFITS

Improve water quality of high value sensitive area near the Nisqually estuary. Runoff currently drains directly to McAllister Creek untreated. Opportunity to treat large contributing area from high traffic highway (AADT 108,000). Monitoring at the project location indicated regular water quality standard failures for fecal coliform bacteria and occasional exceedances of temperature, pH, and dissolved oxygen through routine monitoring (Thurston County Water Resources Monitoring Report).

AVERAGE POLLUTANT LOAD REDUCTION

Pollutant	Reduction Units	Source
Fecal Coliform:	1.9 MPN in billions/yr	Intl. BMP Database
Total Suspended Solids:	1,079 kg/yr	Intl. BMP Database
Dissolved Zinc:	1.1 kg/yr	Intl. BMP Database
Dissolved Copper:	NA kg/yr	NA

Pollutant load reductions were calculated using event mean concentrations by land use (as documented in Table 2 of Ecology's Municipal Stormwater Permits Fact Sheet, August 2018) and by using mean percentage removal data as documented in the source listed, and average annual runoff volume treated.

PROJECT PRIORITIZATION CRITERIA

Flooding and Flow Control Benefit Score:	Low
Community Benefit Score:	Med
Habitat Score:	Med
Water Quality Score:	High
Implementation Score:	Med
Cost and Maintenance Score:	Low

