

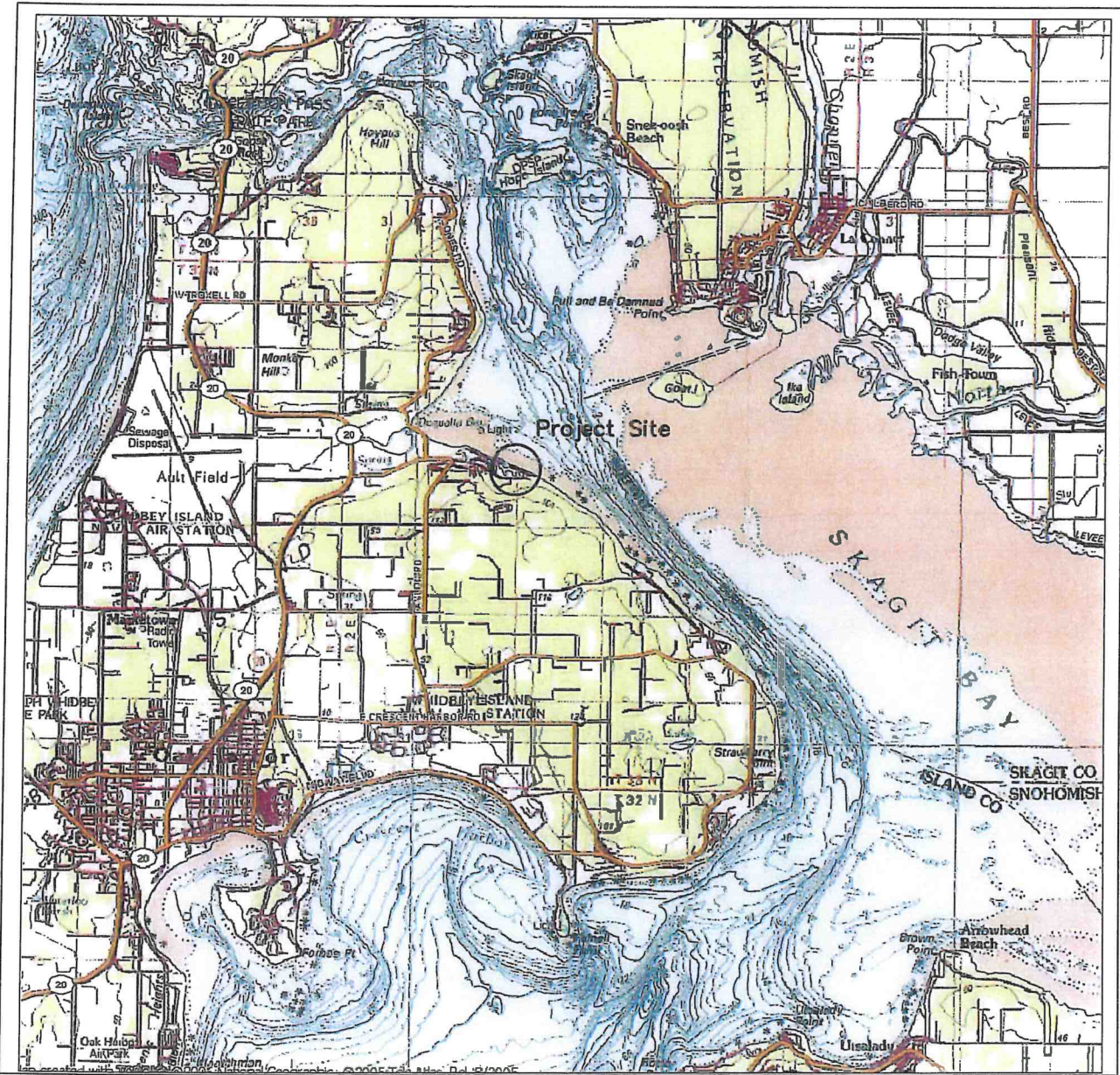
B.2

Dugualla Heights Lagoon Habitat Restoration Project

Project Owners / Applicant

Dugualla Community, Inc.
PO Box 1368, Oak Harbor, WA 98277
c/o Mr. Fred Wilmott, President
Tel. (360) 720-2944

Site Location



Site Location: The project site is located at the Dugualla Heights subdivision at Sec. 17, T 33N, R 2E, near Oak Harbor, Island County, Washington. Lat. 48.350° N, 122.574° W

Project Description

The project will restore tidal hydrology, natural marsh topography and native vegetation communities on a 25-acre nearshore conservation easement in order to rehabilitate approximately 11.1 acres of former tidal wetland and tidal open water, for the purpose of enhancing Chinook salmon rearing habitat.

Index of Drawings

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Project Partners



Design Prepared by

Whidbey Island
Conservation District
PO Box 490
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(360) 678-4708

Moffatt & Nichol, Inc.
600 University St., Ste. 610
Seattle, WA 98101
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Nehalem Marine Mfgt.
24755 Miami River Rd.
Nehalem, OR 97131
(503) 322-0219

Project Purpose

The purpose of the project is to enhance and rehabilitate natural habitat conditions on 11.1 acres of a degraded historical back-beach salt pond and marsh complex. The 11.1 acres of habitat will consist of about 6.0 acres of subtidal and about 5.1 acres of intertidal area. The project will also restore native vegetation communities on about 17.9 acres of the project site.

Project Description

- Restoration of salmon rearing habitat and marsh conditions at the site will involve the following tasks:
- Excavating approximately 275 linear feet of channel through a beach berm between Skagit Bay and the lagoon
 - Constructing various infrastructure at the channel to promote favorable hydraulic conditions for reducing sediment deposition and flood risks, including armoring of channel walls and a muted tidal regulated (MTR) tidegate installed in a concrete vault.
 - "Daylighting" about 150 feet of a small seasonal creek that currently runs through a 12" culvert
 - Grading and removing existing dredge spoils and natural soil from about 4.8 ac. of land adjacent to the current lagoon to restore a natural marsh topography
 - Constructing large wood material (LWM) installations within the restored lagoon and marsh to improve aquatic habitat complexity.
 - Eradicating invasive pasture plants and planting native marsh and upland plant species on about 17.9 acres surrounding the lagoon.

Elevation Datum, MHHW and OHW

All elevation data in the plans are referenced to the NAVD88 datum . The conversion between NAVD88 and local mean lower low water (MLLW) elevation is approximately +1.8', that is 10.0' NAVD88 = 11.8' MLLW. Tidal range at the site is estimated as: MLLW = -1.8', Mean High Water (MHW) = 8.2', Mean Higher High Water (MHHW) = 9.0' and the highest observed tide level is 12.0'. Ordinary High Water (OHW) was determined by field indicators to be about 11.1' NAVD88 on the outer shore and about 7.5' NAVD88 in the existing lagoon. The OHW elevations will remain the same after completion of the project. Site elevations are measured relative to Island County DPW benchmark No. 1005 located in the pavement of Shorecrest Lane near the intersection of Dugualla Road, with an elevation of 26.123' NAVD88. Various project benchmarks are located at easement corners, as shown on the individual plans. Approximate site contours are plotted from Island County LiDAR imagery and lagoon bathymetry soundings.

Land Ownership

The proposed habitat restoration work will take place on a permanent conservation easement owned by the Whidbey Camano Land Trust, over land owned by the Dugualla Community, Inc. (DCI). The project plans also include constructing the final 25 lineal feet of channel on state-owned aquatic land located seaward of the DCI property. Vehicle access to the site is via WCLT's easement off Dugualla Road and Shorecrest Lane.

General Specifications

The project shall be constructed to the lines, grades and specifications shown in the drawings. Except where noted in the drawings or supplemental detailed specification sheets, all work shall follow current WSDOT "Standard Specifications for Road, Bridge and Municipal Construction."

Permits

All work shall be done in accordance with all relevant permit requirements, including WDFW's Hydraulic Project Approval, US Army Corps of Engineer's Section 404 permit, WDOE's Section 401 Water Quality Certification (if required), DNR approval, and Island County permitting requirements.

Utilities

The approximate locations of documented water lines, storm drains and telephone lines are shown in the site plans. These plans do not make any representation as to the existence or non-existence of other/unidentified utility lines. The contractor is responsible for contacting the responsible utility owners by calling 811 to arrange a utility locate. Any construction work within utility easements shall conform with utility company requirements.

Estimated Work Quantities

Estimated quantities of primary work items and materials are listed in the following tables. These estimates may be used for permitting and for bid purposes but may not necessarily represent the actual as-built quantities for the completed project.

1. Grading Quantities for Permitting Purposes:

Grading Quantities for Permit Purposes		
Item	Quantity	
	(cy)	(cc.)
Excavation below the MHHW line	40	0.01
Excavation below the OHW line	810	0.35
Excavation above the OHW line	13440	4.61
Fill below the MHHW line*	15	0.01
Fill below the OHW line*	60	0.03
Fill above the OHW line	14400	4.24
Excavation in Wetlands (see details below)	48	0.03
Fill in Wetlands (see details below)	0	0.00
Total Grading**	28680	9.20

*"Fill" includes all soil, gravel, rock armoring and concrete permanently placed as part of project construction work.

**The total grading quantity refers to the amount of soil excavated plus the amount of soil placed on site, as detailed in the grading plans. All soil will be disposed of on-site. Note that the listed quantities do not necessarily add up because in some cases the calculations for the various categories (e.g. MHHW versus OHW) overlap.

2. Critical Areas Impacts

Sheet No. ENV-1 provides details on the presence of critical areas and proposed impacts to critical areas and buffers.

3. General Legend

The following symbols are commonly used in the drawings. Other symbols are called out in the legends of particular drawings.

- OHW

new OHW

MHHW

= the Land Trust's conservation easement boundary

= parcel line

= the existing ordinary high water line (also "existing OHW)

= the proposed OHW line after completing the grading

= Mean higher high water line

= existing fenceline

= wetland and wetland buffer boundary



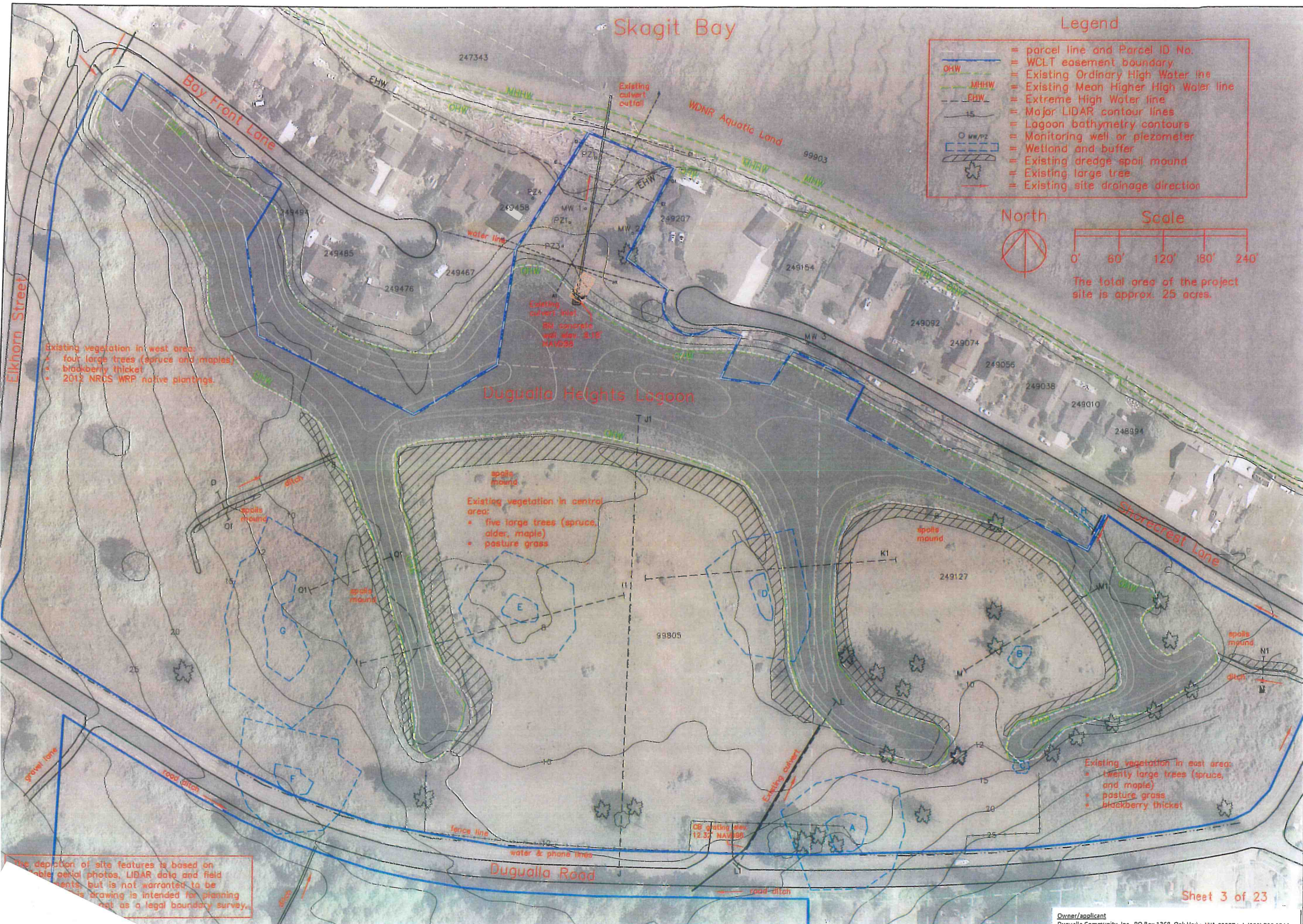
Revisions

Dugualla Heights Lagoon
Habitat Restoration Project
Project Information Sheet



Date:	2-3-14
Scale:	N.A.
Sheet #	G-1

2026.019.007b



Revisions
10-7-11 | 2-20-13

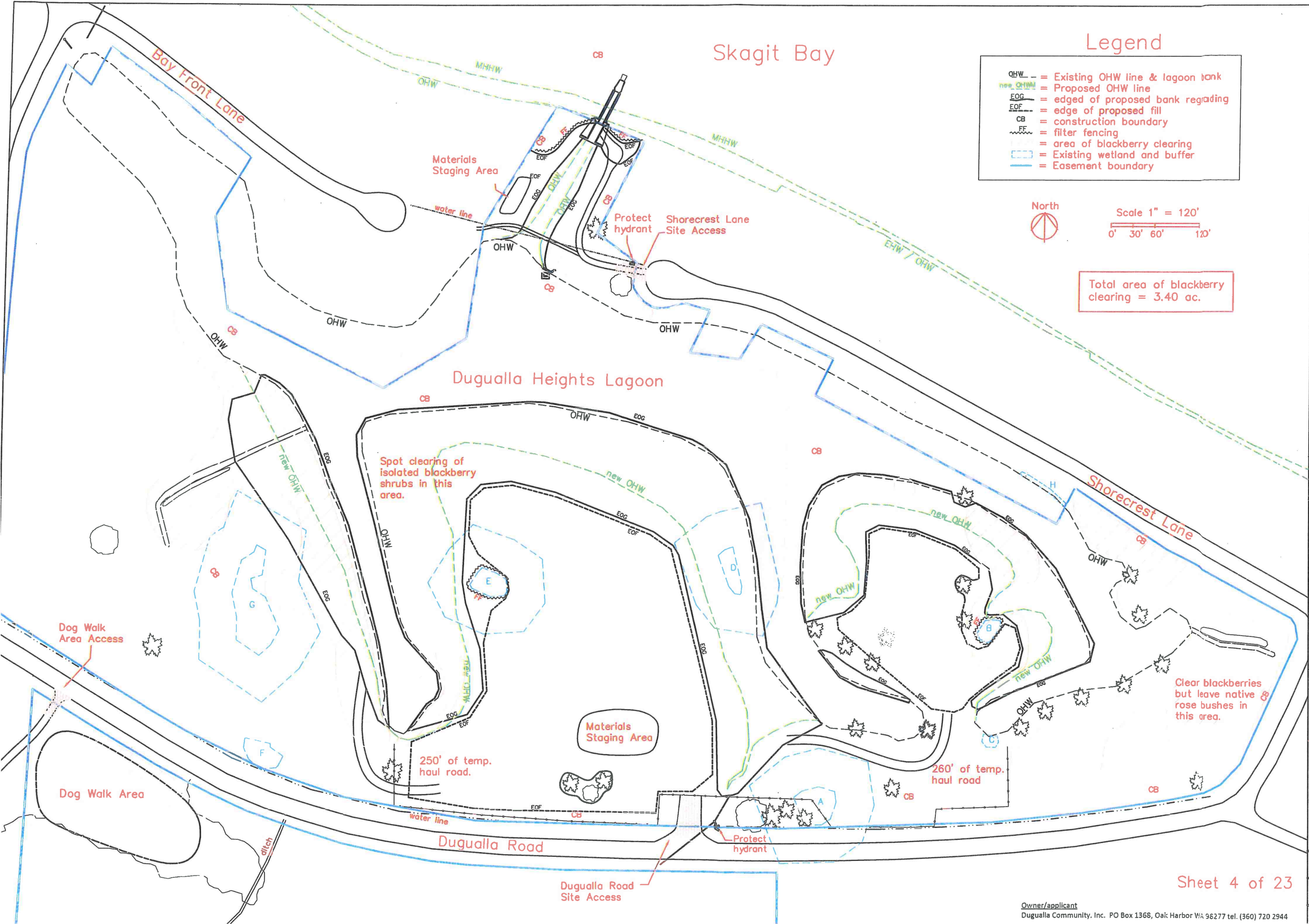
Dugualla Heights Lagoon Restoration Project Existing Site Plan

Prepared for:
WHIDBEY CAMANO LAND TRUST

Prepared by:
WHIDBEY ISLAND CONSERVATION DISTRICT

Date: 2-3-14
Scale: 1" = 120'
Sheet # G-2

2026.019.007c



Revisions

Dugualla Heights Lagoon Restoration Project
TESC Plan and Work Plan Schematic

Prepared for:
WHIDBEY CAMANO LAND TRUST

Prepared by:
WHIDBEY ISLAND CONSERVATION DISTRICT

Date: 2-3-14
Scale: 1" = 120'
Sheet # G-3

2026.019.007d

Construction Plan and TESC Plan

The construction work will be done in accordance with the following general plan and will utilize the specified temporary erosion and sediment control (TESC) measures. The contractor remains solely responsible for determining the specific means and methods of construction.

