Habitat Monitoring Report: Year 3
City of Tacoma Middle Waterway Restoration Project

AND PICKLEWEED RANCH

Photo point LM3B

October 2004

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Habitat Monitoring Report: Year 3
City of Tacoma Middle Waterway Restoration Project

1.0 Introduction

The City of Tacoma (City) performed a habitat restoration on 1.9 acres of vacant industrial property at the head of Middle Waterway in Tacoma, Washington. The property is located near the intersection of East F Street and East 11th Street. The primary objectives of the restoration action were to lower the grade of the properties to salt marsh elevations, cover the surface with clean habitat material, and vegetate the salt marsh and its bordering riparian buffer zones.

This restoration action was conducted as part of the City's settlement of alleged natural resource damages with the Commencement Bay Natural Resource Trustees[1] (Trustees). This monitoring report is being provided to the Trustees as a part of that settlement.

Restoration activities included construction (excavation, backfilling, grading, slope stabilization, fencing, and installation of an irrigation system) performed by RCI Environmental, Inc. between July 21 and September 29, 2000; planting of all the riparian areas by the City and citizen volunteers on November 4, 2000; and planting of salt marsh areas on May 26, 2001.

The City has conducted thirteen monitoring events since completion of construction:

- Year 0 - December 21, 2000; March 29, 2001; June 26, 2001; and August 15, 2001;
- Year 1 - December 11, 2001; March 21, 2002; June 14, 2002; August 20, 2002;
- Year 2 - January 21, 2003; April 4, 2003; June 12, 2003; September 9, 2003; and
- Year 3 - August 30, 2004.

The methods and frequency of these monitoring events were detailed in the "Monitoring and Adaptive Management Plan" (Hart Crowser, February 25, 2000) prepared for this site. Quarterly monitoring events are required for the first two years. The remaining three years of required monitoring include annual monitoring events performed in late summer of each year. The next qualitative monitoring event will occur in August 2005. The final report will be submitted after the Year 5 quantitative monitoring event (2006).

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[1] Commencement Bay Natural Resource Trustees consist of the following entities: National Oceanic and Atmospheric Administration; U.S. Fish and Wildlife Service; Washington State Department of Ecology; Washington State Department of Fish and Wildlife; Washington State Department of Natural Resources; The Puyallup Tribe of Indians and Muckleshoot Indian Tribe.

2.0 Qualitative Monitoring & Results

Qualitative monitoring results are based upon observations of trained personnel during site visits. Qualitative observations were taken of vegetation, sedimentation, wildlife, and other local environmental conditions. For the City of Tacoma, this person is Desiree Pooley, Senior Environmental Specialist. The City has retained David Adams as a site steward, and his observations are also included.

2.1 Physical Site Description

The site is composed of three general areas: the City parcel, the DNR parcel and the 11th Street Right of Way (ROW).

The City parcel is approximately 1 acre and is situated adjacent to the substation on along East "F" Street. The riparian area (elevation > 14 ft MLLW) lines three edges in this portion of the site and is sloped at 4:1 (horizontal: vertical). The riparian soil is all imported sandy loam. There is a broad flat upper salt marsh area (elevations between 12 and 14 ft MLLW) and the substrate is native sands and silts/clays that were uncovered when the excavation got to the project grade. The lower salt marsh area (elevations between 12 ft MLLW down to the project boundary, which is approximately 9 ft MLLW) consists predominantly of imported silty sand.

The 0.7-acre DNR parcel follows the irregularly shaped project boundary on the waterside and is bordered by the substation and the Port Yacht Basin on the upland side. All the substrate on this parcel is imported material. The riparian has some broad flat areas in addition to the transitional sloping portion that leads to the salt marsh. Owing to the limiting project boundaries in this area, the upper and lower salt marsh areas are narrow bands following project boundary. All three elevation ranges converge at a relatively steep slope along side the Port Yacht basin.

The 11th Street ROW is approximately 0.2-acre strip of riparian area that starts at the end of the Port Yacht Basin Property and stretches along East 11th Street. All the soil was imported riparian topsoil.

