ESA

2801 Alaskan Way
Suite 200
Seattle, WA 98121
206.789.9658 phone
206.789.9684 fax

esassoc.com

memorandum

date	February 26, 2024
to	Jacobo Jimenez
cc	
from	Pablo Quiroga, Dane Bahrens
subject	Herring's House Park Shoreline Restoration Feasibility Study - Executive Summary

Executive Summary

This memorandum summarizes the key findings of the Herring's House Shoreline Restoration Feasibility Study conducted by Environmental Science Associates (ESA). The Seattle Parks and Recreation Department (SPR) commissioned the study to assess site conditions, conduct a comprehensive hydrologic study, and develop and propose preliminary alternative design concepts to restore the marsh and upland improvements. The primary focus of the study is to provide SPR with viable alternatives to enhance the site's ecological performance, with an emphasis on expanding the tidal channel to bolster estuarine habitats for Chinook salmon.

The proposed solutions look into enhancing the tidal connection between the marsh and the adjacent Duwamish River channel by widening and realigning the channel. It is expected that the restoration of natural hydrologic processes and tidal regimes will revive other natural processes such as sediment transport, tidal channel formation and maintenance, detritus import and export, and the exchange of aquatic organisms.

Site Background

Herring's House Park is situated on the Puget Sound along the Duwamish River in South Elliot Bay (See Figure 1-1). The current Hering's House Park layout was established in 2000, and it was purposefully designed primarily as a habitat for juvenile Chinook salmon. The park features an intertidal estuary surrounded by an upland area vegetated with native plants and a trail. The shoreline is armored with 8-9 inch diameter quarry stone. The park is used for leisure walks, nature viewing, and cycling via the Duwamish Trail.

The park holds historical significance as a site deeply rooted in the cultural heritage of the *dxʷdəwʔabš* Duwamish ("people of the inside"). The name of the park is derived from the Duwamish village located downstream from the park's location near the mouth of the Duwamish, known as *túʔulʔaltxʷ*, meaning "herring's house".

Key Findings

The feasibility study revealed a number of key considerations and findings that are the base for the proposed conceptual alternatives. Table 1-1 summarizes the study findings and recommendations.

TABLE 1-1
SUMMARY OF KEY FINDINGS

Design Parameter	Description / Recommendations
Inlet Stability	• The inlet was found to be too narrow and too long relative to similar sites connected to Puget Sound. To restore the natural processes to the site, the inlet should be shortened and widened to at least 50 ft wide to meet hydrology requirements and to widen to at least 120 ft for salmon habitat. • It is also recommended to over-excavate the inlet channel to provide additional accommodation space for sedimentation.
Channel Geomorphology	• Rotate the channel alignment to be perpendicular to the existing shoreline. • Dredge pilot channels to an elevation of 4 ft NAVD88 or lower through the marsh. This will allow the site to increase regular tidal inundation and "washing" of the imported soil, which is needed to alter the soil's physical and chemical components that support wetland vegetation.
Riparian and Wetland Vegetation	Riparian and wetland re-vegetation is recommended: • Riparian and wetland vegetation from 8 ft to 10 ft NAVD88. • Seeding on the existing estuary (5 to 8 ft NAVD88) once tidal flow is established.
Sea Level Rise	• 2 to 5-year water level events will be higher than 12.5 ft NAVD by the 2030-2050 period. These events will inundate some upland areas of the park and will become annual occurrences by the 2050-2070 period. • It is recommended to consider the effects of rising sea levels on the Upland design and elevate certain areas of the park during this process. This could be done using a phasing process, and upland areas could be created with a gentle transition from the marsh to higher upland areas.
Upland Improvements and Park Use Opportunities	The proposed inlet alterations and associated improvements will allow Park visitors to witness and track the restoration of this shoreline segment. Several actions are recommended: • Selective trimming and thinning of existing vegetation to provide visual access to the Park. • Bird blinds are recommended at locations where overlooks are provided for views into the wetland. • Create clear demarcation of navigation routes to guide visitors away from critical habitat and restoration areas. This could include split-rail fencing, signage, and strategic planting. • Signage identifying habitat planting locations.

Marsh Restoration

Informed by the technical studies, two conceptual alternatives were developed (Appendix A) that will enhance the marsh ecosystem and restore the tidal flow on the estuary. The concept-level alternatives take into account improvements in the hydrodynamics of the site, ecological benefits, changes to the coastal geomorphology, potential impacts, future recreational use of the park, constructability, and cost.

Construction costs were developed for each concept, and total costs are summarized in Table 1-2 and shown in detail in Appendix B.

Concept 1.

In Concept 1 (See Appendix A), we propose to widen the existing channel inlet and realign it to the shoreline by removing material from the neighboring upland. The channel will be excavated to elevation 2-3 ft NAVD88, and the removed riprap from the upland will be reused as scour protection along the channel. A topsoil with 1 ft minimum thickness will be placed. Planting of low and high marsh will occur on the sides of the channel. This will improve the site's ecological value, help stabilize the channel, and reduce park users walking into the channel.

High Marsh planting will occur along the estuary from elevation 8 to 10 ft NAVD, and seeding of the estuary will occur from elevation 6 ft to 8 ft NAVD88. Pilot channels along the estuary will be excavated up to elevation 3 ft NAVD to reinstate a tidal flow regime.

This option is advantageous because it maximizes the use of the existing channel alignment, reducing the required amount of excavation. It also minimizes disruption of access to the existing shoreline trail. However, excavated material might require hauling offsite.

Concept 2.

Concept 2 (See Appendix A) proposes the excavation of a new inlet channel northeast of the existing channel. This alignment takes advantage of a narrow segment of the shoreline to create a more direct, wider opening to the Duwamish River channel. The inlet channel will have similar characteristics as the Concept 1 channel but with gentler slopes, providing more space for high and low marsh planting. Planting and excavation of pilot channels are also proposed, as done in Concept 1.