1. General

- 1.1. All work will be done in accordance with the WDFW HPA, US Army COE Section 404, Wash. DNR and Island County grading permits.
- 1.2. The site engineer or site manager will flag all lines and grades prior to construction.
- 1.3. The contractor will be responsible for arranging for a utility locate and for following the requirements of the utility owners related to construction impacts on utility lines. Any depiction of the locations of utility lines in the plans are be considered to be approximate and must be verified by the contractor.
- 1.4. The contractor shall arrange for temporary power connection, sanitary facilities and all other facilities needed for construction.

2. Cultural Resources Protection

- 2.1. A cultural resources survey identified a limited potential for archaeological resources at the project site, due the extensive ground disturbance during the excavation of the lagoon in the 1960s. Nevertheless, the site manager will monitor the construction work to check for the presence of any subsurface cultural features, and will direct the contractor to take measures to protect resources that may be identified, if any. Specific monitoring and contingency provisions will be specified in a separate cultural resources protection plan.

3. Construction Equipment and Access

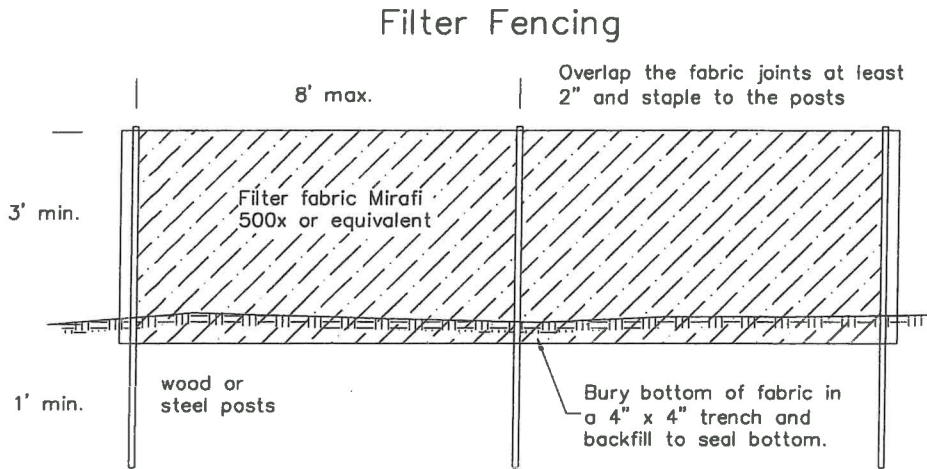
- 3.1. All vehicle traffic and construction activities will be restricted to the construction area boundaries outlined in the work plan site plan (Sheet G-3).
- 3.2. Dump trucks will be used to transport all construction materials to the site and to move excavated soil to the designated disposal areas within the site boundaries. Truck access will be from Dugualla Road and Shorecrest Lane to the two site access points shown in the site plan. The access points will be ballasted with quarry spall to protect the pavement and reduce tracking of dirt onto the roads, per the detail on this sheet. The two water hydrants located near the access points will be protected by placing concrete "ecology" blocks around them, or by an equivalent method.
- 3.3. Temporary gravel haul roads will be constructed at the locations shown in the site plan to facilitate truck access within the project site, per the detail view on this sheet. All stockpiling of construction materials will be limited to the two locations shown in the site plan.
- 3.4. All of the project site lying within the boundary of the Land Trust's conservation easement will be closed to public access during construction activities. The portion of the beach lying outside of the conservation easement boundary will be temporarily closed to public access while active construction work is occurring.
- 3.5. A large, tracked excavator will be used for excavating all soils in the channel area and marsh regrading area and for demolishing the existing culverts and tide box. A tracked bulldozer will be used for shaping of the re-graded marsh slopes and soil disposal areas. All construction equipment will operate on dry ground; the drive mechanisms shall not cross beyond the water line in either the lagoon or the beach.

4. Vegetation Clearing and Protection of Existing Trees

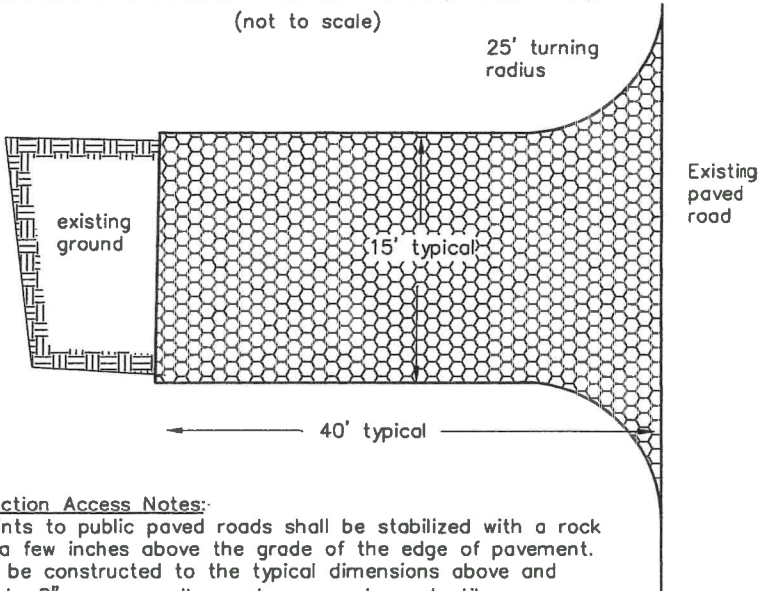
- 4.1. All blackberry shrubs will be cleared from the pasture area prior to starting the marsh regrading work. Areas of clearing are shown on the site plan. At the east end of the pasture, where blackberries are mixed with native rose thickets, the Land Trust and the contractor will determine the extent of clearing so as to keep as many of the native rose shrubs intact as practicable. All cleared vegetation will be disposed of at an offsite "clean green" disposal facility.
- 4.2. With a few exceptions, the mature trees in the pasture area, both live trees and dead snags, will be preserved and protected from construction impacts. The trees, which are shown in the site plan, will be flagged for protection by the Land Trust prior to starting the clearing work. No grading work will be done within the drip edge of the canopy of any protected tree.
- 4.3. The drift logs will be temporarily removed from the upper beach and stockpiled as needed to allow for excavation of the new channel. After completion of the grading work in the channel area, the drift logs will be replaced at roughly the same beach elevation range as originally found.

5. Dewatering and Water Quality Protection

- 5.1. All construction work on the beach will occur when the tide level is seaward of the edge of grading. Likewise, all grading work along the lagoon bank shall be done when the water level is below the edge of grading.
- 5.2. Standard filter fencing will be placed around the perimeters of Wetland "B" and "E" to protect them from sediment runoff, per the detail view. The site plan shows the location of the filter fencing. All other on-site wetlands are located outside of and uphill of the construction boundaries. Because the re-graded lagoon bank and the lagoon outlet channel are intended to be exposed to the daily tide fluctuation, no sediment control measures are planned for these areas.
- 5.3. The contractor will prepare a plan for dewatering the channel area to allow for construction of the channel, tidegate vault, and headwalls. The plan will be approved by the site engineer prior to starting construction. The basic elements of a typical plan are shown in the detail on Sheet G-5. The contractor's plan shall provide a equivalent or better method for meeting the dewatering requirements.
- 5.4 No fueling, cleaning or maintenance of vehicles will be done at the construction site. Spill prevention and containment BMPs will be specified in a separate SPCP plan.



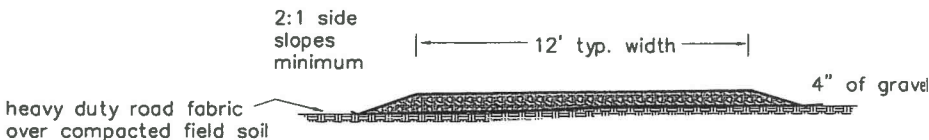
Stabilized Construction Road Access
(not to scale)



Stabilized Construction Access Notes:

- 1. All access points to public paved roads shall be stabilized with a rock pad elevated a few inches above the grade of the edge of pavement.
- 2. The pad shall be constructed to the typical dimensions above and consist of 4" to 8" quarry spall over heavy grade geotextile over compacted field soil.
- 3. The quarry spall shall be replaced when it becomes full of soil, to prevent loose soil or mud from being tracked onto the paved road.

Temporary Gravel Haul Road
(Cross section view. Not to scale)



Temporary Gravel Haul Road Notes:

- 1. Contractor to construct temporary haul roads for concentrating vehicle traffic on the site. Typical locations are shown on the site plan. Other locations must be approved by the site manager.
- 2. Construct the roads by stripping vegetation, compacting the soil, and placing at least 4" of pit run gravel over heavy duty road fabric.
- 3. After completing the construction work in the channel area, the temporary haul road shall be reduced in width to ten feet, compacted with a slight crown in the center, and left in place. All other haul roads shall be removed to bare ground and seeded with grass seed per the erosion control planting spec.



Revisions

Dugualla Heights Lagoon Restoration Project
TESC Plan and Work Plan

Prepared for:



Prepared by:



Date: 2-3-14

Scale: none

Sheet # G-4

Construction Plan and TESC Plan (continued)

Note: JARPA Attachment E describes the specific work tasks that are proposed on DNR-managed state-owned aquatic land.

6. Demolition of Culverts and Concrete Debris in the New Channel Area

- 6.1. The existing concrete tide box and the first ten feet of the existing outfall culvert will be demolished and removed from the lagoon outlet area and disposed of at an approved off-site disposal facility. The resulting excavation trench will be backfilled with sand and gravel and graded to match the surrounding land surface. The existing ecology blocks and gravel truck ramp will be removed and may be reused on site per the contractor's choice.
- 6.2. The final two sections (approximately 16 feet) of the existing beach outfall will be demolished and disposed of off-site. The remaining space will be backfilled with sand and gravel and graded to match the surrounding beach grade. The abandoned section of culvert and metal debris located near the outfall will also be removed and disposed of off-site.
- 6.3. The portion of the existing outfall that lies within the new channel excavation will be demolished and removed from the site. Demolition will extend at least five feet on either side of the channel limits to allow for construction of the channel sides and sealing of the remaining section of culvert.
- 6.4. Monitoring Well No. 1 will be demolished and removed from the site to allow for construction of the channel.

7. Construction of the New Channel and Tidegate System

- 7.1. The new channel will be constructed according to the design in the drawings. In general, the central part of the channel will be completed before connecting with the lagoon and beach at the ends, following the dewatering plan that will be developed by the contractor.
- 7.2. Prior to constructing the channel, the buried water line located across the channel easement will be temporarily rerouted to ensure a continuous supply of water to residents. Re-routing of the water line will follow the design to be developed by the project engineer and approved by the state health department.
- 7.3. The tidegate vault, headwalls and the concrete portion of the channel will be constructed by concrete forming and casting in place, following the design shown in the drawings.
- 7.4. The tidegate, metal grating, trash rack and all mechanical components will be installed after completion of the concrete work, per the tidegate vendor's design and specifications.
- 7.5. The pedestrian bridge will be constructed after completion of the central portion of the channel. Bridge construction work will include casting of concrete abutments and installation of a prefabricated bridge, per the design in the drawings. After completion of the bridge, a new water line will be attached to the bridge structure and connected to the ends of the existing water line, per the design approved by the health department.
- 7.6. The rock-lined channel and scour pad at the seaward end of the channel and the connection to the lagoon at the south end of the channel will be constructed last, after completion of the rest of the channel and tidegate system.
- 7.7. Finish work in the channel area will include constructing soil berms at the tidegate vault to match the existing grade on the adjacent properties, finishing the gravel-surfaced access road to the tidegate vault, construction of a gravel-surfaced foot path across the south end of the easement, and installation of a wood post fence along the sides of the channel, per the design drawings.

8. Grading of the Pasture

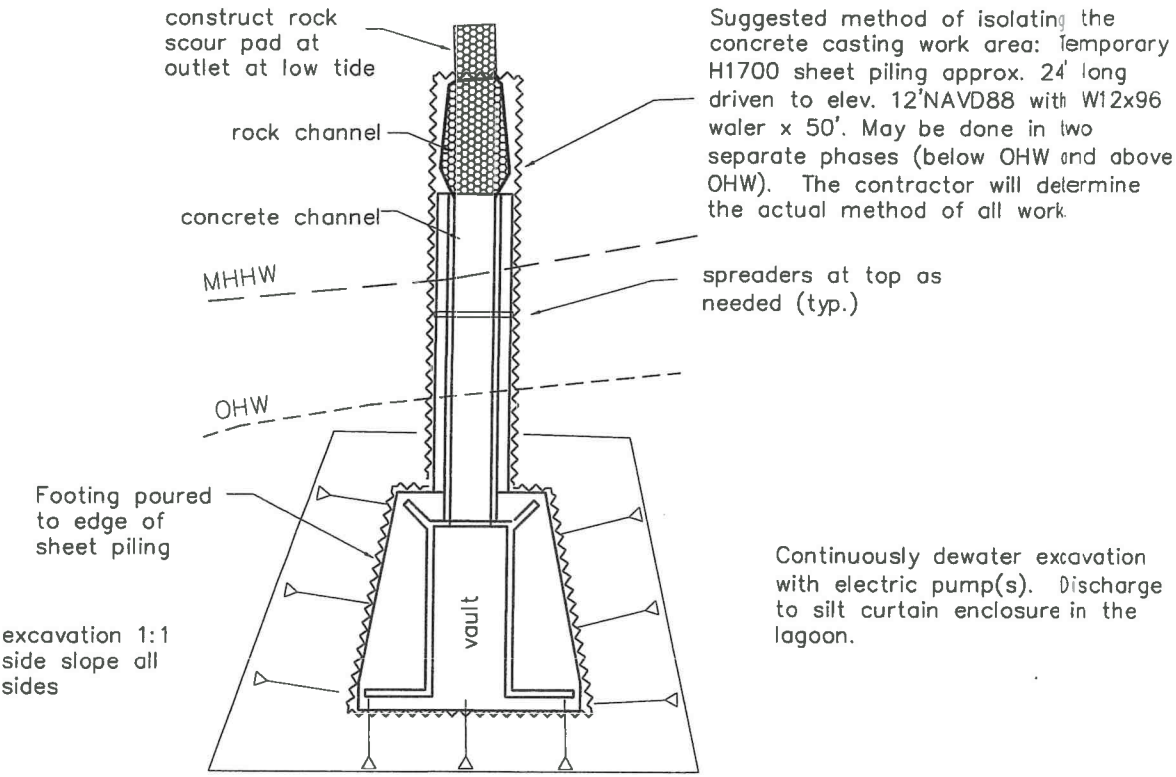
- 8.1. The existing lagoon bank and the dredge spoil mounds along the south side of the lagoon will be graded back from the toe of the existing bank to roughly the 9 foot elevation contour, per the design in the grading plan.
- 8.2. Three "habitat channels" will be excavated at the locations and per the design shown in the grading plan.
- 8.3. The excavated soil will be graded into low mounds at the southern end of the pasture, per the design in the grading plan. Excess soil will be trucked across Dugualla Road and graded to form a low disposal mound at the "Dog Walk" area.
- 8.4. The existing spoil mounds along the two ditches at the east and west ends of the lagoon will be backfilled into the ditches and compacted to match the grade of the surrounding ground. Additional excavation spoils may be backfilled into the ditches if needed.
- 8.5. No grading will be done within existing wetland buffers, except as shown in the grading plan. The boundaries of wetland buffers will be flagged by the site manager.

9. Daylighting the South Culvert

- 9.1. The existing concrete culvert leading from the catchbasin near the Dugualla Road site access will be saw cut at the location shown in the drawings. All of the culvert downstream of the cut will be demolished and removed from the site.
- 9.2. The "daylighted" creek channel will be excavated along the alignment of the old culvert, per the design in the drawings.
- 9.3. The outlet of the remaining section of culvert will be armored with a rock scour apron, per the drawings.

Typical Dewatering Plan for Tidegate Vault Construction (NTS)

- At a minimum, the dewatering plan will allow for the following:
- Draining of the lagoon to the elevation of the invert of the existing outlet (4.6' NAVD88) and preventing the lagoon from refilling during the construction work
 - Ensuring that all casting and curing of concrete can be done without coming into contact with the tide and with flowing surface water.