2.2 Photo Points

Photo points were established as described in the Monitoring Plan and depicted in Figure 1. The location of each point was marked by a stake and surveyed. A photo with a digital camera was taken from each photo point during each monitoring event. The photos are presented in Appendix A.

The photos of the riparian areas show the general good health and vigor of the riparian plantings, as well as the development of volunteers, which are quite extensive in areas. In general, riparian slopes and flats have complete ground coverage.

It was previously noted that few volunteer plants were establishing in the salt marsh areas. However, after review of Year 3 photos and field notes, the pickleweed continues to spread in mass and by seed. The salt marsh has also attracted volunteer native species including goose-toungue (Plantago maritima ssp. juncoides) and sea arrow grass (Triglochin maritimum).

2.3 Vegetation

Several general trends continue to be observed:

- Nootka rose, alder, and hooker's willow continue to thrive.
- Pickleweed is forming mats in the lower salt marsh and reseeding itself in areas outside the goose exclusion areas.
- Salt grass in the upper salt marsh continues to spread beyond the confines of the goose exclusion devices.
- Volunteer vegetation is noted in all areas of the project site.
- Annual maintenance continues to control invasive species.
- Red alder have survived the second consecutive caterpillar infestation with minimal loss.

2.4 Sediment

Certain areas of the restoration site have experienced limited sediment loss since construction was completed. The transitional area between the upper and lower salt marsh areas continue to equalize. Readings taken in 2004, suggest the overall project trend continues to be accretion of sediment. This could be attributed to the increase in vegetative cover. Areas that had experienced erosion now have equalized to the extent that vegetation is colonizing these areas.

2.5 Wildlife

Many animals have been visiting the site. Direct observations and / or evidence of the following animals have been documented:

• Salmon fry	• Violet-green swallow
• Spotted sandpiper	• Song sparrow
• Crow	• Widgeon
• Canada geese	• Great Blue Heron
• Seagulls	• Killdeer
• Rabbit	•

2.6 Local Environment

In August 2004, Washington State Department of Natural Resources (DNR) began cleanup of the sediments at the head of Middle Waterway. Construction activities were located adjacent to our site and included excavation, sediment sampling, dewatering and capping. Please contact Tim Goodman, DNR, at (360) 902-1057 for project details.

The Middle Waterway site along with others was included in a tour related to the 2004 Coastal and Estuarine Habitat Restoration Conference. Participants walked the site and learned about site history, construction, and lessons learned.

In addition to the DNR cleanup, other shoreline areas within Middle Waterway continue to be the focus of restoration. Both Foss Maritime (225 E. "F" Street) and General Construction (311 E. "F" Street) located on the west bank of the waterway have completed restoration. Much of the east bank is slated for future restoration projects related to the Thea Foss cleanup mitigation.

3.0 Quantitative Monitoring Methods

Quantitative monitoring involves collection and analysis of numerical data concerning habitat features such as vegetation and sedimentation.

3.1 Vegetation

No quantitative vegetation monitoring was conducted in Year 3. The next round of quantitative data will be collected during Year 5 monitoring event (2006).

3.2 Sediment

Quantitative sediment monitoring consisted of recording the sediment elevation at each of 8 sediment stakes. The stakes were installed on October 30, 2000 in the areas shown on Figure 1 and initial readings recorded. Because these stakes were installed shortly after the end of construction it is appropriate to address this reading as Year 4. Each stake was marked in centimeters starting at the top of the stake, however, over time the marks have worn off. During Year 4 monitoring all stakes were read with a tape measure in centimeters from the bottom up.

3.3 Groundwater Seep Sampling

The site was monitored for the presence of seeps throughout each quarterly event, but no seeps have been observed. Therefore, no seep sampling or analysis is possible at this time. We will continue to look for seeps during future monitoring events.

4.0 Quantitative Results

4.1 Vegetation

No quantitative vegetation monitoring was conducted in Year 3. The next round of quantitative data will be collected during Year 5 monitoring event (2006).