Similar to Concept 1, this concept will allow for the reuse of excavated material onsite for constructing neighboring upland areas. The primary advantage of this Concept is that it allows for a shorter, wider channel. However, since it would occupy an existing shoreline area, it would require larger excavation volumes.

Upland Improvements

Although the project focuses on marsh restoration, ESA also considered the implications of the different concepts on upland areas of the park. Combining the tidal inlet, marsh, and upland improvements will create a more holistic restoration project and a more coherent improvement of the park amenities and park-user experience. This approach will help SPR take into account not only the marsh ecology but also other factors like cultural resources, construction costs, improvements and phasing of upland ecology, coastal resilience, and use of the park.

ESA proposes three varying alternatives (Appendix C) that can be divided into two categories. Radial improvements (Alternative A) and Circuit Improvements (Alternative B and C).

Construction cost estimates were developed for each alternative and are summarized in Table 1-2 and shown in detail in Appendix D.

Alternative A

The radial improvements scheme places a focus on park improvements that provide enhanced accessible circulation routes originating from the parking area to focus points within the park where visitors are afforded a view of the restoration area and the Duwamish Waterway as well as connection points to həʔapus Village Park. This option considers limiting access to the Park so large areas of the Park will have limited human intervention.

Alternative B

Circulation routes will be enhanced with a focus on accessibility through a combination of surface replacement and selective re-alignment. Circulation routes that navigate through dynamic topography and amidst mature trees on the northern half of the site will rely on natural trail surfacing and boardwalks to bring visitors to a waterway overlook. Existing overlook locations will receive updates for structural integrity and safety, which may require replacement. It is further recommended that waterway overlooks be revised to include bird blinds where they may impact wildlife.

Alternative C

The circuit improvements scheme will focus on park improvements that allow visitors to circumnavigate the wetland restoration via accessible paths originating at the parking lot and connecting to həʔapus Village Park to the south. Visitors will be routed around the wetland, including navigation of a bridge spanning the re-aligned inlet. Further study will be required for the design and positioning of the bridge. The provision of accessible paths on the northern half of the site will require selective grading which may require some tree removal. It is recommended that plantings be provided along the property fence lines to assist with screening the adjacent industrial properties.

No Action Alternative

The No Action alternatives is included as a basis for understanding the benefits of the restoration alternatives. We expect that this alternative would result in the following:

- Degradation and instability of the existing inlet channel.
- Deterioration of existing trails and lookouts
- Continued lack of functionality of existing ecology, especially for Chinook salmon.
- Projected sea level rises will change the vegetation without planned or phased changes. This will also mean an increase in coastal flooding frequency by 2050.

This alternative is not preferred and does not provide benefits compared to the other alternatives. No cost estimate was developed for this alternative.

Cost Estimate

A summary of the construction cost is shown in Table 1-2. Detailed cost estimates are shown in Appendix B and D. Total costs are shown as a first order of magnitude at a concept level and will require further refinement. Cost estimates between concepts 1 and 2 are considered closed for the marsh restoration. Construction costs do not consider the possible disposal of contaminated soil, which will need to be investigated in further phases of the project. If contaminated soil is found in the proposed areas of excavation, the cost estimate shown here will be higher.

Upland improvement costs are shown as a first order of magnitude at the concept level and are meant to help Parks consider the cost of different approaches and amenities proposed in this study. Cost estimates for Alternative C are considerably higher due to the use of a boardwalk along the park, the proposed regrading of the upland, and the use of a bridge to connect the Park trail.

TABLE 1-2
SUMMARY OF COST ESTIMATES

ALTERNATIVES	TOTAL COST
Marsh Restoration	
Concept 1	$820,000
Concept 2	$855,000
Upland Improvements	
Alternative A	$930,000
Alternative B	$1,800,000
Alternative C	$3,640,000

Next Steps

ESA identified several areas that will require further investigation prior to the development of the preferred alternative design plans. These areas include.

Permitting Requirements

Before proceeding with the design of a preferred alternative, a study of the permitting requirements is needed. This should include identifying any potential permitting issues. The project will likely require federal, state, and local permits.

Cultural Resources

The location has a high sensitivity for cultural resources. Additional review will be necessary to identify and evaluate the potential impacts of cultural resources. The project might be required to comply with municipal, state, or federal regulations that require consideration of the potential effects of the project's cultural resources. If ground disturbance is planned within the boundaries of a recorded archaeological site, a state excavation permit may be required. from the Department of Archaeology and Historic Preservation (DAHP)

Contaminated Soils

Historical records show that contaminated soils may be present below grade at the project site. Further investigation of the location of the contaminated soil within the proposed excavated area is needed to inform future phases and decisions related to the preferred alternative.

Marsh and Upland Vegetation

A more detailed study of the proposed re-vegetation of the marsh and the upland by a biologist will be needed to advance the preferred alternative design further.

Coastal Resilience

During this study, Coastal vulnerabilities of the existing park were identified. A comprehensive analysis of sea level rise implications on upland vegetation and coastal inundation is recommended. Proposed solutions for the preferred alternative must also undergo evaluation. ss

Path: U:\GIS\GIS\Projects\2021xxx\D202101177_00_Herrings_House_Shoreline_Restoration\03_Project\Herrings_House_Shoreline_Restoration.aprx Fig1_ProjectSite_ALNguyen 1/29/2024