10. Placement of Large Wood Material Habitat Structures.

- 10.1. Six "large wood material" habitat structures will be constructed at the locations and per the typical design shown in the drawings.

11. Site Cleanup and Temporary Erosion Control Planting

- 11.1. The temporary haul roads and material stockpiling areas will be removed and re-graded to match the surrounding ground surface. All ruts caused by vehicle operations will be filled or graded to match the surrounding ground surface.
- 11.2. Any fencing or road pavement that may have been damaged by construction activities will be repaired or replaced, as directed by the site manager.
- 11.3. As a temporary erosion control measure, a native grass seed mix will be planted on all soil lying above ordinary high water elevation of 7.5' NAVD88 that was disturbed by construction activities. Mix shall be applied at a minimum of 35 lb/seed per acre and fertilized with a 16-20-20 fertilizer at a rate of 250 lb/acre. Much with weed-free straw at a rate of 1.5 tons/acre, pressed into the soil and water at least twice until the grass establishes itself. Alternatively, the contractor may elect to hydroseed these areas.
- 11.4. All construction equipment and materials will be removed from the site to the satisfaction of the Land Trust.

12. Final Site Planting

- 12.1. Native vegetation communities will be planted at the site per the Planting Plan (Sheets ENV-2 and ENV-3) during late fall or early spring following construction under a separate contract.

Sheet 6 of 23



Revisions

8-2-13

Dugualla Heights Lagoon Restoration Project
TESC Plan and Work Plan (continued)

Prepared for:



Prepared by:

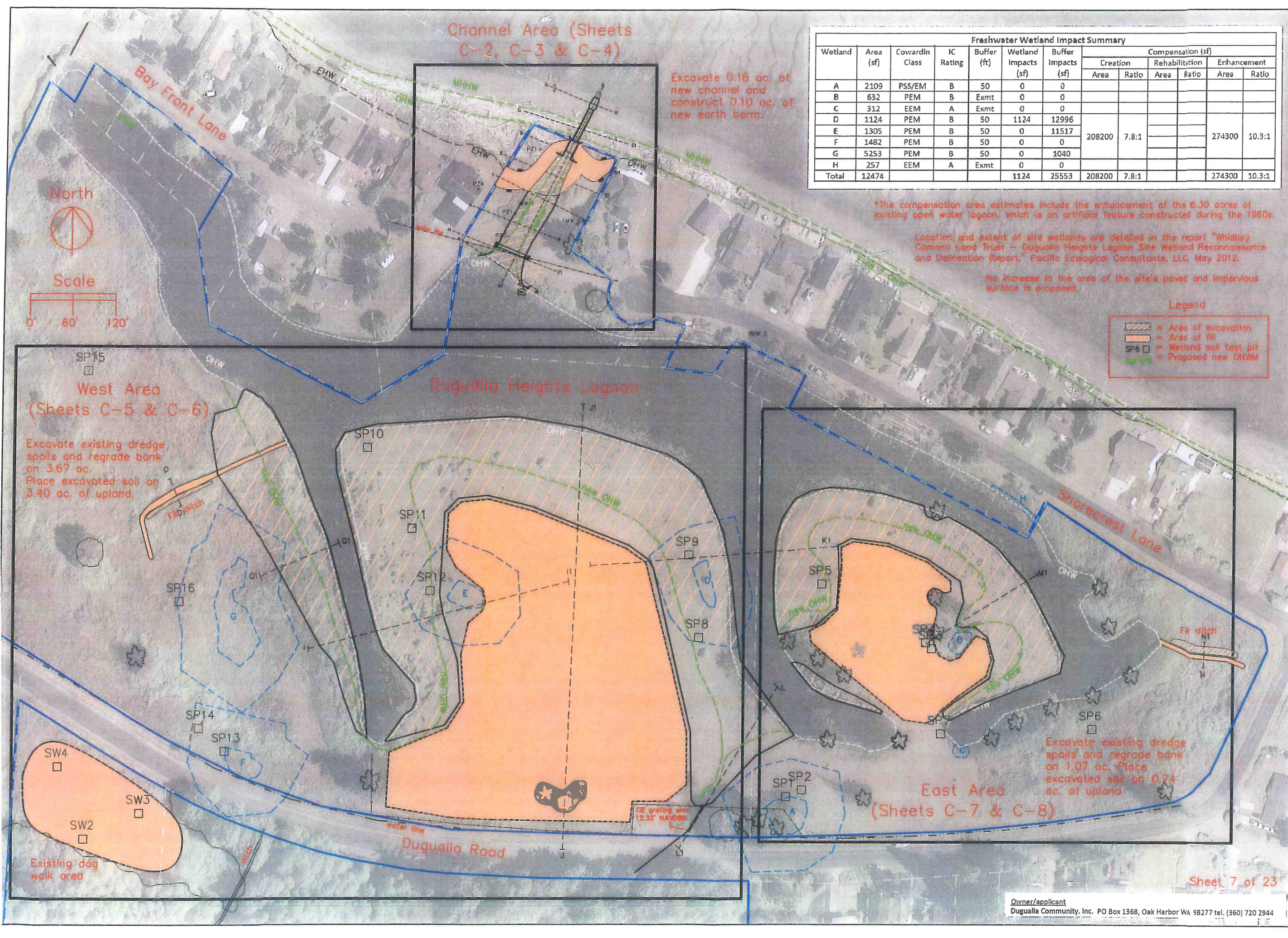


Date: 2-3-14

Scale: none

Sheet # G-5

2026.019.007f



Channel Area (Sheets C-2, C-3 & C-4)

Excavate 0.18 ac. of new channel and construct 0.10 ac. of new earth berm.

Freshwater Wetland Impact Summary												
Wetland	Area (sf)	Cowardin Class	IC Rating	Buffer (ft)	Wetland Impacts (sf)	Buffer Impacts (sf)	Compensation (sf)					
							Creation		Rehabilitation		Enhancement	
							Area	Ratio	Area	Ratio	Area	Ratio
A	2109	PSS/EM	B	50	0	0						
B	632	PEM	B	Exmt	0	0						
C	312	EEM	A	Exmt	0	0						
D	1124	PEM	B	50	1124	12996						
E	1305	PEM	B	50	0	11517	208200	7.8:1			274300	10.3:1
F	1482	PEM	B	50	0	0						
G	5253	PEM	B	50	0	1040						
H	257	EEM	A	Exmt	0	0						
Total	12474				1124	25553	208200	7.8:1			274300	10.3:1

*The compensation area estimates include the enhancement of the 6.30 acres of existing open water lagoon, which is an artificial feature constructed during the 1960s.

Location and extent of site wetlands are detailed in the report "Whidbey Camano Land Trust - Dugualla Heights Lagoon Site Wetland Reconnaissance and Delineation Report," Pacific Ecological Consultants, LLC, May 2012.

No increase in the area of the site's paved and impervious surface is proposed.

Legend

- Area of excavation
- Area of fill
- Wetland soil test pit
- Proposed new OHWM

West Area (Sheets C-5 & C-6)

Excavate existing dredge spoils and regrade bank on 3.67 ac. Place excavated soil on 3.40 ac. of upland.

Dugualla Heights Lagoon

East Area (Sheets C-7 & C-8)

Excavate existing dredge spoils and regrade bank on 1.07 ac. Place excavated soil on 0.74 ac. of upland.

Revisions

Dugualla Heights Lagoon Restoration Project
General Grading and Wetland Impact Site Plan

Prepared for:

Prepared by:

Date: 2-3-14
Scale: 1"=120'
Sheet # C-1 / ENV-1

2026.019.007g



Revisions

6-29-12	2-20-13
5-17-13	8-5-13

Dugualla Heights Lagoon Restoration Project
Proposed Channel Area Grading Plan

Prepared for:



Prepared by:



Date: 2-3-14

Scale: 1" = 30'

Sheet # C-2



Scale



Note: Work waterward of Sta. 0+25 is believed to be on SOAL.

Channel at Sta. 0+08 at scarp between mudflat and gravel beach. Elev. = 4.1'±. Centerline of channel is 64' west of and parallel to the eastern easement line.

Channel from Sta. 0+08 to 0+25 is rock armored with 1:1 side slopes.

Channel from Sta. 0+25 to 0+73 is vertical wall concrete with roughening structures. Grated above Sta. 0+40.

Sta. 0+73 to 0+99: Concrete headwalls and 26' long concrete tidegate vault, with grating and railings over vault to allow vehicle & pedestrian access.

265 LF of gravel road to access tidegate from Shorecrest Lane. See detail on Sheet C-11.

New 50' x 4' footbridge over the channel at Sta. 2+44 per details on Sheet C-11. Grade existing footpath to meet the bridge. Re-route approx. 130 LF of the water line across the bridge per details on Sheet C-12.

Legend

- EOG = proposed channel/grading edge
- EOF = proposed berm/edge of fill
- 8' = new concrete structure
- 8' = proposed grading contours
- 8' = easement boundary
- 8' = parcel boundaries
- 8' = cross section (Sheet 7)
- 8' = existing drain field
- 8' = geocell stabilized slope
- 8' = rock armored slope

Last 16' of the existing outfall to be removed. Remainder blocked in place.

Install stepping stones for crossing the channel

Rock scour pad from Sta. 0+00 to end of channel at Sta. 0+08.

Construct earthen berm to elev. 13.5' NAVD to meet existing grade at neighboring lots, per Detail Sheet C-11. Landscape with native beach grasses and shrubs

Remove the existing 30" outfall pipe from Sta. 1+70 to 2+20 to allow for channel construction. Block ends per detail.

Van Wyngarden property

Install LWM habitat features per detail Sheet.

Sta. 0+99 to 2+60 armor sides of channel with rock. Sta. 2+60 to 2+80 use quarry spall, per section views.

TBM1 hub el. 11.84' NAVD88

Taper final 25 feet of channel grading to meet existing lagoon bank.

Van Wyngarden property

Block existing culvert and remove the inlet box, ecology blocks and gravel fill.

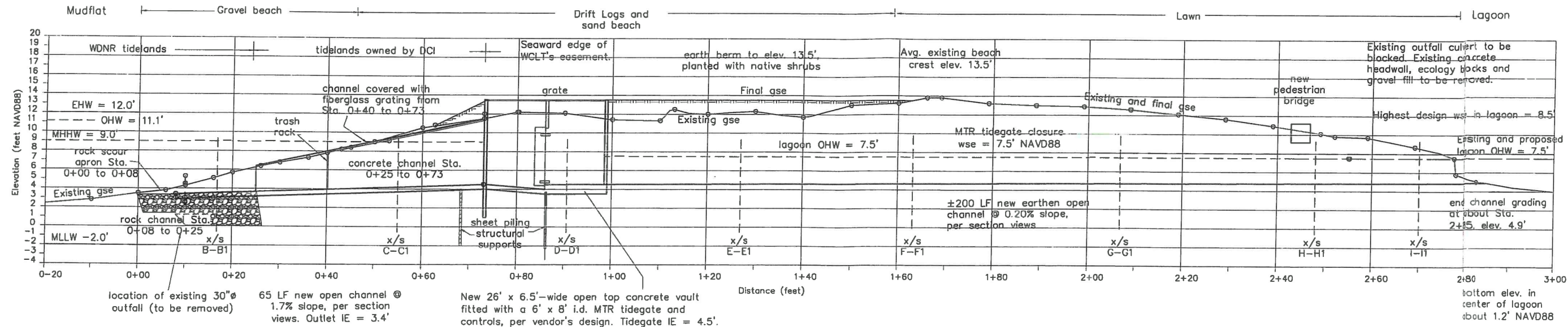
BM top of wall el. 8.18' NAVD88

TBM3 water valve cover el. 13.52' NAVD88

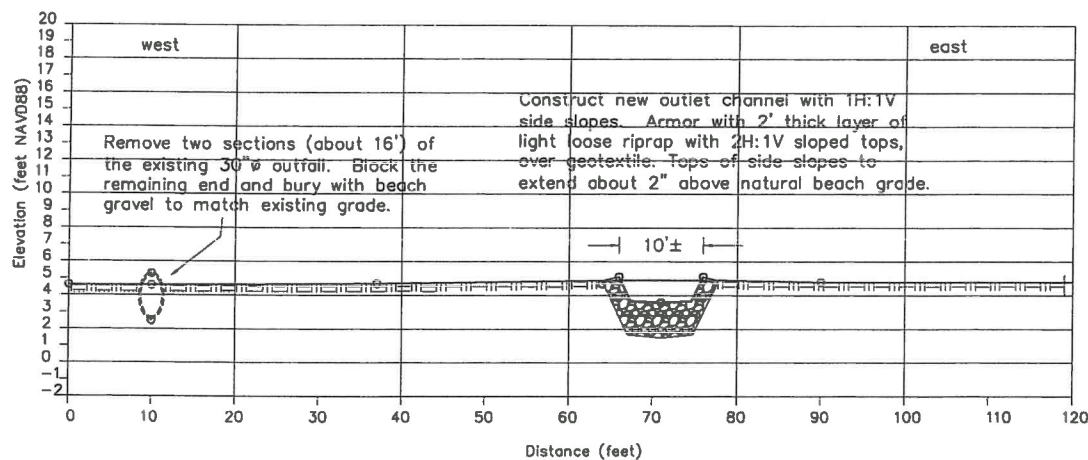
Shorecrest Lane

2026.019.007h

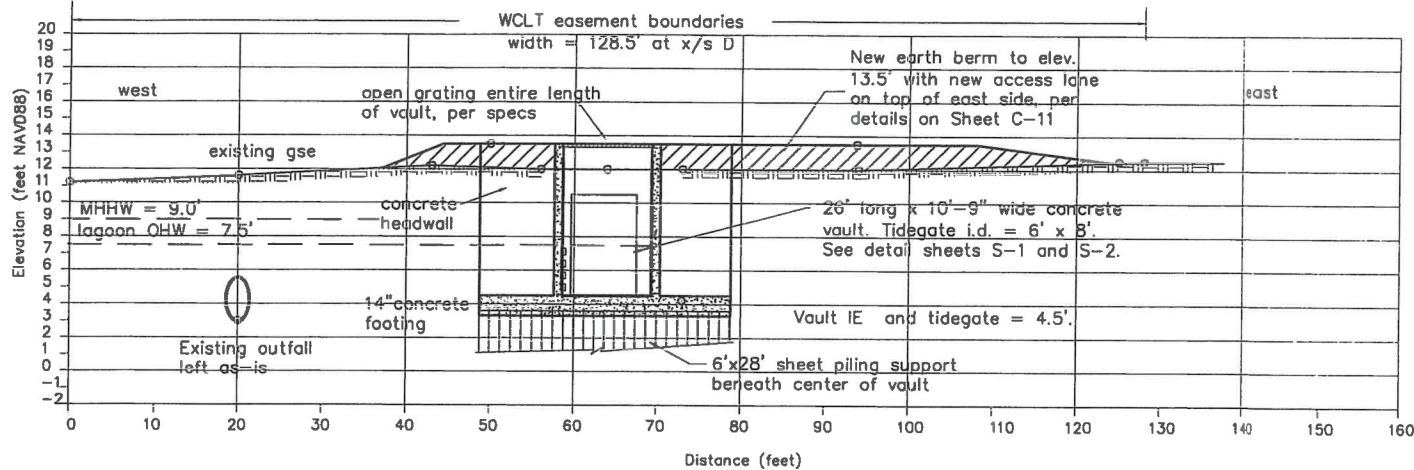
Profile of Proposed New Channel (A-A1) - Scale 1'V = 2' H



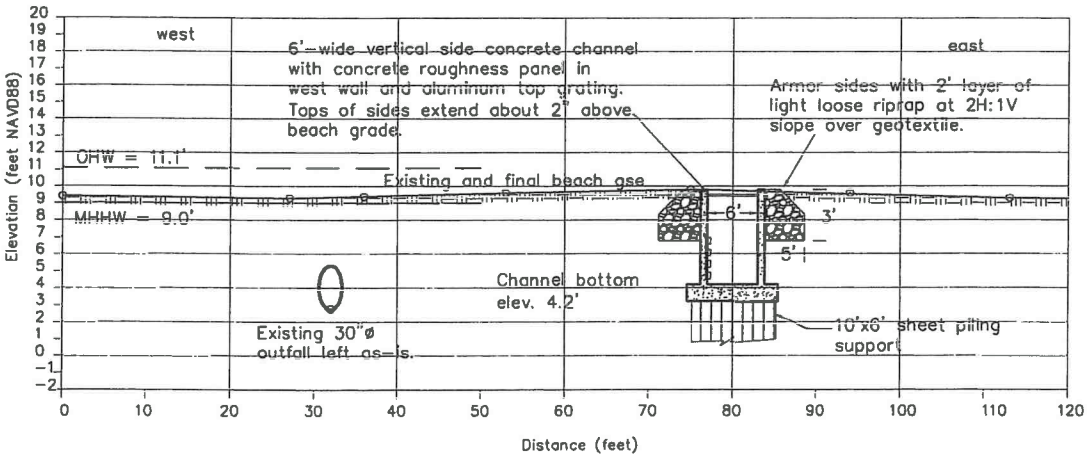
Proposed Channel Cross Section B-B1 (Sta. 0+17)
Scale 1'V = 2' H