PROJECT RENDERINGS

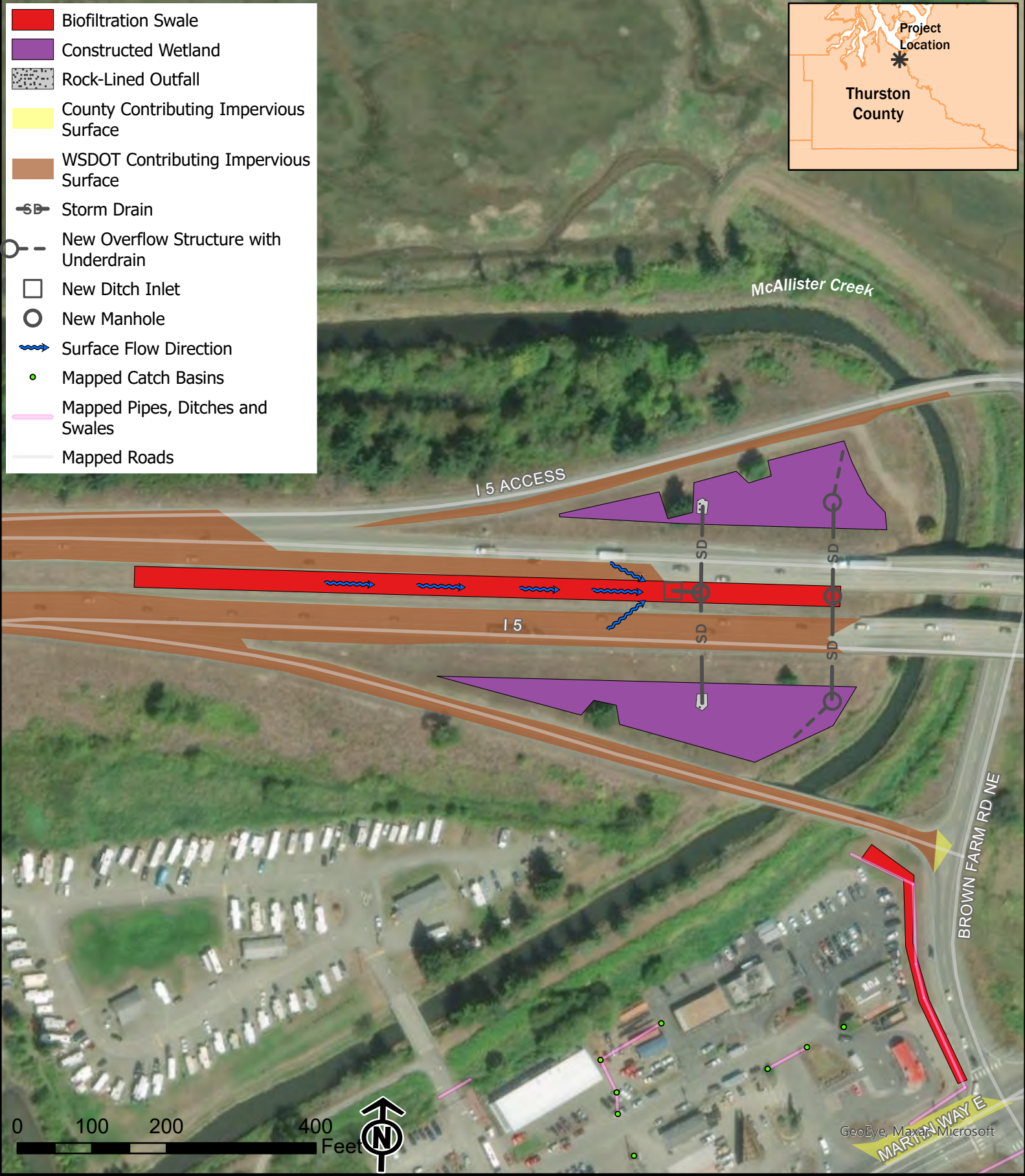


Constructed wetland retrofit between offramp and freeway. Overflow drain is piped back to existing storm main in median to eliminate a new outfall.



Biofiltration swale retrofit in existing roadway ditch (County Right-of-Way).

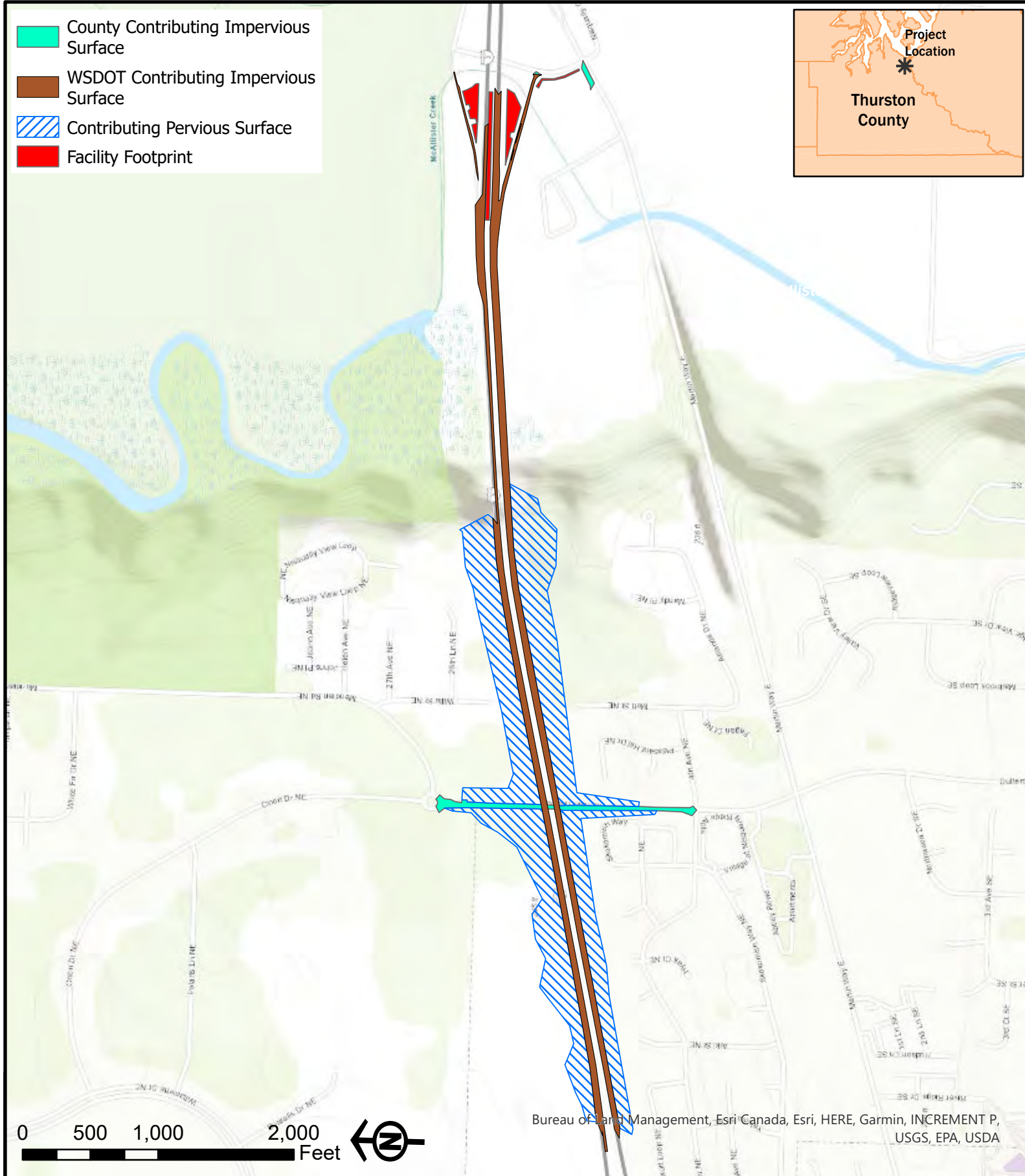
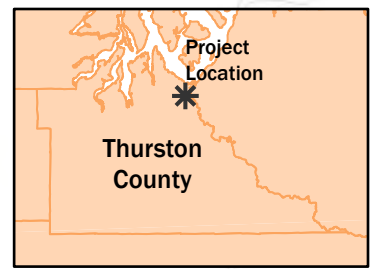
- Biofiltration Swale
- Constructed Wetland
- Rock-Lined Outfall
- County Contributing Impervious Surface
- WSDOT Contributing Impervious Surface
- Storm Drain
- New Overflow Structure with Underdrain
- New Ditch Inlet
- New Manhole
- Surface Flow Direction
- Mapped Catch Basins
- Mapped Pipes, Ditches and Swales
- Mapped Roads