Basemap: Esri; County Boundaries: WA DNR; City Boundary: ArcGIS; Study Area: ESA

Herrings House Shoreline Restoration

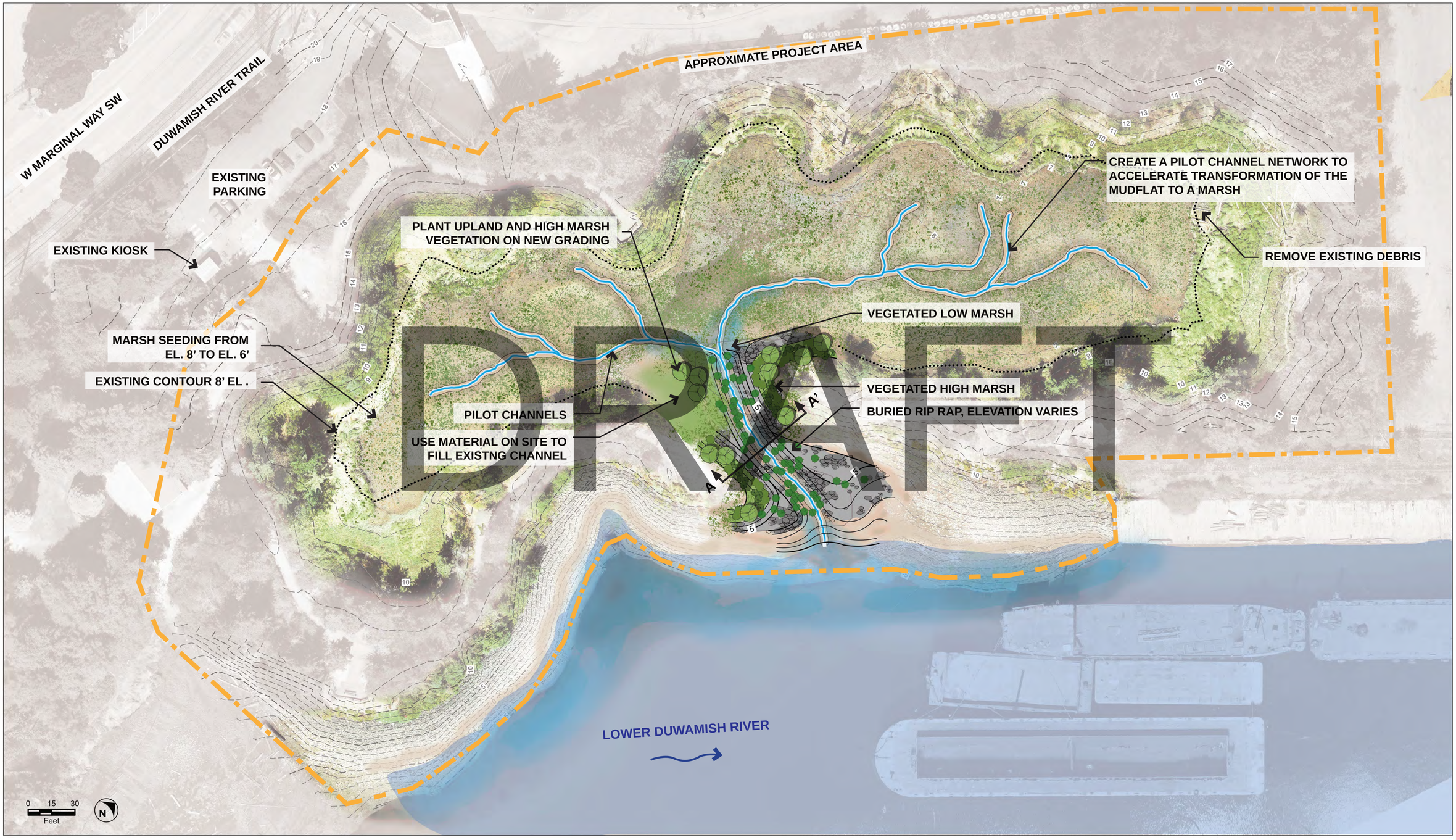
Figure 1-1
Project Location and Vicinity Map