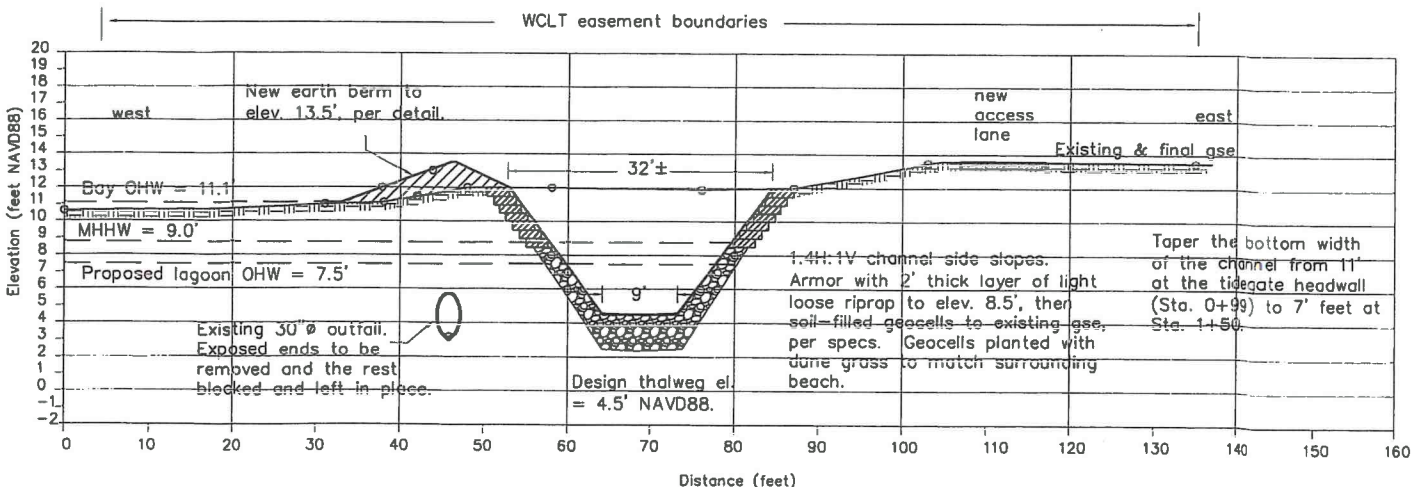
Proposed Cross Section D-D1 (Sta. 0+91) - Scale 1'V = 2' H



Proposed Channel Cross Section C-C1 (Sta. 0+55)
Scale 1'V = 2' H



Proposed Cross Section E-E1 (Sta. 1+27) - Scale 1'V = 2' H



Revisions

Dugualla Heights Lagoon
Habitat Restoration Project
Proposed Channel Profile & Section Views

Prepared for:
WHIDBEY CAMANO LAND TRUST

Prepared by:
WHIDBEY ISLAND CONSERVATION DISTRICT

Date: 2-3-14

Scale: as noted

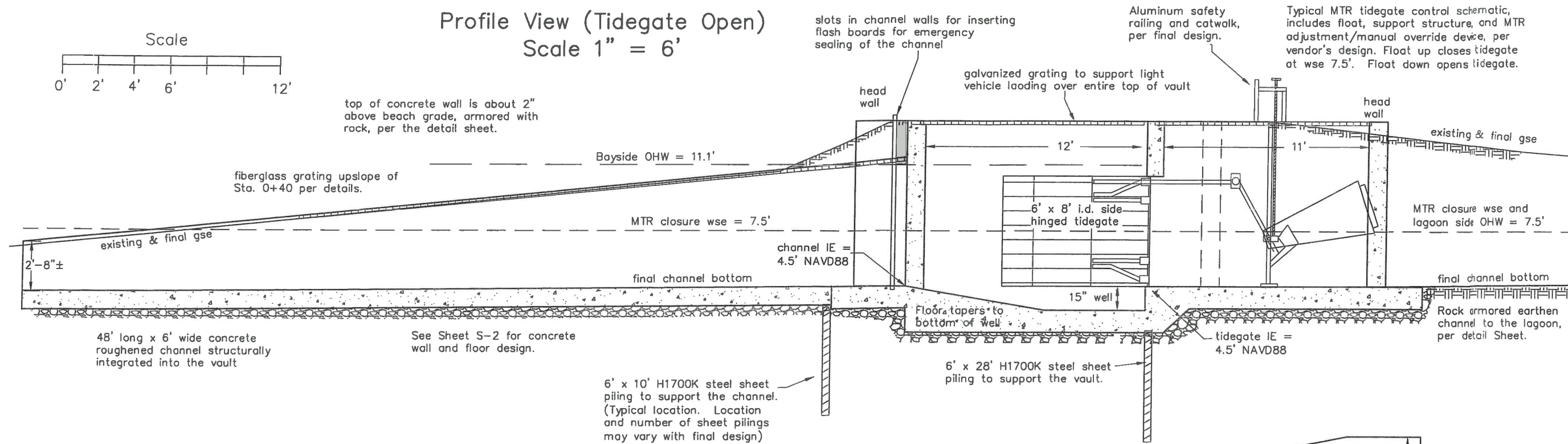
2026.019.001

Tidegate and Vault Details

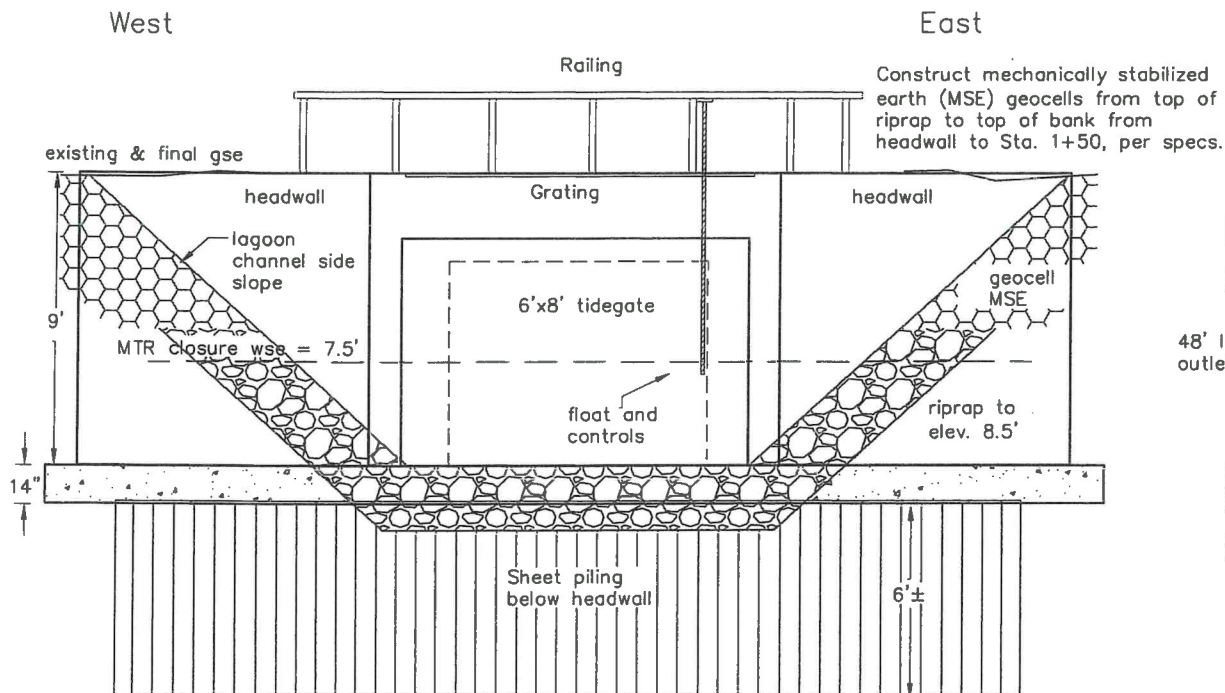
← Skagit Bay

→ Lagoon

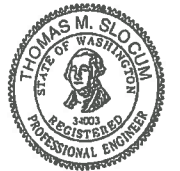
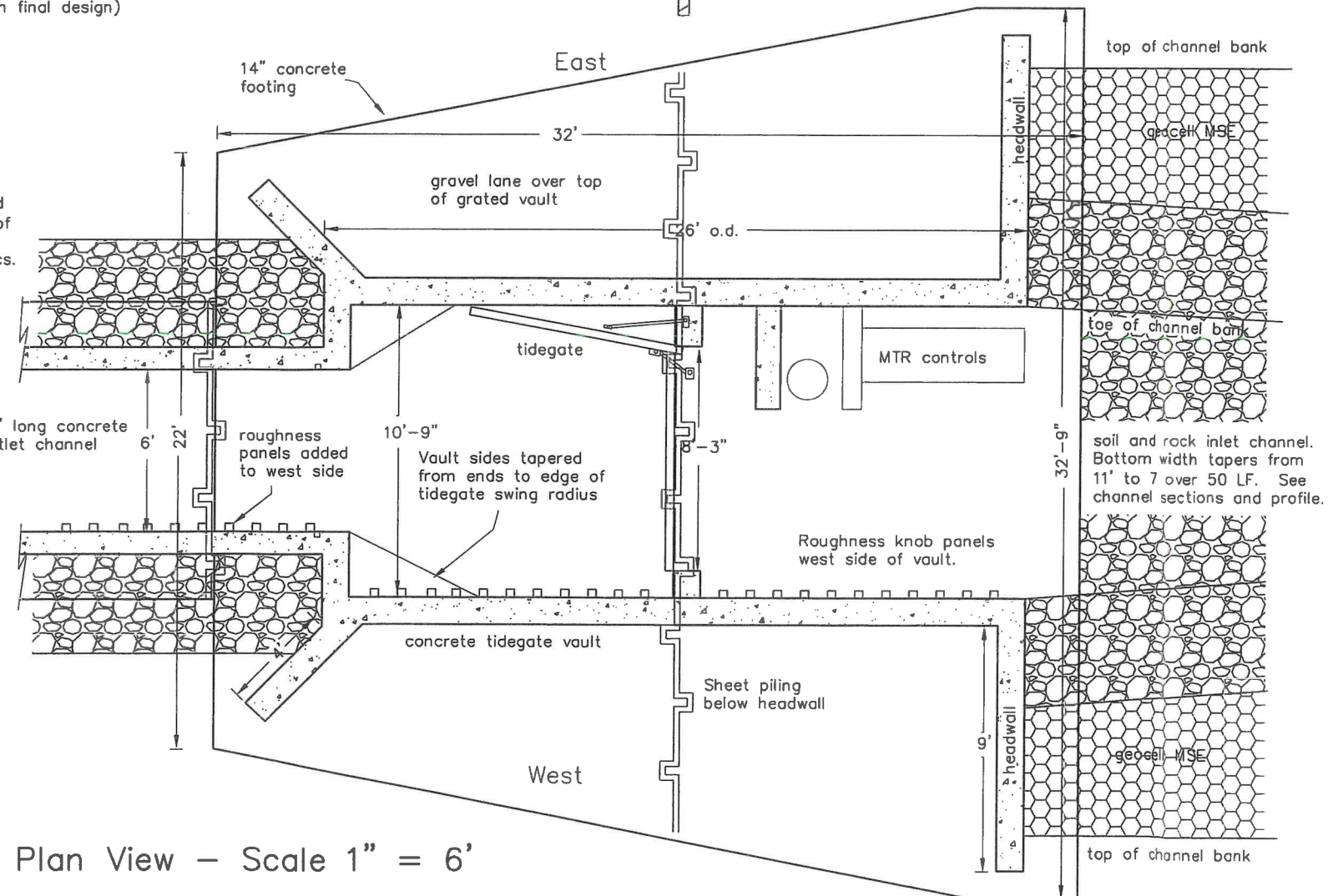
Profile View (Tidegate Open)
Scale 1" = 6'



South Elevation View — Scale 1" = 6'



Plan View — Scale 1" = 6'



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Tidegate and Vault Details

Prepared for:



Prepared by:



Date: 2-3-14

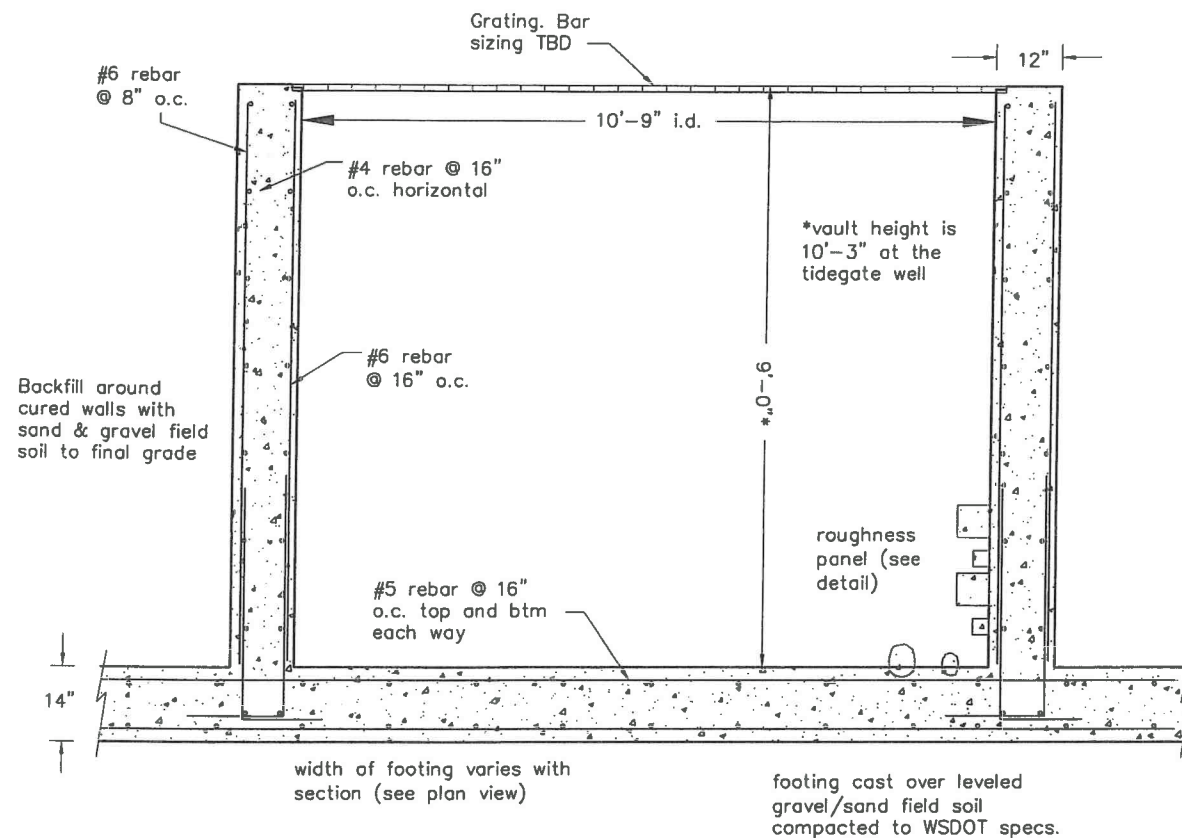
Scale: 1" = 6'

Sheet # S-1

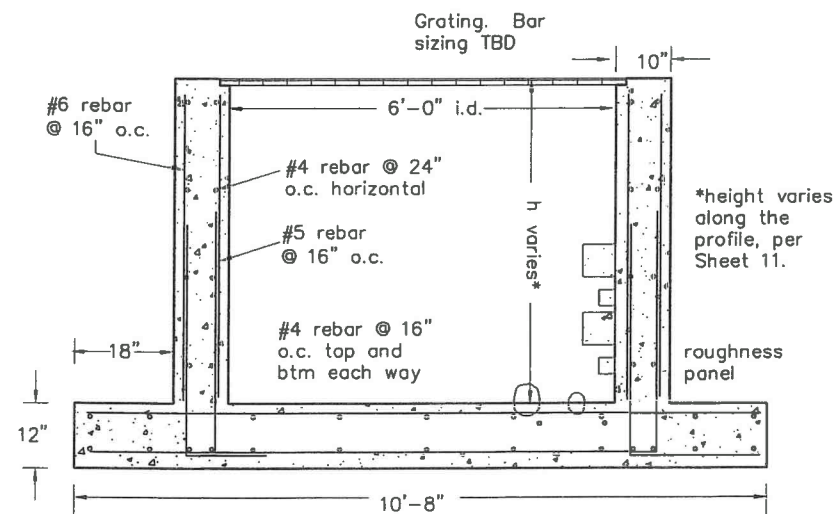
Sheet 11 of 23

1026.019.007K

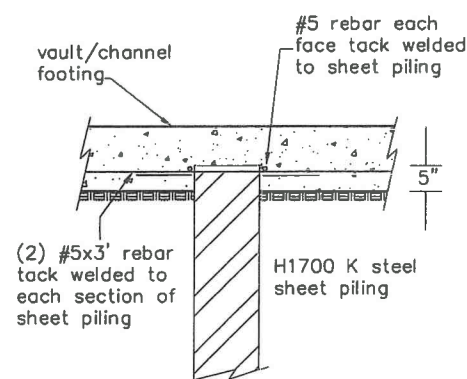
Vault Section View Scale 1" = 3'-0"



Channel Section View Scale 1" = 3'-0"



Detail of Sheet Piling Connection

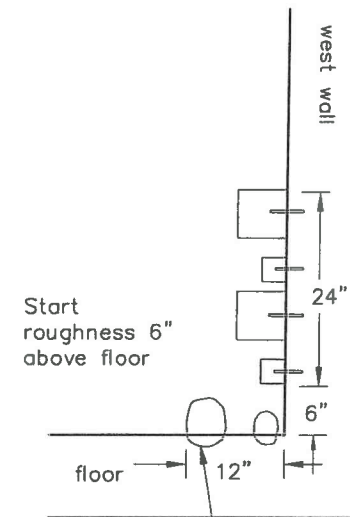


Specifications for Reinforced Concrete

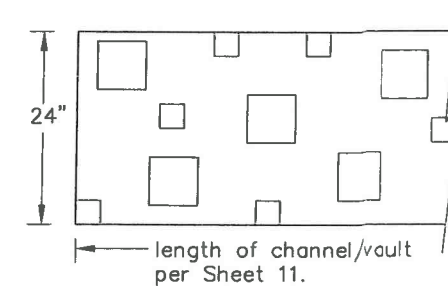
- Reinforcing bars shall be ASTM A615, Grade 60.
- Bar detailing not shown otherwise shall conform to the CRSI Manual of Standard Practice.
- Bar splices, if any, shall overlap 48x bar diameter.
- Concrete materials shall conform to the following:
Aggregate - Stone aggregate ASTM C33, 3/4" max.
Cement - Type I or II ASTM C150
Admixtures - Air Entraining ASTM C260
Water reducing ASTM C494 Type A
All concrete shall be ready mix. Comply with ASTM C94. $f_c = 2500$ psi after 28 days. W/C 0.50 max.
- All construction joints shall be clean and free from foreign substances and loose material.