McAllister Creek Constructed Wetland and Biofiltration Swale



- County Contributing Impervious Surface
- WSDOT Contributing Impervious Surface
- Contributing Pervious Surface
- Facility Footprint



Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

McAllister Creek Constructed Wetland and Biofiltration Swale Contributing Drainage Area



Engineering Construction Cost Estimate for Concept Design of Site 15 McAllister Creek Constructed Wetland and Biofiltration Swale

Project Name: County/WSDOT Stormwater Retrofits
 Project Number: 16-06459-013
 Client: Thurston County



QA Review

Completed/Updated By: Adam Lee
 Last Updated On: 3/30/2021
 Approved By: Joy Michaud
 Approved On.: 3/30/2021

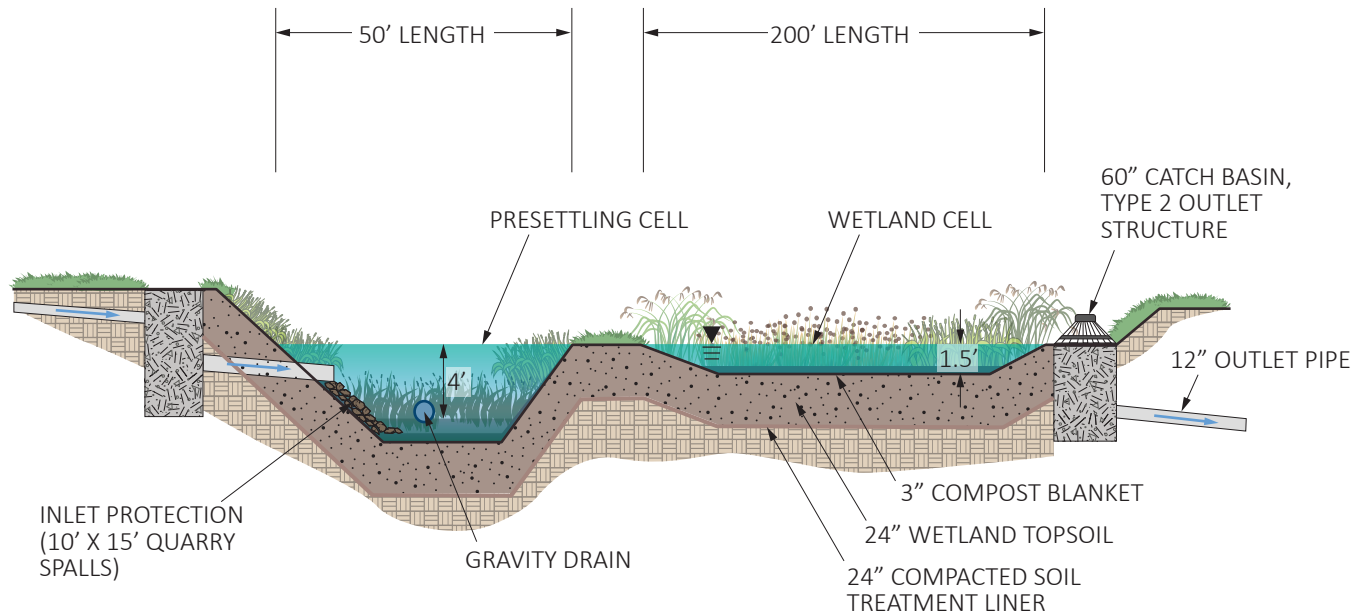
Item No.	Spec Sect. / Std. Item No.	Spec Division	Item Description	Qty	Unit	Unit Cost	Total Cost
		Part 100	General Conditions				
		Part 200	Temporary Features and Appurtenances				
1	0001		Mobilization	1	L.S.	10%	\$ 49,710.00
2	6490		Erosion/Water Pollution Control	1	L.S.	\$ 20,000.00	\$ 20,000.00
3			Temporary Work Zone Traffic Control, Complete	1	L.S.	\$ 40,000.00	\$ 40,000.00
4			Construction Survey	1	L.S.	\$ 15,000.00	\$ 15,000.00
		Part 300	Roadwork				
5	0050		Removal of Structures and Obstructions	1	L.S.	5%	\$ 33,120.00
6	0025		Clearing and Grubbing	1.49	Acre	\$ 4,500.00	\$ 6,720.00
7	1030		Ditch Excavation Including Haul	465	C.Y.	\$ 30.00	\$ 13,960.00
8	1085		Quarry Spalls	72	C.Y.	\$ 50.00	\$ 3,620.00
9	5095		Crushed Surfacing Base Course	444	C.Y.	\$ 75.00	\$ 33,340.00
10	5115		Crushed Surfacing Top Course	119	C.Y.	\$ 75.00	\$ 8,890.00
11	7530		Construction Geotextile for Separation	1,387	S.Y.	\$ 5.00	\$ 6,940.00
		Part 400	Drainage and Sewers				
12			Trenchless Construction 24-In Storm Sewer	460	L.F.	\$ 300.00	\$ 138,000.00
13	4005		Structure Excavation Class B Incl. Haul	1,481	C.Y.	\$ 45.00	\$ 66,670.00
14	7360		Manhole 48-In Dia. Type 3	2	Each	\$ 4,000.00	\$ 8,000.00
15	3109		Catch Basin Type 2 60 In. Dia.	1	Each	\$ 6,000.00	\$ 6,000.00
16	3541		Schedule A Storm Sewer Pipe 12 IN. DIA.	500	L.F.	\$ 55.00	\$ 27,500.00
		Part 1000	Right of Way Development and Control				
17	6453		Compost Blanket	6,528	S.Y.	\$ 10.00	\$ 65,280.00
18			Stormwater Plantings and Plant Establishment	1.49	Acre	\$ 40,000.00	\$ 59,690.00
19	6407		Topsoil Type A	0.43	Acre	\$ 45,000.00	\$ 19,370.00
20			Wetland Topsoil	1,481	C.Y.	\$ 60.00	\$ 88,890.00
21			Treatment Liner (Imported Topsoil)	1,481	C.Y.	\$ 60.00	\$ 88,890.00
22			Soil Testing	1	L.S.	\$ 500.00	\$ 500.00
23	0260		Hazardous Material Handling and Disposal	1	Est.	\$ 20,000.00	\$ 20,000.00
			Construction Subtotal				\$ 820,100
			Construction Contingency	40%			\$ 328,100
			Construction Subtotal (with +40% Contingency)				\$ 1,148,200
			Design Engineering	30%			\$ 344,500
			Permitting and Required Documentation	1	L.S.		\$ 90,000
			Construction Management	20%			\$ 229,700
			Total (with Contingency and Design)				\$ 1,813,000