ESA

APPENDIX A

Marsh Conceptual Restoration Design

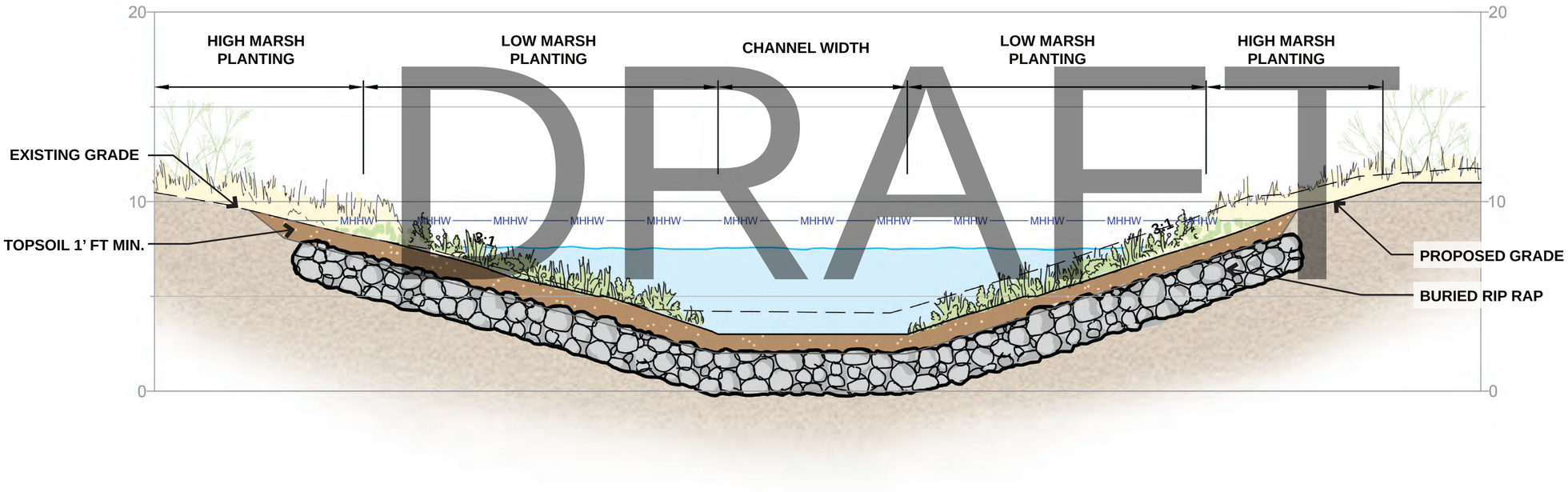
DRAFT



Herring's House

Marsh Restoration Concept Plan 1

ESA

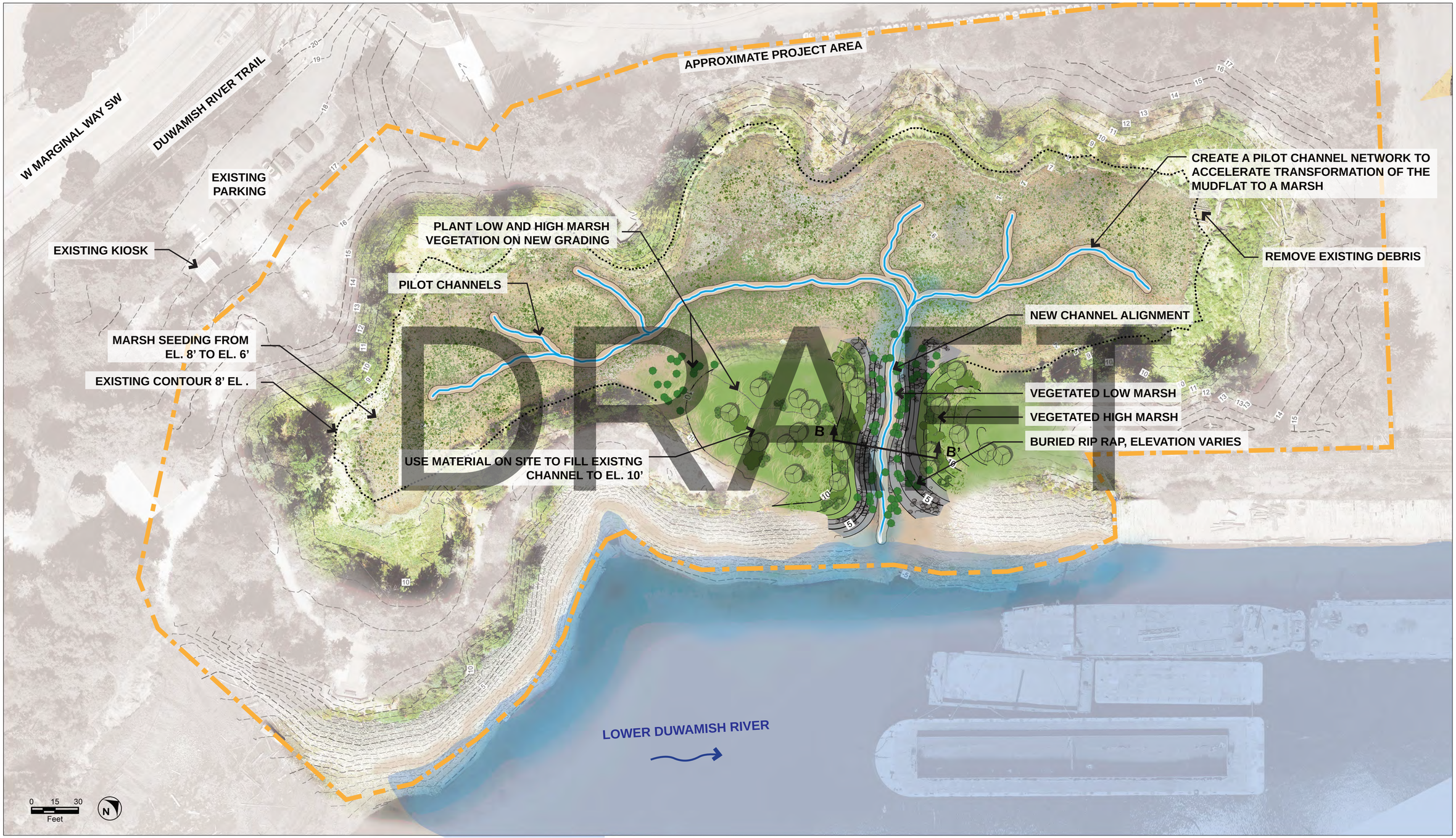


Section A-A': Channel Cross Section (Not to Scale)

Herring's House

Main Channel Concept 1

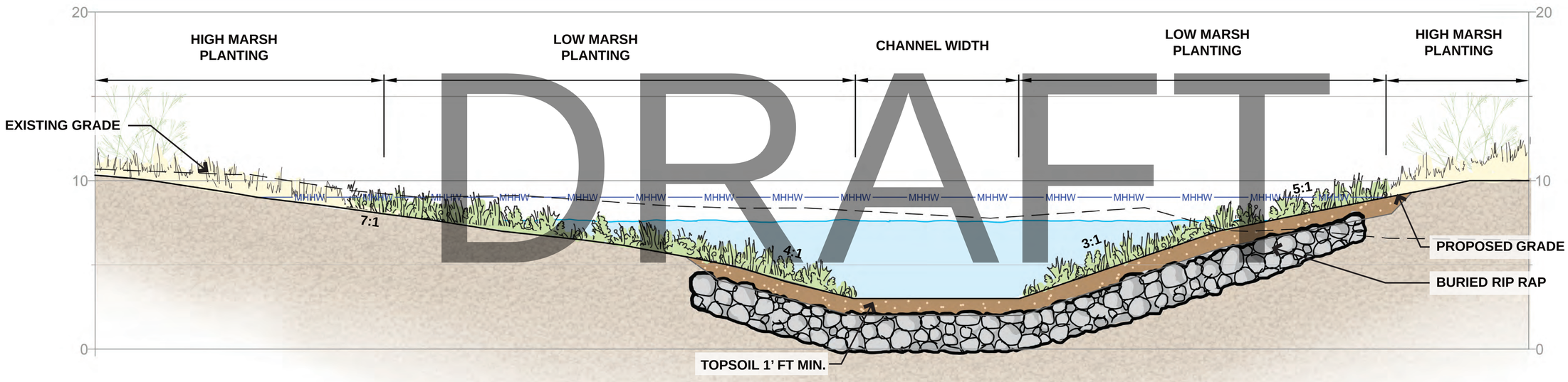
ESA



Herring's House

Marsh Restoration Concept Plan 2

ESA



Section B-B': Channel Cross Section (Not to Scale)