Roughness Panel Details Scale 1" = 2'-0"

Roughness knobs shall be rounded 6" and 3" concrete cubes cast with a 1/4" threaded rod in center, per the detail. Screw and epoxy each knob into the corresponding insert in the wall so that it forms a tight fit with the finished wall surface.

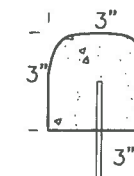


Cast 3" to 6" diameter cobble directly into a 12" strip along the west side of the channel and vault floors in the same pattern as the wall knobs.



Cast 1/4" x 3" threaded inserts into the 24" tall strip of the west wall of the channel and vault to allow for attaching roughness knobs. Vary the placement of 6" and 3" to allow for a random pattern that breaks up flow velocity along the wall and allows for low velocity resting sites in the lee of the knobs. Allow typ. 3" to 6" spacing on all sides of knobs. A typical placement pattern is shown.

Detail of 6" Knob

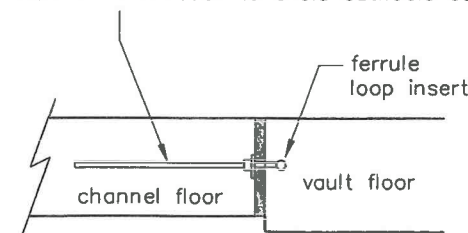


6" concrete cube with top rounded on all sides with a 6" x 1/4" threaded rod cast into the center (use 4.5' rod for the 3" cubes)

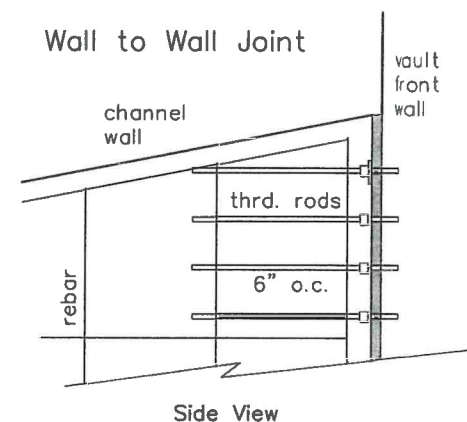
Vault/Channel Connection Detail Scale 1" = 2'-0"

The connections between the floors and walls of the channel and vault structures shall consist of threaded rods extended through a layer of expansion material, which will allow for flexibility along the joint and avoid cracking due to differential settlement. The contractor shall install the design below or an equivalent design approved by the site engineer.

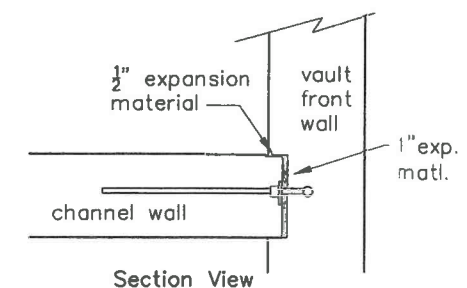
3/4" x 24" threaded rod with nut and 3 1/2" square washer, spaced 6" o.c. All hardware to be epoxy coated or galvanized and shall not contact rebar to avoid cathodic corrosion.



Floor to Floor Joint Section View



Side View



Section View

Owner/applicant

Sheet 12 of 23



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Channel and Vault Structural Details

Prepared for:



Prepared by:



Date: 7-26-13

Scale: as noted

Sheet #

026.019.007L

View of Typical MTR Tidegate Configuration

Float and Linkage Assembly Mounted on Headwall



Tidegate Mounted on Concrete Vault



Vendor to supply and install a float activated, side hung tidegate system meeting mechanical operation characteristics of a Nehelem Marine Manufacturing, Inc. patented MTR tidegate system, or equivalent model approved by the project engineer. Photographs of a typical MTR system installation are provided as illustration for permitting purposes only.



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Illustration of Typical MTR Tidegate
Mechanical Components

Prepared for:



Prepared by:



Date: 2-3-14

Scale: NTS

Sheet # M-1



Revisions

Dugualla Heights Lagoon Restoration Project Proposed West Lagoon Area Grading Plan

Prepared for:



Prepared by:



Date: 2-3-14

Scale: 1" = 80'

Sheet # C-5

2026.019.007n

Legend

- existing OHW = Existing OHW line & lagoon bank
- new OHW = Proposed OHW line
- EOG = edge of proposed bank regrading
- EOF = edge of proposed fill
- = proposed grading/fill contours
- = easement boundary
- K - K1 = cross section & profile lines
- = LWM habitat structure
- = wetland and buffer

Fill in ditch with existing spoils to match ground surface. 0.05 ac / 50 cy

All existing large trees to remain except where noted. No grading of soil within drip line of tree canopies.

Final site grading may be varied to mimic natural irregularities in the topography provided that the total quantity of excavation and fill does not change from the quantities shown in this plan.

Grade back bank from elev. 6.0' to 10.0' per typical cross sections on Sheet C-6. Total quantity of grading in west pasture = 0.76 ac / 1780 cy.

Excavate "pilot" habitat channel, per and install LWM habitat structure per typical details on Sheet C-10.

Install LWM habitat structure.

250' of temporary graveled haul road.

Place approx. 10,600 cy of upland soil disposal covering 2.78 ac. of pasture. Set back 15' from easement line. Top elev. is 3' above surrounding grade, with side slopes no steeper than 10:1. Plant per the planting plan.

Remove existing 12" culvert to fenceline and excavate new stream channel per details on Sheet C-9.

Excavate channel and install LWM.

Grade back bank from elev. 5.0' to 9.0' per typical cross sections on Sheet C-8. Total quantity of bank grading in east pasture = 1.07 ac / 4230 cy. Plant per the planting plan.

Excavate channel and install LWM.

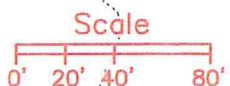
Install LWM.

Place 1400 cy of upland soil disposal covering 0.57 of pasture. Set back 15' from easement line. Top elev. is 2' above surrounding grade, with 10:1 side slopes. Plant per the planting plan.

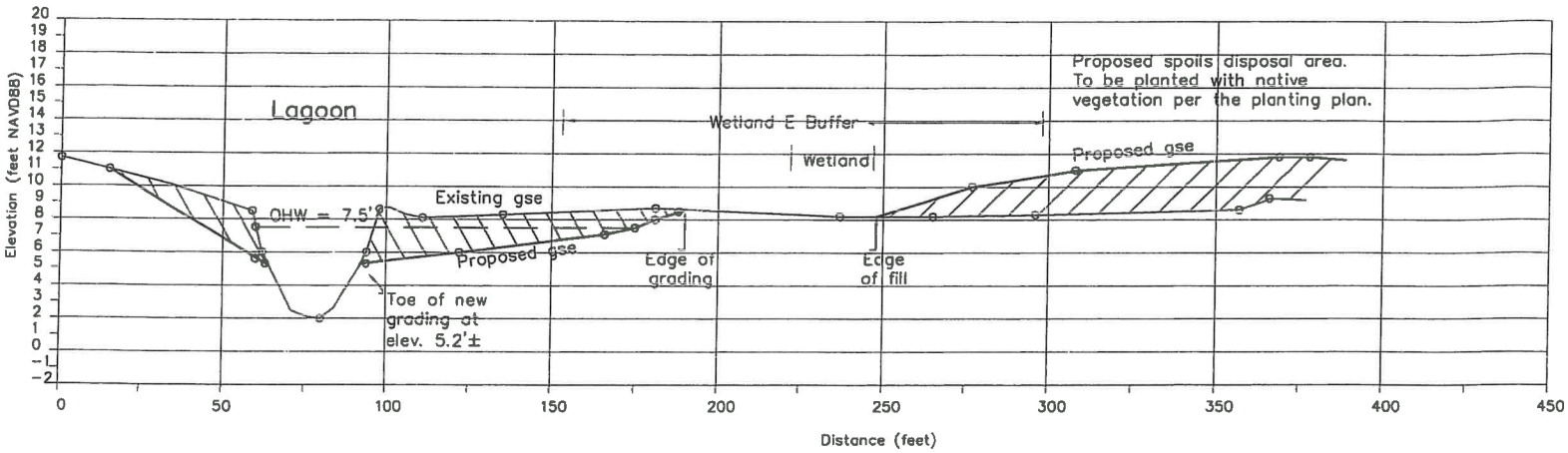
All temporary haul roads to be removed to natural ground surface after construction.

Owner/applicant
Dugualla Community, Inc. PO Box 1368, Oak Harbor WA 98277 tel. (360) 720 2944

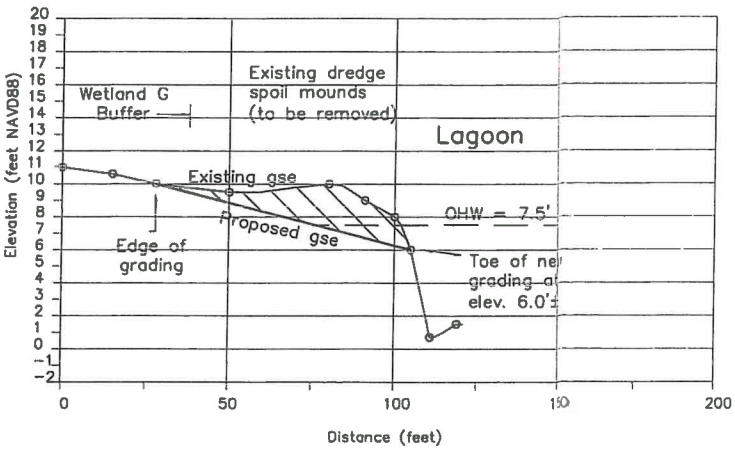
Sheet 14 of 23



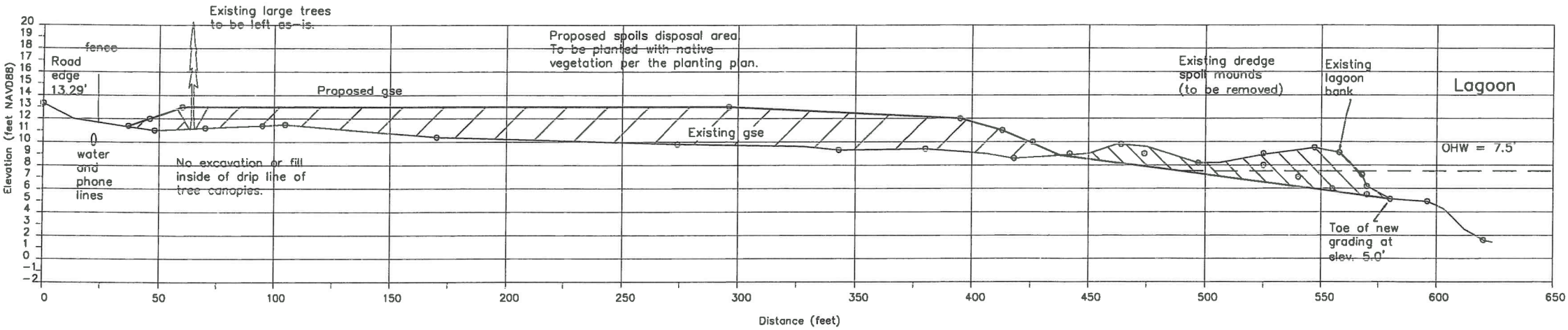
Proposed Grading Cross Section I-I - Scale 1'V = 5' H



Proposed Grading Cross Section Q-Q1
Scale 1'V = 5' H

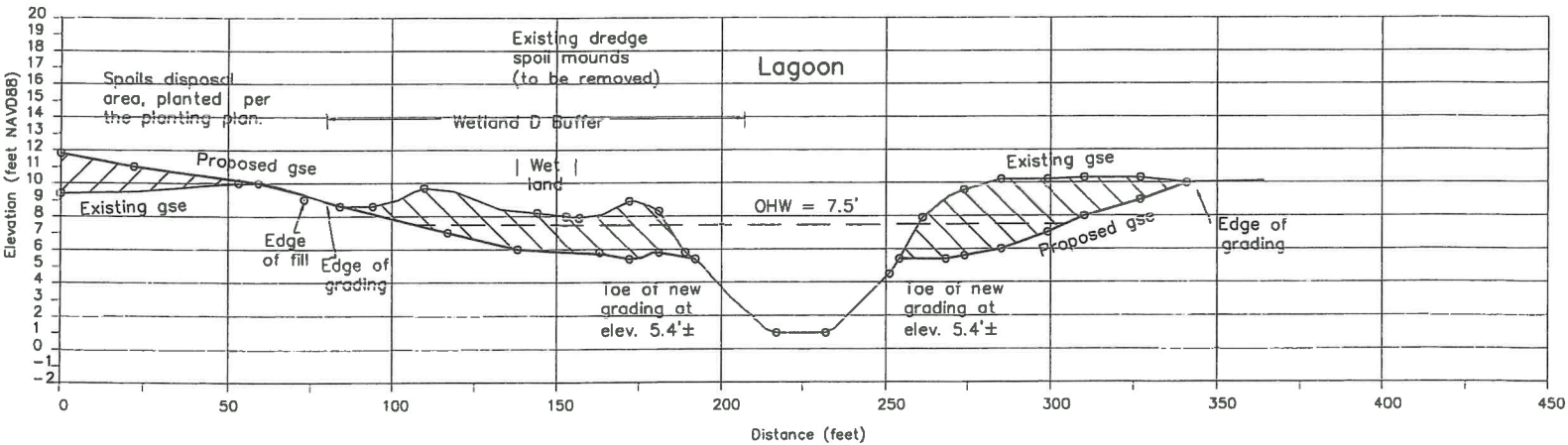


Proposed Grading Cross Section J-J1 - Scale 1'V = 5' H

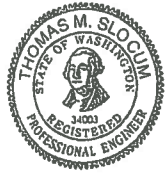
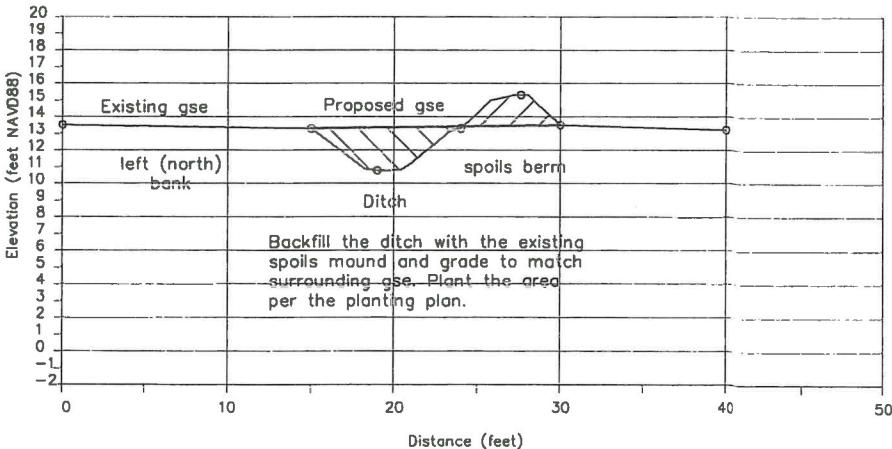


Legend
= Excavation
= Fill

Proposed Grading Cross Section K-K1 - Scale 1'V = 5' H



Proposed Grading Section O-O1 (West Ditch)
Scale 1'H = 1'V



Revisions

2-20-13

Dugualla Heights Lagoon Habitat
Restoration Project
Proposed West Area Grading
Section Views

Prepared for:



Prepared by:



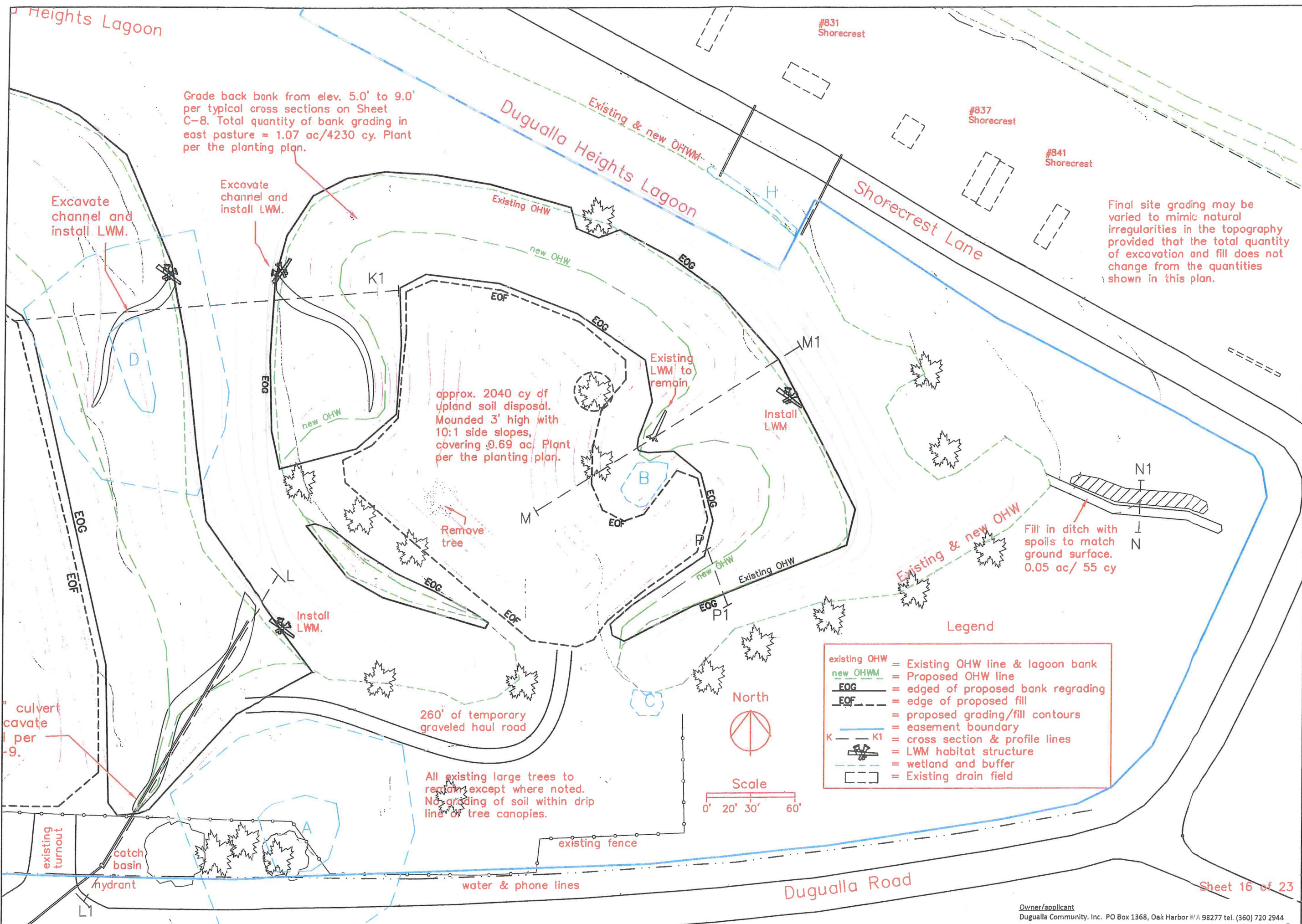
Date: 2-3-14

Scale: as noted

Sheet # 15 of 23

Owner/applicant

2026.019.0070



Revisions

Dugualla Heights Lagoon Restoration Project Proposed East Lagoon Area Grading Plan

Prepared for:
WHIDBEY CAMANO LAND TRUST

Prepared by:
WHIDBEY ISLAND CONSERVATION DISTRICT

Date:
2-3-14

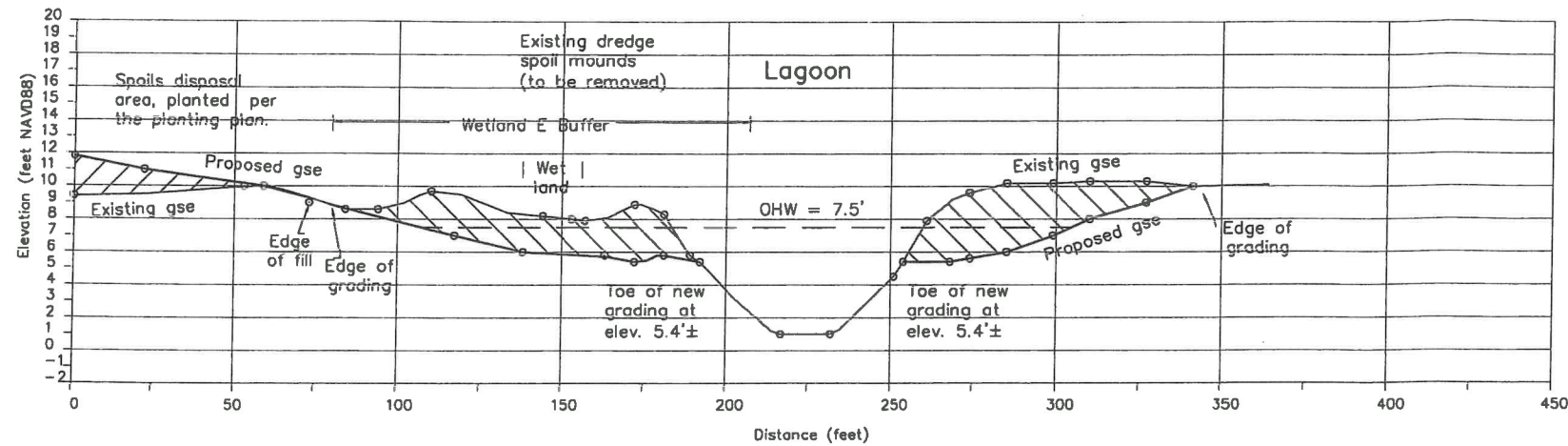
Scale:
1" = 60'

Sheet #
C-7

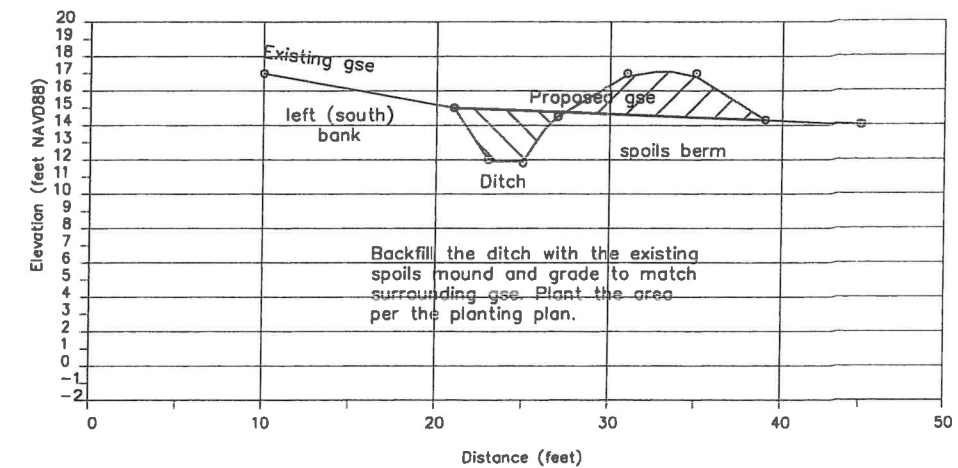
Owner/applciant
Dugualla Community, Inc. PO Box 1368, Oak Harbor WA 98277 tel. (360) 720 2944

2026.019.007p

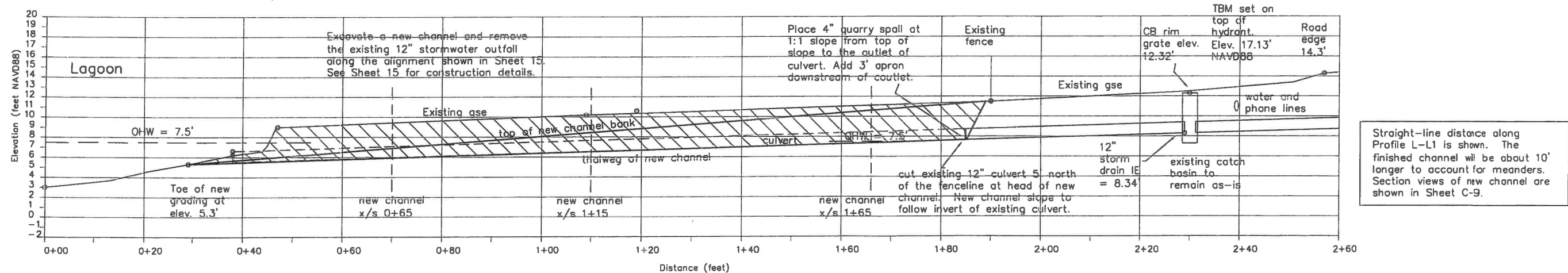
Proposed Grading Cross Section K-K1 - Scale 1'V = 5' H



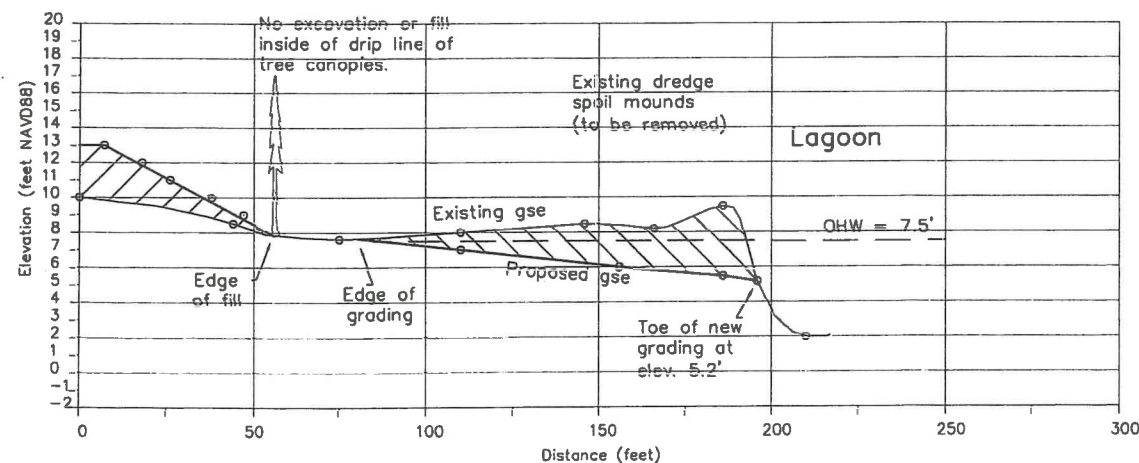
Proposed Grading Section N-N1 (East Ditch)
Scale 1'H = 1'V



Proposed Grading Cross Section L-L1 (Culvert Daylighting) - Scale 1'V = 2' H



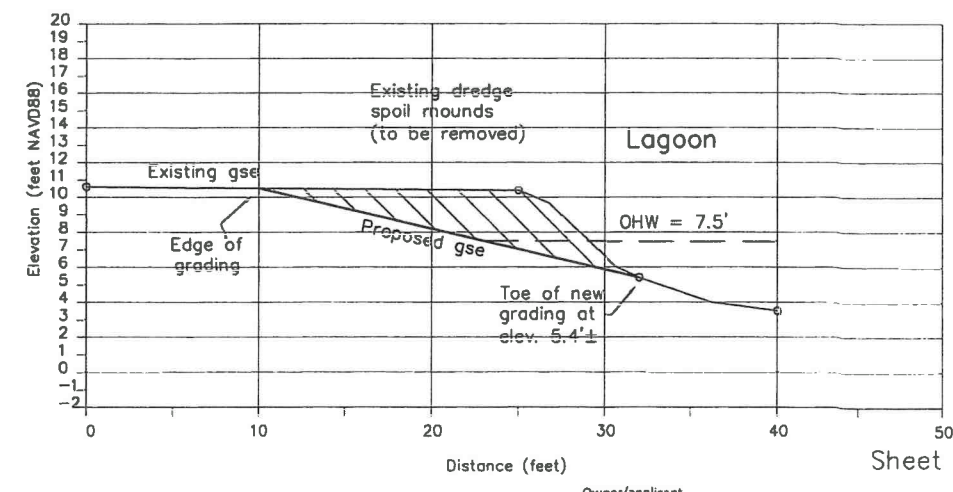
Proposed Grading Cross Section M-M1 - Scale 1'V = 5' H



Legend

-  = Excavation
-  = Fill

Proposed Grading Section P-P1
(South Shore of Lagoon)
Scale 1'H = 1'V



Revisions

5-11-12 2-20-13

Dugalla Heights Lagoon Habitat
Restoration Project
Proposed East Area Grading
Section Views

Prepared for:



Prepared by:



Date: 2-3-14

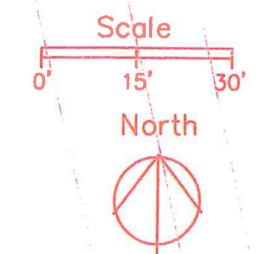
Scale: as noted

Sheet # 8

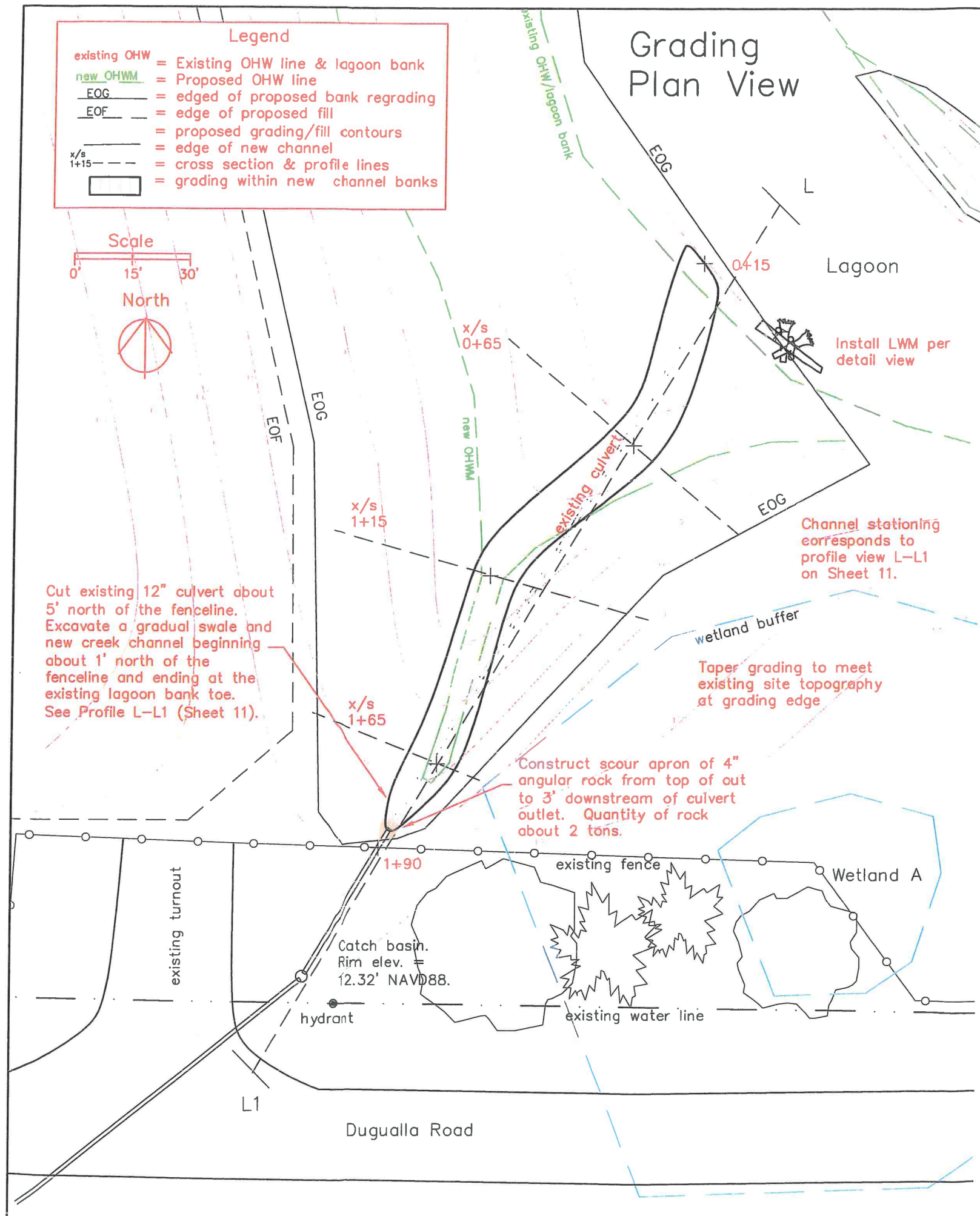
Sheet 17 of 23

2026.019.0079

- Legend**
- existing OHW = Existing OHW line & lagoon bank
 - new OHWM = Proposed OHW line
 - EOG = edged of proposed bank regrading
 - EOF = edge of proposed fill
 - = proposed grading/fill contours
 - = edge of new channel
 - x/s 1+15 = cross section & profile lines
 - ▨ = grading within new channel banks