WSDOT - THURSTON COUNTY STORMWATER RETROFITS

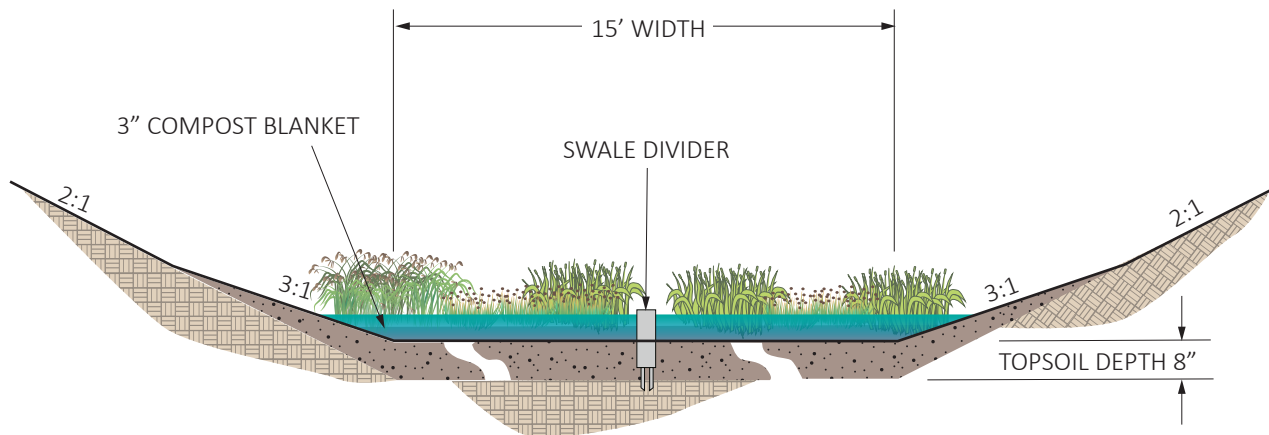
Site Name - WSDOT I-5

McAllister Creek Constructed Wetland and Biofiltration Swale

Cross Sections Used for Cost Estimate



CONSTRUCTED STORMWATER TREATMENT WETLAND
NTS



BIOFILTRATION SWALE SECTION
NTS

NOTE: TYPICAL SECTION(S) ARE PROVIDED.
ENGINEERING DESIGN WILL BE IN ACCORDANCE
WITH THE WASHINGTON STATE DEPARTMENT OF
TRANSPORTATION HIGHWAY RUNOFF MANUAL.



WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT I-5

Nisqually River Biofiltration Swale



SUMMARY

Property Type: WSDOT Median	Total Estimated Cost: \$394,000		
Receiving Water: Nisqually River Side Channel	Design and Permitting Cost: \$165,900	Construction Cost: \$189,600	Construction/Management Costs: \$38,000
Facility Type(s): Compost-Amended Biofiltration Swale			

PROJECT DESCRIPTION

Stormwater retrofits will provide treatment and flow control of highway runoff from I-5 between mileposts 114.6 and 114.9:

- 1,350 LF of the median of I-5 will be retrofitted as a compost amended biofiltration swale (CI-CABS) to treat runoff from northbound and southbound inner lanes .
- Existing catch basins in the median that collect runoff from the southbound lane will be modified with curb cuts and slope protection to distribute runoff as it enters the CI-CABS.
- Improvements will be made to provide vehicle parking for maintenance access.

This retrofit and improvements will provide treatment of approximately 2.0 acres of high traffic highway that discharges in the vicinity of the Billy Frank Jr. Nisqually National Wildlife Refuge, an ecologically high-value estuary. The treated stormwater will be conveyed to a side channel of the Nisqually River.

DRAINAGE AREA (~2 Acres)

Pervious Areas	0 Ac
Impervious Areas	2.0 Ac
Percent WSDOT Contributing Impervious Area	100 %
Percent Non-WSDOT Contributing Impervious Area	0 %
WSDOT Contributing Area	2.0 Ac

DESIGN CONSIDERATIONS

Facility Size: 1,350 LF of CI-CABS
Infiltration Potential: Low
WSDOT ROW: Yes
Site Constraints/Challenges: Limited construction access, maintenance access construction required.
Potential Utility Conflicts: No known utility conflicts
Potential Permit Requirements: JARPA (Corps Nationwide Permit No 43, Ecology individual 401 (due to wetlands), WDFW HPA (discharging to stream), SEPA, WSDOT (General Permit, Roadside Vegetation Permit, Access Connection), and Local Permits (e.g. Critical Areas, Shoreline)

BENEFITS

Improve water quality of sensitive area draining through the Nisqually National Wildlife Refuge.
High traffic highway (121,000 AADT) runoff appears to drain directly to river untreated.

AVERAGE POLLUTANT LOAD REDUCTION

Pollutant	Reduction	Units	Source
Fecal Coliform:	1.9	MPN in billions/yr	Intl. BMP Database
Total Suspended Solids:	1,079	kg/yr	Intl. BMP Database
Dissolved Zinc:	1.1	kg/yr	Intl. BMP Database
Dissolved Copper:	NA	kg/yr	NA

Pollutant load reductions were calculated using event mean concentrations by land use (as documented in Table 2 of Ecology's Municipal Stormwater Permits Fact Sheet, August 2018) and by using mean percentage removal data as documented in the source listed, and average annual runoff volume treated.









PROJECT PRIORITIZATION CRITERIA

Flooding and Flow Control Benefit Score:	Low
Community Benefit Score:	Low
Habitat Score:	Med
Water Quality Score:	High
Implementation Score:	High
Cost and Maintenance Score:	Med

PROJECT RENDERINGS



Biofiltration swale retrofit in WSDOT I-5 median, with additional curb cuts and erosion protection.

-  Biofiltration Swale
-  New Maintenance Pullout
-  WSDOT Contributing Impervious Surface
-  Curb Cuts
-  Mapped Pipes, Ditches and Swales
-  Approximate Stream Location
-  Surface Flow Direction
-  Mapped Roads



WSDOT I-5 Nisqually River Biofiltration Swale



Engineering Construction Cost Estimate for Concept Design of Site I5 Nisqually River Biofiltration Swale

Project Name: County/WSDOT Stormwater Retrofits
 Project Number: 16-06459-013
 Client: Thurston County



QA Review

Completed/Updated By: Adam Lee
 Last Updated On: 3/30/2021
 Approved By: Joy Michaud
 Approved On.: 3/30/2021