Herring's House

Main Channel Concept 2

ESA

APPENDIX B

Marsh Restoration Quantities and Costs

Herring's House Park - MARSH RESTORATION CONCEPT 1

Estimate of Probable Construction Cost

Date: 1/24/2020

By: PDQ

Checked: DB

ITEM NO.	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	COST
SITE PREPARATION					**$ 23,800**
1	TREE REMOVAL	3	EA	$ 300.00	$ 900
2	CLEARING AND GRUBING	9200	SF	$ 0.75	$ 6,900
3	HIGH VISIBILITY FENCE	200	LF	$ 5.00	$ 1,000
4	CONSTRUCTION SURVEY	1	LS	$ 15,000.00	$ 15,000
EROSION CONTROL					**$ 150,000**
5	TEMPORARY EROSION AND SEDIMENT CONTROL	1	LS	$ 20,000.00	$ 20,000
6	INSTALL, MAINTAIN AND REMOVE TURBIDITY CURTAIN	1	LS	$ 120,000.00	$ 120,000
7	STABILIZED CONSTRUCTION ENTRANCE	1	EA	$ 10,000.00	$ 10,000
EARTHWORK AND CHANNEL INLET					**$ 207,200**
8	EXCAVATION AND STOCKPILE	1,600	CY	$ 40.00	$ 64,000
9	HAUL AND DISPOSE EXCESS RIPRAP	120	CY	$ 70.00	$ 8,400
10	HAUL AND DISPOSE EXCESS AND UNSUITABLE MATERIAL	1,290	CY	$ 40.00	$ 51,600
11	EXISTING CHANNEL FILL	50	CY	$ 40.00	$ 2,000
12	ROCK FOR EROSION CONTROL AND SCOUR PROTECTION REUSED RIPRAP	520	CY	$ 30.00	$ 15,600
13	TOPSOIL MATERIAL	1,100	CY	$ 40.00	$ 44,000
14	PILOT CHANNEL EXCAVATION	360	CY	$ 60.00	$ 21,600
SITE RESTORATION					**$ 105,500**
15	PLANTING AREA	16,000	SF	$ 5.00	$ 80,000
16	HAND SEEDING	6,500	SY	$ 3.00	$ 19,500
17	TREES - 6'-8' HT.	12	EA	$ 500.00	$ 6,000
	DIRECT ITEM SUBTOTAL				$ 486,500
	BONDING AND INSURANCE	2%			$ 9,730
	GENERAL CONDITIONS	10%			$ 48,650
	MOBILIZATION/DEMOBILIZATION	10%			$ 48,650
	CONTINGENCY	40%			$ 194,600
	CONTRACTOR OVERHEAD AND PROFIT	6%			$ 29,190
	SALES TAX (not included, 10.1%)				$ -
	CONSTRUCTION TOTAL (Rounded)				**$ 820,000**

NOTES:

1. Cost does not include permitting, engineering design, management, or other soft costs.
2. Costs provided in 2024 dollars.
3. This estimate represents upland/public acces related work only.
4. Cost do not reflect geotechinical study or input.
5. Cost do not include any utilty alterations or upgrades.
6. Sales tax is not included.

Herring's House Park - MARSH RESTORATION CONCEPT 2

Estimate of Probable Construction Cost — By: PDQ

Date: 1/24/2020 — Checked: DB

ITEM NO.	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	COST
SITE PREPARATION					**$ 29,500**
1	TREE REMOVAL	7	EA	$ 300.00	$ 2,100
2	CLEARING AND GRUBING	15200	SF	$ 0.75	$ 11,400
3	HIGH VISIBILITY FENCE	200	LF	$ 5.00	$ 1,000
4	CONSTRUCTION SURVEY	1	LS	$ 15,000.00	$ 15,000
EROSION CONTROL					**$ 155,000**
5	TEMPORARY EROSION AND SEDIMENT CONTROL	1	LS	$ 25,000.00	$ 25,000
6	INSTALL, MAINTAIN AND REMOVE TURBIDITY CURTAIN	1	LS	$ 120,000.00	$ 120,000
7	STABILIZED CONSTRUCTION ENTRANCE	1	EA	$ 10,000.00	$ 10,000
EARTHWORK AND CHANNEL INLET					**$ 218,000**
8	EXCAVATION AND STOCKPILE	1,800	CY	$ 40.00	$ 72,000
9	HAUL AND DISPOSE EXCESS RIPRAP	200	CY	$ 70.00	$ 14,000
10	HAUL AND DISPOSE EXCESS AND UNSUITABLE MATERIAL	820	CY	$ 40.00	$ 32,800
11	EXISTING CHANNEL FILL	800	CY	$ 40.00	$ 32,000
12	ROCK FOR EROSION CONTROL AND SCOUR PROTECTION REUSED RIPRAP	360	CY	$ 30.00	$ 10,800
13	TOPSOIL MATERIAL	900	CY	$ 40.00	$ 36,000
14	PILOT CHANNEL EXCAVATION	340	CY	$ 60.00	$ 20,400
SITE RESTORATION					**$ 105,500**
15	PLANTING AREA	16,000	SF	$ 5.00	$ 80,000
16	HAND SEEDING	6,500	SY	$ 3.00	$ 19,500
17	TREES - 6'-8' HT.	12	EA	$ 500.00	$ 6,000
	DIRECT ITEM SUBTOTAL				$ 508,000
	BONDING AND INSURANCE	2%			$ 10,160
	GENERAL CONDITIONS	10%			$ 50,800
	MOBILIZATION/DEMOBILIZATION	10%			$ 50,800
	CONTINGENCY	40%			$ 203,200
	CONTRACTOR OVERHEAD AND PROFT	6%			$ 30,480
	SALES TAX (not included, 10.1%)				$ -
	CONSTRUCTION TOTAL (Rounded)				**$ 855,000**

NOTES:

1. Cost does not include permitting, engineering design, management, or other soft costs.
2. Costs provided in 2024 dollars.
3. This estimate represents upland/public acces related work only.
4. Cost do not reflect geotechinical study or input.
5. Cost do not include any utilty alterations or upgrades.
6. Sales tax is not included.