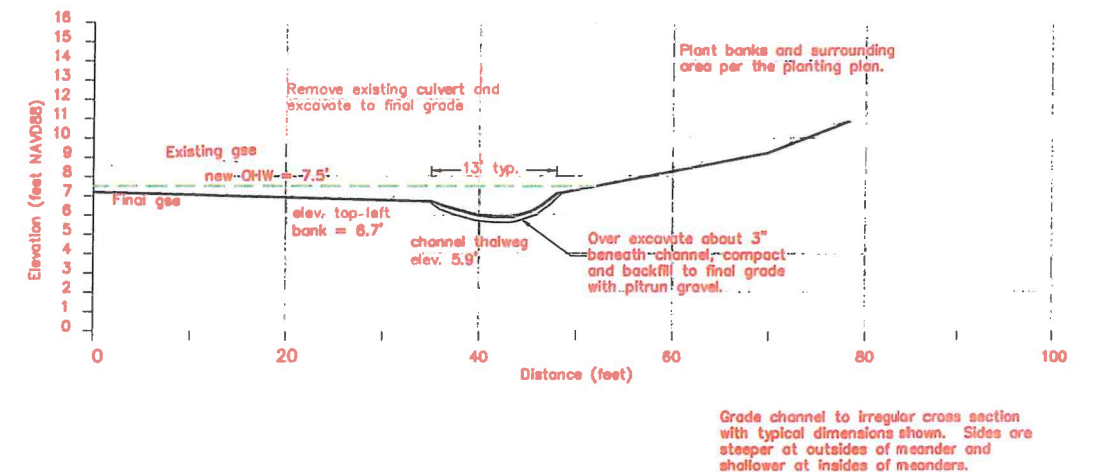


Grading Plan View

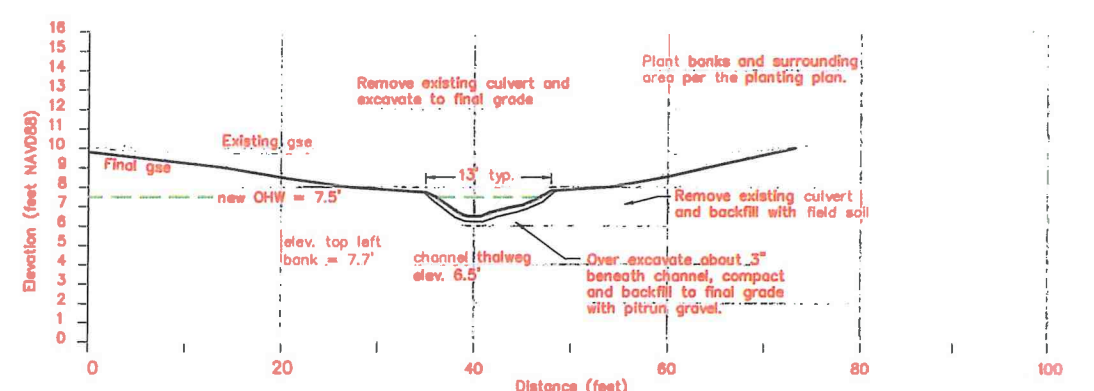


Typical Channel Grading Sections

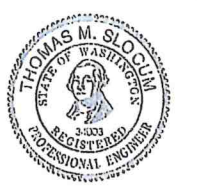
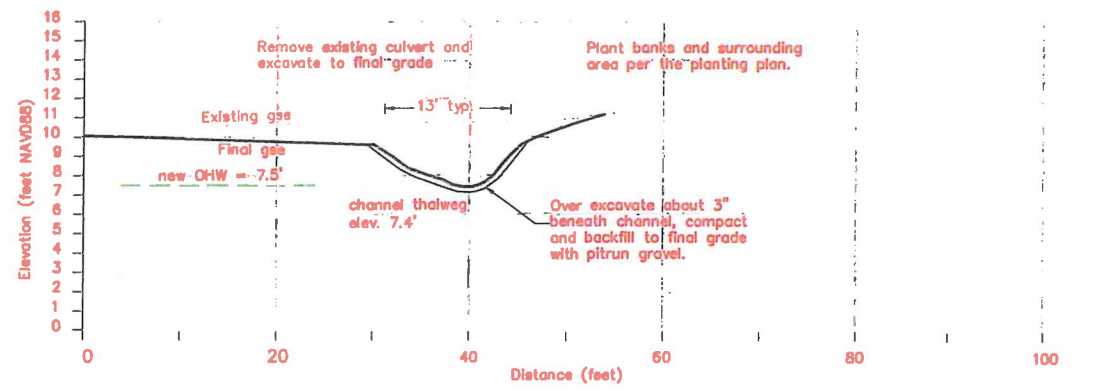
"Daylighted" Channel Section 0+65 - Scale 1'V = 2' H



"Daylighted" Channel Section 1+15 - Scale 1'V = 2' H



"Daylighted" Channel Section 1+65 - Scale 1'V = 2' H



Revisions

7-23-13

Dugualla Heights Lagoon Restoration Project

Culvert Daylighting Details

Prepared for:



Prepared by:



Date: 2-3-14

Scale: 1" = 30'

Sheet # C-9

Sheet 18 of 23

Owner/applicant
Dugualla Community, Inc. PO Box 1368, Oak Harbor WA 98277 tel. (360) 720 2944

2026.019.007r

DRAFT



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Habitat Channel and LWM Details

Prepared for:



Prepared by:

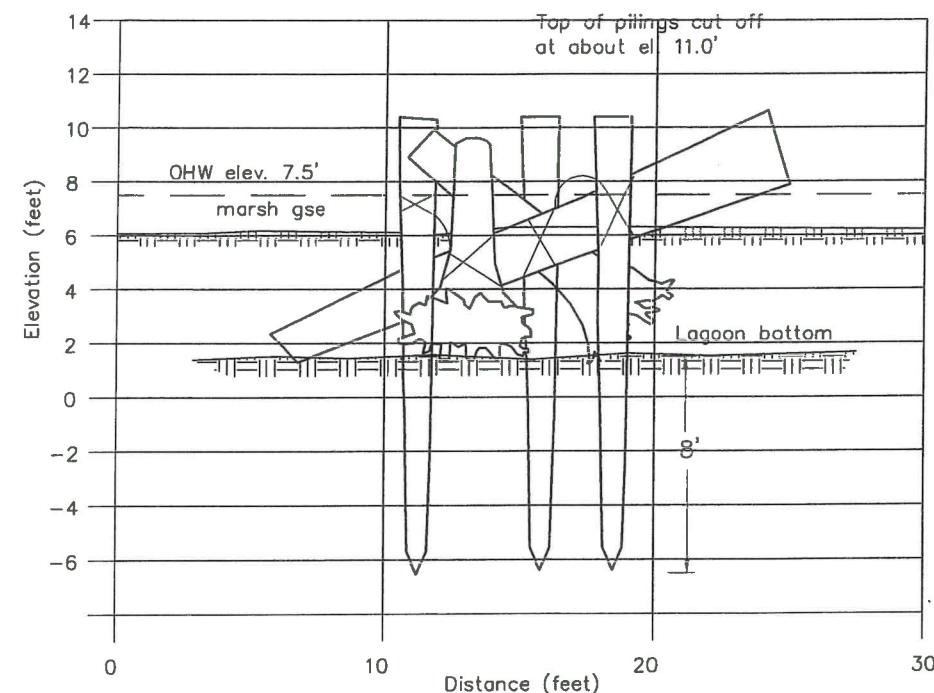


Date: 2-3-14

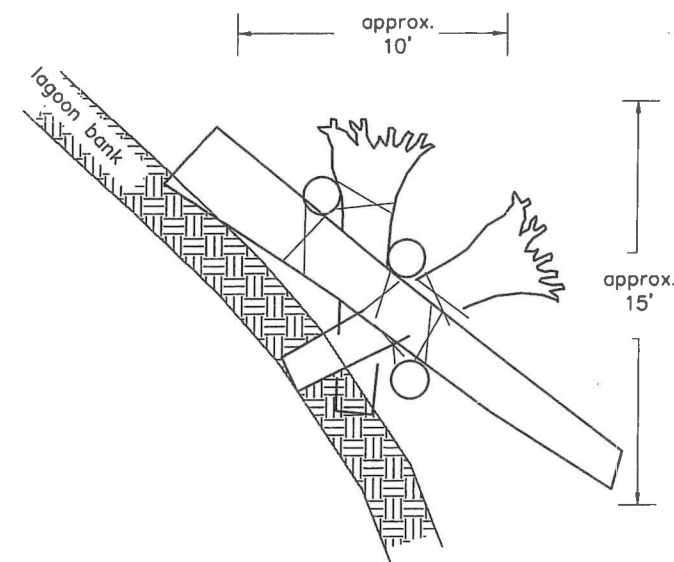
Scale: 1" = 8'

Sheet #C-10

Elevation View of Typical LWM Habitat Structure



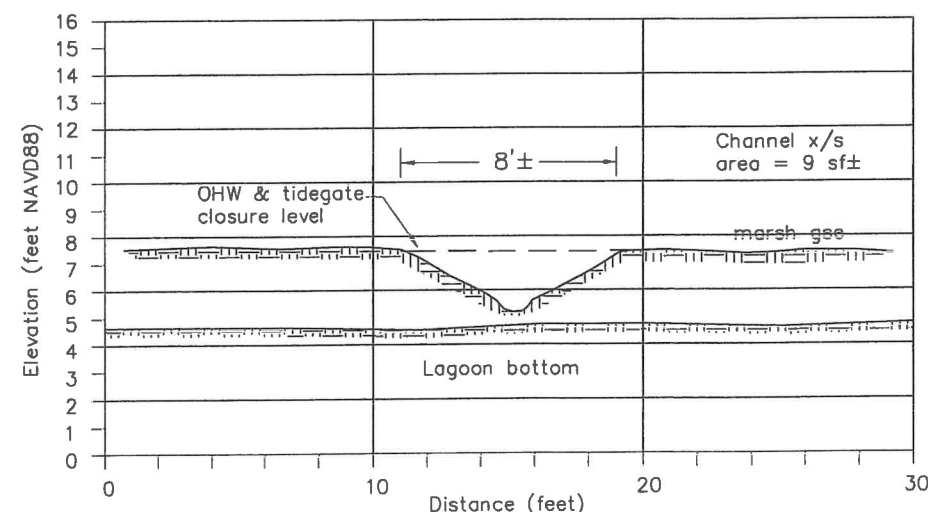
Plan View of Typical LWM Habitat Structure



Each LWM structure shall consist of two rootwads and one large log chained to three log pilings. Units shall be placed at locations determined by the site manager to provide fish habitat benefits. The views on this sheet show typical placement of LWM pieces. The site manager shall decide final configuration of pieces.

Section View – Proposed Pilot Habitat Channel
Scale 1' H = 1'V

Excavate "pilot" habitat channels with approximate dimensions shown. Channel thalweg profile rises from the existing lagoon bottom to approx. elev. 6.5' at the upper end. Final morphology of the channel will form through natural erosion of banks.



Construction Specifications

Pilings

1. Pilings shall be fir or cedar logs in good condition. Minimum length 15', minimum diameter 12". Sharpen end to a point. Drive into the lagoon bottom or marsh using an excavator with thumb attachment or an equivalent method to at least 8 feet below the ground surface. There shall be three pilings per LWM unit, spaced to form solid supports for anchoring each LWM piece. A typical spacing is shown in the figure. Pilings shall be driven into the ground at an angle, sloping across the top of the LWM pieces.
2. After final cabling of LWM pieces, the tops of the pilings shall be cut off at approx. elevation 11.0', provided that there is at least 2 feet between the ends of the pieces and the chain wraps.

LWM Pieces

LWM pieces shall consist of large logs and root wads. All pieces shall be fir or cedar in sound condition with little or no rot. Minimum size of logs shall be 12" diameter at narrow end with length at least 18 feet. Root wads shall be 8' to 10' long with minimum diameter 15" at the trunk end and about 4' across at the root end.

Chain

Chain shall be heavy gauge galvanized steel, rated for use in salt water.

Placement of LWM pieces.

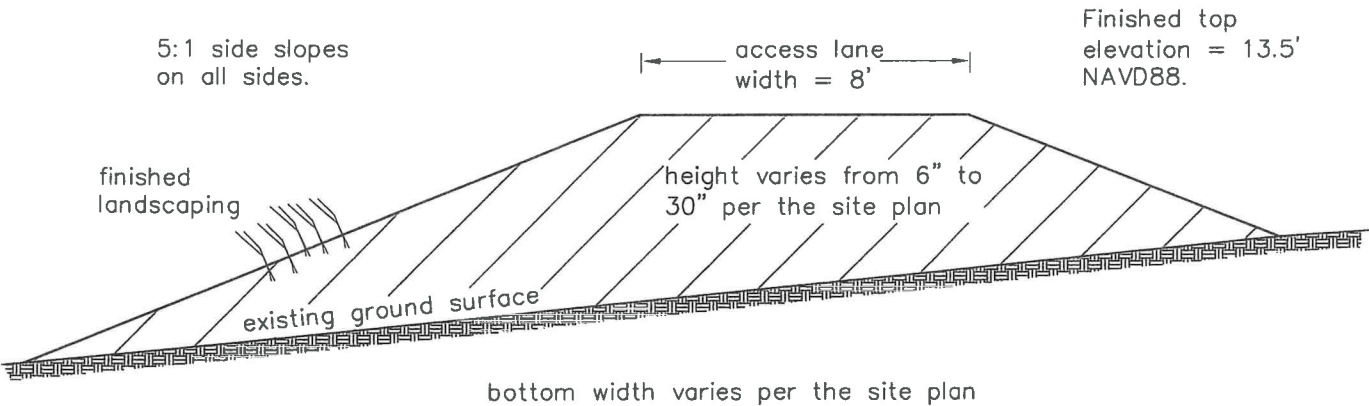
1. Each LWM piece shall be secured to two pilings with chain. The chain shall be wrapped two full turns around the LWM piece and piling and stapled and the free end secured to the rest of the cable with clamps. Staples and clamps shall be rated for use in salt water. Chain wrap locations shall be at least 2 feet from the end of the LWM pieces and pilings. Each chain wrap point shall have at least one staple and one clamp. After final placement of the chains, the clamps shall be deformed or welded to prevent theft.
2. Enough slack shall be left in each section of chain to allow the LWM pieces to float up to the OHW elevation of about 7.5' NAVD88. Slack length shall be determined for each LWM by the site manager.
3. If the actual lengths and diameters of the wood pieces vary, the pieces shall be varied so that each structure contains approximately the same mass of wood. The final configuration at each location shall be determined by the site manager to suit the particular conditions.

2026.019.0075

Earth Berm Details

- Construct new earth berm to elevation 13.5' at locations shown to following specifications:
1. Strip sod and topsoil from the footprint of the berm to the depth of the mineral soil. Save topsoil for surface dressing of the berm. Roll and compact the footing to a firm condition to support heavy construction vehicles.
 2. Construct the berm using soil meeting the following minimum sieve sizes:
 - 100% passing 2" square
 - 70% min. passing No. 40 sieve
 - 30% min. passing No. 200 sieveOnsite soil may be used if it meets this gradation, if not, soil must be imported.
 3. Place the soil in horizontal lift. Uniformly compact the lifts during dry weather to between 90 and 92 percent of maximum dry density using a sheepsfoot roller or vibratory drum roller. Do not over compact.

Typical Section View (not to scale) Distortion 2'H = 1'V



Place 4" of topsoil over the berm surface and hydroseed per WSDOT specs. After the hydroseeding establishes itself, the surface will be replanted with dune grass and native rose per the Planting Plan.

Construct a gravel maintenance access lane from the Shorecrest Lane cul-de-sac to the east side of the tidegate vault as shown in the site plan. Place woven geotextile (Mirafi 500x or equivalent) over the finished berm top and surface with 3" crushed surfacing top course. Compact per WSDOT specs. Where the lane is not on the berm, prepare the soil foundation as per the berm specs.

Footbridge Details

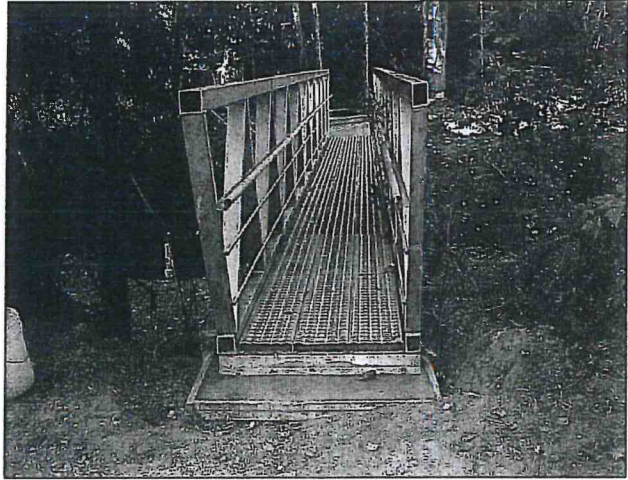
Contractor to provide a prefabricated 50' x 4' aluminum "gangway" footbridge by Manile Industries or equivalent. The contractor's selection shall be approved in advance by the project engineer. Construct concrete abutments at the locations on Sheet C-2 per the detail and install the bridge on the abutments.