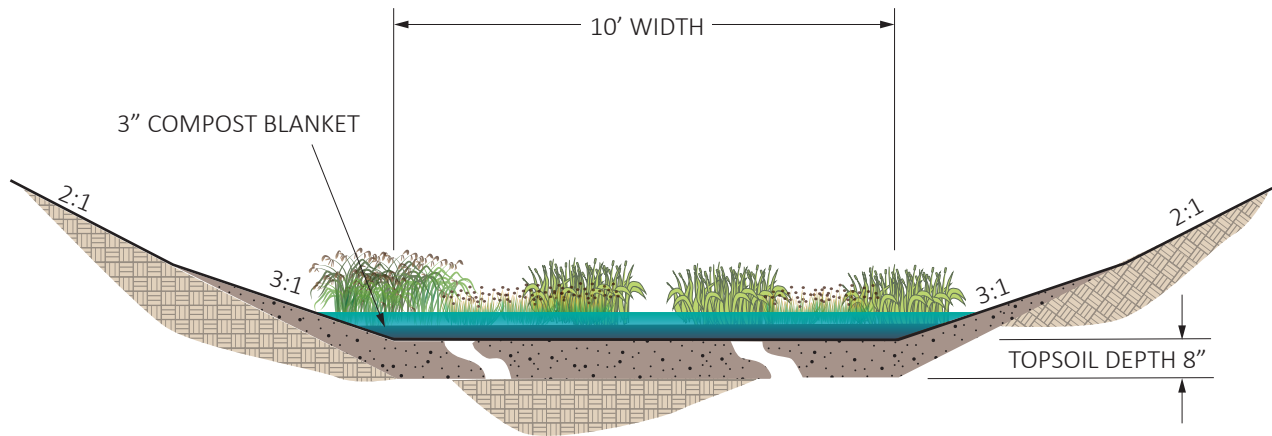
Item No.	Spec Sect. / Std. Item No.	Spec Division	Item Description	Qty	Unit	Unit Cost	Total Cost
		Part 100	General Conditions				
		Part 200	Temporary Features and Appurtenances				
1	0001		Mobilization	1	L.S.	10%	\$ 8,220.00
2	6490		Erosion/Water Pollution Control	1	L.S.	\$ 10,000.00	\$ 10,000.00
3			Temporary Work Zone Traffic Control, Complete	1	L.S.	\$ 20,000.00	\$ 20,000.00
4			Construction Survey	1	L.S.	\$ 15,000.00	\$ 15,000.00
		Part 300	Roadwork				
5	0050		Removal of Structures and Obstructions	1	L.S.	2%	\$ 1,620.00
6	0025		Clearing and Grubbing	0.65	Acre	\$ 4,500.00	\$ 2,940.00
7	0140		Removing Asphalt Conc. Curb	30	L.F.	\$ 30.00	\$ 900.00
8	1030		Ditch Excavation Including Haul	335	C.Y.	\$ 30.00	\$ 10,050.00
9	1085		Quarry Spalls	9	C.Y.	\$ 100.00	\$ 890.00
10	5625		Cement Concrete Pavement	49	C.Y.	\$ 350.00	\$ 17,290.00
		Part 400	Drainage and Sewers				
		Part 1000	Right of Way Development and Control				
11	6453		Compost Blanket	1,500	S.Y.	\$ 10.00	\$ 15,000.00
12			Stormwater Plantings and Plant Establishment	0.65	Acre	\$ 30,000.00	\$ 19,540.00
13	6407		Topsoil Type A	0.31	Acre	\$ 45,000.00	\$ 13,950.00
			Construction Subtotal				\$ 135,400
			Construction Contingency	40%			\$ 54,200
			Construction Subtotal (with +40% Contingency)				\$ 189,600
			Design Engineering	40%			\$ 75,900
			Permitting and Required Documentation	1	L.S.		\$ 90,000
			Construction Management	20%			\$ 38,000
			Total (with Contingency and Design)				\$ 394,000

WSDOT - THURSTON COUNTY STORMWATER RETROFITS

Site Name - WSDOT I-5

Nisqually River Biofiltration Swale

Cross Sections Used for Cost Estimate



BIOFILTRATION SWALE SECTION
NTS