APPENDIX C

Upland Conceptual Design

DRAFT

Herring's House

Upland Alternative - A

ESA

Herring's House

Upland Alternative - B

ESA

Herring's House

Upland Alternative - C

ESA

APPENDIX D

Upland Quantities and Costs

DRAFT

Herring's House Park - UPLAND ALTERNATIVE 'A'
Estimate of Probable Construction Cost
Date: 1/24/2020

By: TTF, MAC
Checked: PDQ

ITEM NO.	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	COST
SITE PREPARATION					**$ 51,800**
1	CLEARING AND GRUBBING	47000	SF	$ 0.50	$ 23,500
2	TREE REMOVAL	1	LS	$ 300.00	$ 300
3	CONSTRUCTION SURVEY AND STAKING	1	LS	$ 20,000.00	$ 20,000
4	TARGETED INVASIVE REMOVAL	16000	SF	$ 0.50	$ 8,000
EROSION CONTROL					**$ 71,000**
5	EROSION/WATER POLLUTION CONTROL	1	LS	$ 15,000.00	$ 15,000
6	HIGH VISIBILITY FENCE	1350	LF	$ 4.00	$ 5,400
7	FILTER FENCE	2600	LF	$ 6.00	$ 15,600
8	TREE AND VEGETATION PROTECTION ALLOWANCE	1	LS	$ 10,000.00	$ 10,000
9	STRAW WADDLE	1200	LF	$ 2.50	$ 3,000
10	STABILIZED CONSTRUCTION ENTRANCE	1	EA	$ 10,000.00	$ 10,000
11	UTILITY PROTECTION ALLOWANCE	12	MO	$ 1,000.00	$ 12,000
DEMOLITION & TEMPORARY STRUCTURES					**$ 45,830**
12	SAW CUT	140	LF	$ 2.00	$ 280
13	ASPHALT PATH	9,250	SF	$ 3.00	$ 27,750
14	BELOW GRADE STRUCTURE AT OVERLOOKS	3	LS	$ 2,500.00	$ 7,500
15	GUARDRAIL AT OVERLOOKS	100	LF	$ 8.00	$ 800
16	BENCH	4	EA	$ 550.00	$ 2,200
17	GRAVEL PATH	4,200	SF	$ 1.50	$ 6,300
18	CONCRETE PAD	300	SF	$ 2.50	$ 750
19	PRESERVE AND PROTECT KIOSK	1	EA	$ 250.00	$ 250
EARTHWORK					**$ 45,900**
20	IMPORTED FILL	560	CY	$ 40.00	$ 22,400
21	IMPORTED TOPSOIL AMMENDMENT	100	CY	$ 40.00	$ 4,000
22	ROUGH GRADING	30,000	SF	$ 0.25	$ 7,500
23	FINE GRADING	30,000	SF	$ 0.40	$ 12,000
PLANTING					**$ 112,770**
24	PLANTING AREA	18,500	SF	$ 3.00	$ 55,500
25	IRRIGATION - MODIFY EXISTING SYSTEM	18,500	SF	$ 1.00	$ 18,500
26	FINE COMPOST	115	CY	$ 40.00	$ 4,600
27	SEEDING	6,890	SY	$ 3.00	$ 20,670
28	TREES - 6'-8' HT.	22	EA	$ 500.00	$ 11,000
29	TREE LIMBING	1	LS	$ 2,500.00	$ 2,500
SITE RESTORATION					**$ 224,800**
30	CONCRETE CURB	130	LF	$ 35.00	$ 4,550
31	CONCRETE PAVING	10,000	SF	$ 12.00	$ 120,000
32	*SPECIALTY CONCRETE PAVING*	*0*	*SF*	*$ 15.00*	*$ -*
33	GRAVEL PAVING - 1/4" MINUS	2,850	SF	$ 5.00	$ 14,250
34	*BOARDWALK*	*0*	*SF*	*$ 120.00*	*$ -*
35	BIRD BLIND	2	EA	$ 5,000.00	$ 10,000
36	*BOARDWALK OVERLOOK*	*0*	*EA*	*$ 15,000.00*	*$ -*
37	*BOARDWALK GUARDRAIL*	*0*	*LF*	*$ 100.00*	*$ -*
38	*OVERLOOK GUARDRAIL*	*0*	*LF*	*$ 200.00*	*$ -*
39	AT GRADE OVERLOOK	4	EA	$ 10,000.00	$ 40,000
40	SIGNAGE ALLOWANCE	1	LS	$ 10,000.00	$ 10,000
41	*PREFABRICATED BRIDGE*	*0*	*LF*	*1000*	*$ -*
42	*BRIDGE HEADWALLS*	*0*	*LF*	*250*	*$ -*
43	BENCH	6	EA	$ 1,500.00	$ 9,000
44	SPLIT RAIL FENCE	220	LF	$ 50.00	$ 11,000
45	PICNIC TABLE	2	EA	$ 3,000.00	$ 6,000
	DIRECT ITEM SUBTOTAL				$ 552,100
	BONDING AND INSURANCE	2%			$ 11,042
	GENERAL CONDITIONS	10%			$ 55,210
	MOBILIZATION/DEMOBILIZATION	10%			$ 55,210
	CONTINGENCY	40%			$ 220,840
	CONTRACTOR OVERHEAD AND PROFT	6%			$ 33,126
	SALES TAX (not included, 10.1%)				$ -
	CONSTRUCTION TOTAL (Rounded)				**$ 930,000**

NOTES:

1. Cost does not include permitting, engineering design, management, or other soft costs.
2. Assume no stormwater treatment is required for existing parking lot.
3. Assume additional fire/emergency access turnaround not required.
4. Costs provided in 2024 dollars.
5. This estimate represents upland/public acces related work only.
6. Cost do not reflect geotechinical study or input.
7. Cost do not include any utilty alterations or upgrades.
8. Cost assume no interruption to traffic patterns.
9. Sales tax is not included.