Typical Structural Configuration

A typical structural configuration is shown. The vendor shall provide shop drawings showing relevant structural details for approval by the project engineer prior to contract award.



Elevation View



End View

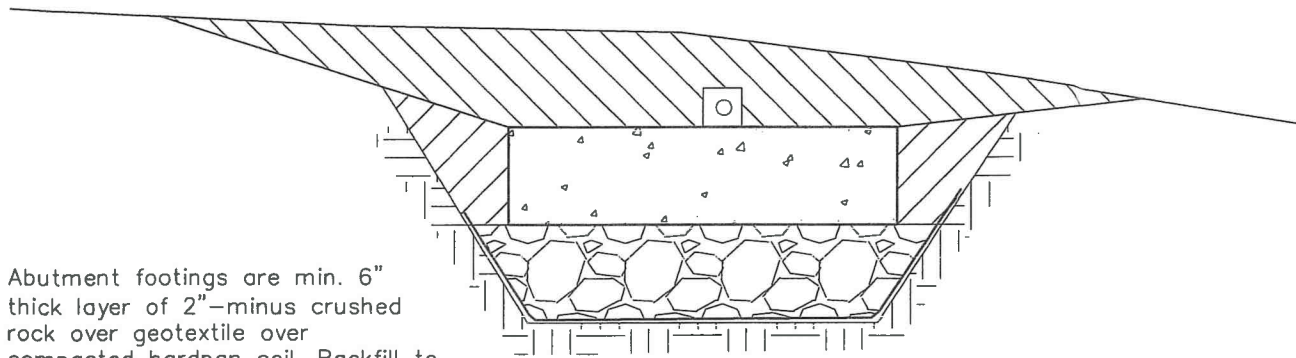
Abutment Detail – Scale 1" = 1'

Construct reinforced concrete pad footings for the prefabricated gangway structure. Footings shall be minimum 2'x6'x8" thick with No. 4 rebar on 6" spacing and with brackets cast in for securely attaching the gangway. Gangway shall be welded or otherwise securely attached to the brackets to prevent theft.

Excavate top of right (east) bank as needed so that the abutment top is no higher than 9" above the top of the right bank abutment.

Top elevation of right bank (east) abutment is 10.40'.

Top elevation of left bank (west) abutment is 9.50'.



Abutment footings are min. 6" thick layer of 2"-minus crushed rock over geotextile over compacted hardpan soil. Backfill to surrounding grade with compacted pitrun gravel.



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Earth Berm and Footbridge Details

Prepared for:



Prepared by:



Date: 2-3-14

Scale: as noted

Sheet # C-11

Sheet 20 of 23

Owner/applicant

Dugualla Community, Inc. PO Box 1258 Oak Harbor WA 98271 (360) 333-3344

026.019.007+

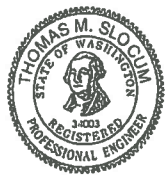
Water Line Replacement Details

Approximately 110 LF of the existing Dugualla Community, Inc.'s. public water supply pipeline shall be removed and rerouted across the new footbridge. A provisional draft design is provided below. The project sponsor shall develop the final design in consultation with DCI's water system operator King Water Management Co. and Washington Department of Health NW Drinking Water Office staff.

1. Approximately 110 LF of water line shall be re-routed. Preliminary routing is shown on Sheet C-2. Final routing to be determined per approval by WDOH.
2. The new water line shall meet all design and construction requirements in WDOH "Water System Design Manual" and WSDOT "Standard Specifications for Road Bridge and Municipal Construction."
3. The pipeline shall be minimum 4" i.d SDR PVC pipeline meeting ASTM D2241 specs, pressure rated to at least 100 psi.
4. The new pipe shall connect to the existing 4" asbestos-cement line per a design apporved by DOW. Standard PE utility boxes shall be installed at the two connections and at any junctions in to allow for inspection and repair.
5. The pipe across the new channel shall be enclosed in a 6" i.d. HDPE smooth wall drain pipe. The innner pipe shall be immobilized against the outer pipe at each joint by means of shims, urethane foam, or other approved method.
6. The pipe system shall be secured to the outside of the trestle chord or webbing using galvanized steel U-bolts or 28 guage galvanized steel strapping spaced 4' o.c. Provide plastic coatings or pads at contacts between the aluminum trestle and the U bolts / strapping to resist corrosion and to provide cathodic protection. The final configuration of the brackets is to be determined by the contractor.

Placeholder for detail drawings.

Placeholder for detail drawings.



Revisions

Dugualla Heights Lagoon Habitat
Restoration Project
Water Line Relocation Details

Prepared for:



Prepared by:



Date: 78-x-13

Scale: 1" = 1'

Sheet # C-12

Planting Plan

Objectives

Approximately 18.1 acres of land within the project boundaries will be planted with native plants to promote four objectives: 1) stabilize soil with the root mass, 2) provide shading and cover for juvenile fish rearing habitat, 3) provide habitat functions for birds, insects and other animals, and 4) promote the aesthetic scenery within WCLT's conservation easement.

Planting Zones

Four distinct zones, which approximate the natural plant communities in nearby reference sites, will be planted. The zones are shown in the schematic below and site plan on Sheet EnV-3. Existing vegetation is shown on Sheet G-2.

Zone 1 will consist of native herbaceous plants that are adapted to the high tide range in the vicinity of Dugallia Bay. The species composition will represent salt marsh plant communities at nearby reference sites, where the elevation typically ranges between approximately 5.5' NAVD88 to the MHHW elevation of 8.8' NAVD88 (corresponding to about 7.5' to 10.8' MLLW). Because the daily high tide height at the project site will be muted to 7.5' NAVD88, the elevation range for Planting Zone 1 will be from 5.5' and 7.5' NAVD88. The total area of Planting Zone 1 is about 2.9 acres.

Zone 2 will consist of native herbaceous and shrub species that represent the dune grass and high marsh/shrub plant community at nearby reference sites, normally lying between the MHHW elevation of 8.8' NAVD to the extreme high water elevation of about 12.0' NAVD. Because the daily high tide and extreme high water elevations will be muted at the project site, Zone 2 plants will be installed between 7.5' and 10.0' NAVD88. The total area of Planting Zone 2 is about 3.2 acres.

Zone 3 will consist of upland shrubs and trees at locations consistent with the view corridors stipulated in the conservation easement agreement. This represents the lower limit of scrub-shrub and shoreline forest at nearby reference sites, which occurs above extreme high tide (12.0' NAVD88). High water is muted within the area adjacent to the lagoon, so Zone 3 plants will be installed above 10.0' NAVD88. The total area of Zone 3 is about 11.3 acres.

Zone 4 will consist of native meadow grasses planted over the soil disposal area on the open pasture at the southwest corner of the conservation easement. Community members currently use this area for walking dogs, so stabilizing the soil with native grasses will allow this land use to continue. The area of Zone 4 is about 0.7 acres.

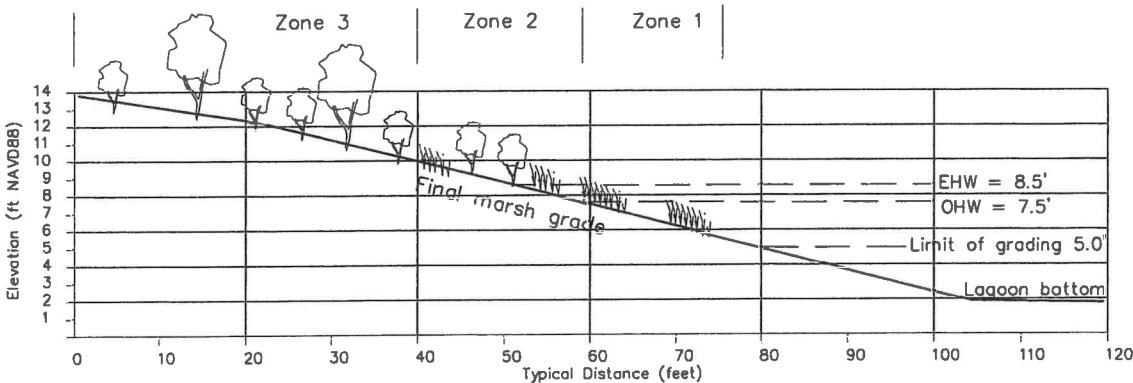
Conservation and Salvage of Existing Plants

With one exception, all of the existing large trees at the project site, both living and dead snags, will be preserved. These trees are shown on the schematic plan on ENV-3. One large spruce located in the eastern "lobe" of the existing pasture will be removed to allow for soil grading in that area. These trees will be flagged before soil grading commences and no grading will occur within the drip edge of each living tree's canopy.

Site Preparation and Planting

All existing blackberry, thistle and other invasive weeds will be removed prior to grading work at the site. Plants will be planted directly on the finished grade of the re-graded site. Planting will be done either in the late fall or late winter/early spring rainy seasons. Plants will be conservation grade nursery stock. Herbaceous plants will be broadcast in a seed/mulch matrix. Shrubs and trees will be bare root seedlings. All planting will be done by hand per the contract specifications.

Planting Elevation Zone Schematic



Species Inventory (numbers and species are estimates, subject to final approval by Land Trust staff).

Zone 1

Herbaceous plants will be spaced on average 1 stem per 3 square feet, allowing for variation between denser clumps in some areas and less coverage in others.

Seashore saltgrass (<i>Distichlis spicata</i>)	-	26,000
Pickleweed (<i>Salicornia virginica</i>)	-	15,000

Zone 2

Herbaceous species will average 1 stem per 3 sf. Shrubs spacing will average 1 stem per 10 sf, allowing for variation between clumps.

Herbaceous

Lyngby's sedge (<i>Carex lyngbyei</i>)	-	2,500
American threesquare (<i>Scirpus americanus</i>)	-	2,500
Dune wild rye (<i>Leymus mollis</i>)	-	2,500
Baltic rush (<i>Juncus balticus</i>)	-	2,000
Gumweed (<i>Grindelia integrifolia</i>)	-	2,000
Suksdorf's sagewort (<i>Artemisia suksdorfii</i>)	-	2,000
Tufted hairgrass (<i>Deschampsia caespitosa</i>)	-	2,000
Douglas aster (<i>Aster subspicatus</i>)	-	2,000

Shrubs

Nootka rose (<i>Rosa nutkana</i>)	-	4,400
Oceanspray (<i>Holodiscus discolor</i>)	-	4,400

Zone 3

Clusters of shrubs and trees will be planted at locations to be determined by the Land Trust, taking into consideration view lines and height restrictions, as specified in the stewardship plan for the conservation easement. Typical shrub spacing in clusters is 1 stem per 36 sf; typical tree spacing will be 1 tree per 100 sf.

Shrubs

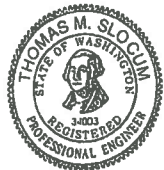
Rosa nutkana (Nootka rose)	-	1000
Salal (<i>Gaultheria shallon</i>)	-	1000
Oregon Grape (<i>Mahonia aquifolium</i>)	-	1000
Pacific crabapple (<i>Pyrus fusca</i>)	-	1000
Black twinberry (<i>Lonicera involucrata</i>)	-	1000
Oceanspray (<i>Holodiscus discolor</i>)	-	1000
Salmonberry (<i>Rubus spectabilis</i>)	-	1000
Thimbleberry (<i>Rubus parviflorus</i>)	-	1000
Red flowering currant (<i>Ribes sanguineum</i>)	-	1000
Red elderberry (<i>Sambucus racemosa</i>)	-	1000

Trees

Western red cedar (<i>Thuja plicata</i>)	-	250
Sitka spruce (<i>Picea sitchensis</i>)	-	250
Red alder (<i>Alnus rubra</i>)	-	250
Scouler's willow (<i>Salix scouleri</i>)	-	250

Monitoring and Maintenance

All plantings will be watered at least twice during the first summer. For the first two years, the clusters of herbaceous plants will be covered with netting to protect from grazing by Canada geese. Plants will be inventoried each year for three years. Dead plants will be replaced to ensure 90 percent survival after three years. Blackberries and other invasives will be removed.



Revisions

3-20-13

Dugallia Heights Lagoon Restoration Project
Planting Plan

Prepared for:



Prepared by:



Date:

2-3-14

Scale:

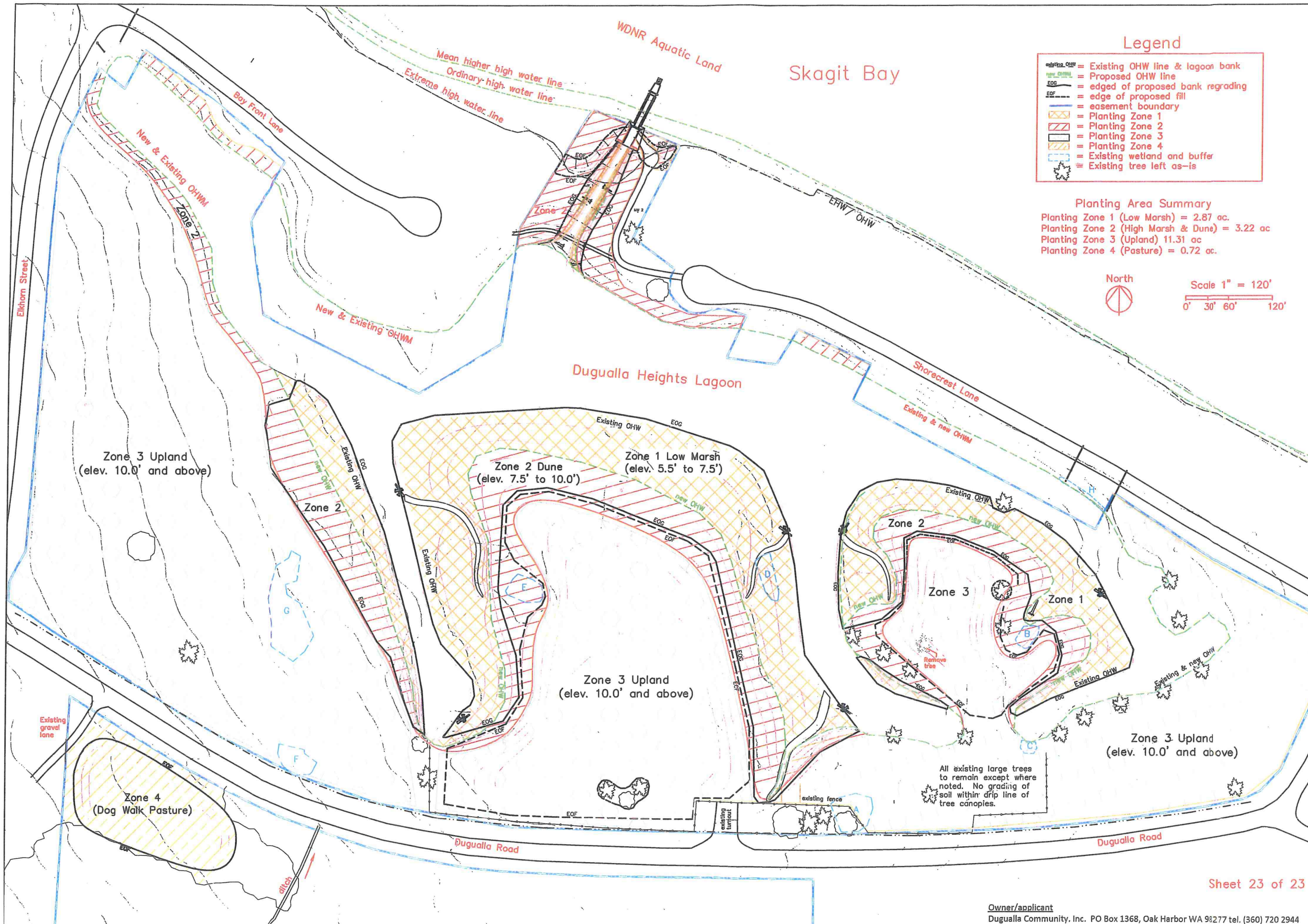
NTS

Sheet #

ENV-2

Owner/applicant

Dugallia Community, Inc. PO Box 1368, Oak Harbor WA 98277 tel. (360) 720 2944



Legend

- Existing OHW line & lagoon bank
- Proposed OHW line
- edged of proposed bank regrading
- edge of proposed fill
- easement boundary
- Planting Zone 1
- Planting Zone 2
- Planting Zone 3
- Planting Zone 4
- Existing wetland and buffer
- Existing tree left as-is

Planting Area Summary

Planting Zone 1 (Low Marsh) = 2.87 ac.
Planting Zone 2 (High Marsh & Dune) = 3.22 ac
Planting Zone 3 (Upland) 11.31 ac
Planting Zone 4 (Pasture) = 0.72 ac.



Scale 1" = 120'
0' 30' 60' 120'



Revisions

3-20-13

Dugualla Heights Lagoon Restoration Project
Planting Plan Schematic

Prepared for:



Prepared by:



Date:

8-x-13

Scale:

1" = 120'

Sheet #

ENV-3

2026.019.007w