Herring's House Park - UPLAND ALTERNATIVE 'B'
Estimate of Probable Construction Cost
Date: 1/24/2020

By: TTF, MAC
Checked: PDQ

ITEM NO.	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	COST
SITE PREPARATION					**$ 73,050**
1	CLEARING AND GRUBBING	71000	SF	$ 0.50	$ 35,500
2	TREE REMOVAL	1	LS	$ 300.00	$ 300
3	CONSTRUCTION SURVEY AND STAKING	1	LS	$ 30,000.00	$ 30,000
4	TARGETED INVASIVE REMOVAL	14500	SF	$ 0.50	$ 7,250
EROSION CONTROL					**$ 71,000**
5	EROSION/WATER POLLUTION CONTROL	1	LS	$ 15,000.00	$ 15,000
6	HIGH VISIBILITY FENCE	1350	LF	$ 4.00	$ 5,400
7	FILTER FENCE	2600	LF	$ 6.00	$ 15,600
8	TREE AND VEGETATION PROTECTION	1	LS	$ 10,000.00	$ 10,000
9	STRAW WADDLE	1200	LF	$ 2.50	$ 3,000
10	STABILIZED CONSTRUCTION ENTRANCE	1	EA	$ 10,000.00	$ 10,000
11	UTILITY PROTECTION ALLOWANCE	12	MO	$ 1,000.00	$ 12,000
DEMOLITION & TEMPORARY STRUCTURES					**$ 45,830**
12	SAW CUT	140	LF	$ 2.00	$ 280
13	ASPHALT PATH	9,250	SF	$ 3.00	$ 27,750
14	BELOW GRADE STRUCTURE AT OVERLOOKS	3	LS	$ 2,500.00	$ 7,500
15	GUARDRAIL AT OVERLOOKS	100	LF	$ 8.00	$ 800
16	BENCH	4	EA	$ 550.00	$ 2,200
17	GRAVEL PATH	4,200	SF	$ 1.50	$ 6,300
18	CONCRETE PAD	300	SF	$ 2.50	$ 750
19	PRESERVE AND PROTECT KIOSK	1	EA	$ 250.00	$ 250
EARTHWORK					**$ 67,150**
20	IMPORTED FILL	355	CY	$ 40.00	$ 14,200
21	IMPORTED TOPSOIL AMMENDMENT	300	CY	$ 40.00	$ 12,000
22	ROUGH GRADING	63000	SF	$ 0.25	$ 15,750
23	FINE GRADING	63000	SF	$ 0.40	$ 25,200
PLANTING					**$ 118,670**
24	PLANTING AREA	20,500	SF	$ 3.00	$ 61,500
25	IRRIGATION - MODIFY EXISTING SYSTEM	20,500	SF	$ 1.00	$ 20,500
26	FINE COMPOST	125	CY	$ 40.00	$ 5,000
27	SEEDING	6,890	SY	$ 3.00	$ 20,670
28	TREES - 6'-8' HT.	17	EA	$ 500.00	$ 8,500
29	TREE LIMBING	1	LS	$ 2,500.00	$ 2,500
SITE RESTORATION					**$ 693,550**
30	CONCRETE CURB	130	LF	$ 35.00	$ 4,550
31	CONCRETE PAVING	7,000	SF	$ 12.00	$ 84,000
32	*SPECIALTY CONCRETE PAVING*		*SF*	*$ 15.00*	*$ -*
33	GRAVEL PAVING - 1/4" MINUS	4,500	SF	$ 5.00	$ 22,500
34	BOARDWALK	3,000	SF	$ 120.00	$ 360,000
35	BIRD BLIND	2	EA	$ 8,500.00	$ 17,000
36	BOARDWALK OVERLOOK	3	EA	$ 15,000.00	$ 45,000
37	BOARDWALK GUARDRAIL	850	LF	$ 100.00	$ 85,000
38	OVERLOOK GUARDRAIL	100	LF	$ 200.00	$ 20,000
39	AT GRADE OVERLOOK	3	EA	$ 7,500.00	$ 22,500
40	SIGNAGE ALLOWANCE	1	LS	$ 15,000.00	$ 15,000
41	*PREFABRICATED BRIDGE*		*LF*	*1000*	*0*
42	*BRIDGE HEADWALLS*		*LF*	*250*	*0*
43	BENCH	8	EA	$ 1,500.00	$ 12,000
44	SPLIT RAIL FENCE		LF	$ 50.00	$ -
45	PICNIC TABLE	2	EA	$ 3,000.00	$ 6,000
	DIRECT ITEM SUBTOTAL				$ 1,069,250
	BONDING AND INSURANCE	2%			$ 21,385
	GENERAL CONDITIONS	10%			$ 106,925
	MOBILIZATION/DEMOBILIZATION	10%			$ 106,925
	CONTINGENCY	40%			$ 427,700
	CONTRACTOR OVERHEAD AND PROFT	6%			$ 64,155
	SALES TAX (not included, 10.1%)				$ -
	CONSTRUCTION TOTAL (Rounded)				**$ 1,800,000**

NOTES:
1. Cost does not include permitting, engineering design, management, or other soft costs.
2. Assume no stormwater treatment is required for existing parking lot.
3. Assume additional fire/emergency access turnaround not required.
4. Costs provided in 2024 dollars.
5. This estimate represents upland/public acces related work only.
6. Cost do not reflect geotechinical study or input.
7. Cost do not include any utilty alterations or upgrades.
8. Cost assume no interruption to traffic patterns.
9. Sales tax is not included.

Herring's House Park - UPLAND ALTERNATIVE 'C'
Estimate of Probable Construction Cost
Date: 1/24/2020

By: TTF, MAC
Checked: PDQ

ITEM NO.	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	COST
SITE PREPARATION					**$ 58,550**
1	CLEARING AND GRUBBING	51000	SF	$ 0.50	$ 25,500
2	TREE REMOVAL	8	EA	$ 300.00	$ 2,400
3	CONSTRUCTION SURVEY AND STAKING	1	LS	$ 30,000.00	$ 30,000
4	TARGETED INVASIVE REMOVAL	1300	SF	$ 0.50	$ 650
EROSION CONTROL					**$ 71,000**
5	EROSION/WATER POLLUTION CONTROL	1	LS	$ 15,000.00	$ 15,000
6	HIGH VISIBILITY FENCE	1350	LF	$ 4.00	$ 5,400
7	FILTER FENCE	2600	LF	$ 6.00	$ 15,600
8	TREE AND VEGETATION PROTECTION ALLOWANCE	1	LS	$ 10,000.00	$ 10,000
9	STRAW WADDLE	1200	LF	$ 2.50	$ 3,000
10	STABILIZED CONSTRUCTION ENTRANCE	1	EA	$ 10,000.00	$ 10,000
11	UTILITY PROTECTION ALLOWANCE	12	MO	$ 1,000.00	$ 12,000
DEMOLITION & TEMPORARY STRUCTURES					**$ 45,830**
12	SAW CUT	140	LF	$ 2.00	$ 280
13	ASPHALT PATH	9,250	SF	$ 3.00	$ 27,750
14	STRUCTURE AT OVERLOOKS	3	LS	$ 2,500.00	$ 7,500
15	GUARDRAIL AT OVERLOOKS	100	LF	$ 8.00	$ 800
16	BENCH	4	EA	$ 550.00	$ 2,200
17	GRAVEL PATH	4,200	SF	$ 1.50	$ 6,300
18	CONCRETE PAD	300	SF	$ 2.50	$ 750
19	PRESERVE AND PROTECT KIOSK	1	EA	$ 250.00	$ 250
EARTHWORK					**$ 49,350**
20	IMPORTED FILL	295	CY	$ 40.00	$ 11,800
21	IMPORTED TOPSOIL AMMENDMENT	110	CY	$ 40.00	$ 4,400
22	ROUGH GRADING	51,000	SF	$ 0.25	$ 12,750
23	FINE GRADING	51,000	SF	$ 0.40	$ 20,400
PLANTING					**$ 122,370**
24	PLANTING AREA	21,500	SF	$ 3.00	$ 64,500
25	IRRIGATION - MODIFY EXISTING SYSTEM	21,500	SF	$ 1.00	$ 21,500
26	FINE COMPOST	130	CY	$ 40.00	$ 5,200
27	SEEDING	6,890	SY	$ 3.00	$ 20,670
28	TREES - 6'-8' HT.	16	EA	$ 500.00	$ 8,000
29	TREE LIMBING	1	LS	$ 2,500.00	$ 2,500
SITE RESTORATION					**$ 1,817,550**
30	CONCRETE CURB	130	LF	$ 35.00	$ 4,550
31	CONCRETE PAVING	7,000	SF	$ 12.00	$ 84,000
32	SPECIALTY CONCRETE PAVING	2,500	SF	$ 15.00	$ 37,500
33	*GRAVEL PAVING - 1/4" MINUS*	*0*	*SF*	*$ 5.00*	*$ -*
34	BOARDWALK	10,000	SF	$ 120.00	$ 1,200,000
35	BIRD BLIND	2	EA	$ 8,500.00	$ 17,000
36	BOARDWALK OVERLOOK	1	EA	$ 10,000.00	$ 10,000
37	BOARDWALK GUARDRAIL	2,000	LF	$ 100.00	$ 200,000
38	OVERLOOK GUARDRAIL	50	LF	$ 200.00	$ 10,000
39	AT GRADE OVERLOOK	2	EA	$ 7,500.00	$ 15,000
40	SIGNAGE ALLOWANCE	1	LS	$ 20,000.00	$ 20,000
41	PREFABRICATED BRIDGE	120	LF	1500	$ 180,000
42	BRIDGE HEADWALLS	80	LF	250	$ 20,000
43	BENCH	9	EA	$ 1,500.00	$ 13,500
44	*SPLIT RAIL FENCE*	*0*	*LF*	*50*	*$ -*
45	PICNIC TABLE	2	EA	$ 3,000.00	$ 6,000
	DIRECT ITEM SUBTOTAL				$ 2,164,650
	BONDING AND INSURANCE	2%			$ 43,293
	GENERAL CONDITIONS	10%			$ 216,465
	MOBILIZATION/DEMOBILIZATION	10%			$ 216,465
	CONTINGENCY	40%			$ 865,860
	CONTRACTOR OVERHEAD AND PROFT	6%			$ 129,879
	SALES TAX (not included, 10.1%)				$ -
	CONSTRUCTION TOTAL	(Rounded)			**$ 3,640,000**

NOTES:
1. Cost does not include permitting, engineering design, management, or other soft costs.
2. Assume no stormwater treatment is required for existing parking lot.
3. Assume additional fire/emergency access turnaround not required.
4. Costs provided in 2024 dollars.
5. This estimate represents upland/public acces related work only.
6. Cost do not reflect geotechinical study or input.
7. Cost do not include any utilty alterations or upgrades.
8. Cost assume no interruption to traffic patterns.
9. Sales tax is not included.