4.2 Sediment

Erosion of salt marsh or riparian soil substrates could cause loss of habitat and vegetation. However, some equilibration of sedimentary regime is to be expected. The performance goal for sediment erosion is to have less than 1 cm of erosion per year, on average, between Year 2 (2002) and Year 5 (2005) monitoring events. As construction was completed in August 2000 and stakes were placed in October 2000, the Year 4 (2004) readings have no performance measure. Table 1 presents Year 4 sediment stake readings, the net change over the year, and the opportunity to compare these readings to the averages of Year 2 and 3 readings are for informational purposes only.

Table 1. Sediment Stake Readings for Year 4

	Year 2	Year 3	Year 4	Year 2-4	Average
Sediment Stake ID	2002	2003	2004	Net change (x)	Change (x/2)
705	60.2	59.8	59.4	-0.8	-0.4
706	50.5	51.1	49.5	-1.0	-0.5
*712	50.1	50.1	46	-4.1	-2.1
713	60.8	59.8	60	-0.8	-0.4
715	50.8	50.7	50.5	-0.3	-0.2
716	51.6	50.8	51.6	0	0
719	49.3	47.8	47.5	-1.8	-0.9
720	48.6	47.8	47.5	-1.1	-0.6

*The top most metal portion of the stake has begun to corrode due to the saline environment.
Readings are in centimeters from the top of the stake to the sediment surface.
Positive net change means the sediment surface is getting further from the top of the stake = erosion.
Negative net change means the sediment surface is getting closer to the top of the stake = accretion.

Please note that the reading of sediment stake #712 is inaccurate due to the failing stake material. Past measurements of the stake #712, show it to be a very stable area. As no significant accretion or adjacent erosion was noted in the field notes, the net change and average change can be assumed to inaccurate and not indicative of any sediment problems.

The site will continue to be monitored over Year 5 (2005) to ensure none of the capped areas experience a loss of sediment, which could possibly expose underlying materials.

5.0 Maintenance / Adaptive Management

This section presents the maintenance activities that have been completed and the activities that are proposed under the adaptive management process.

5.1 Completed & On-going Activities

In anticipation of DNR construction activities and disturbance to the restoration site, two plant salvage efforts (May 22 and June 19, 2004) were undertaken to try and save as many existing plants as possible (See Appendix B for informative article and Pre-salvage photos). Both riparian and lower salt marsh plants were transplanted to other areas of the restoration site. Transplanting success was approximately 50% for the riparian plants and 95% for the salt marsh plants. The low survival rate of the riparian transplants could be due to soil conditions, dry summer, or transplant shock. Replanting of the disturbed areas is anticipated for the riparian areas in Fall 2004 and salt marsh areas in Spring 2005.

In June and July 2004, maintenance was completed through a partnership with Pierce Conservation District and Tacoma's Urban League crew. Supervised by David Adams, the crew spent 3 days on-site removing Himalayan blackberry and butterfly bush as well as Canada thistle.

David Adams (site steward under City contract), frequently visits the site maintains the GED, removes noxious weeds as necessary, and gathers other pertinent information on the condition of the site. David also provides advice and expertise on adaptive management options.

5.2 Recommended Adaptive Management Activities

The overall health and vigor of the vegetation at this restoration site is very good. As competition between native and non-native species continues, so will the City's efforts to eradicate invasives species such as: butterfly bush, Himalayan blackberry, Scot's broom, Tansy ragwort, and Canada thistle.

The irrigation system will continue to operate during the dry months.

It is also recommended that the following activities continue:

- Monitor moisture in site soils during operation of irrigation system
- Monitor sedimentation and erosion
- Maintain GED
- Continue quantitative (2005) and qualitative (2006) monitoring
- Continue to remove trash as needed

The News Tribune - Tacoma, WA

Tuesday, June 22, 2004

Tribnet.com < Back to Regular Story Page

Middle Waterway cleanup nears end

SUSAN GORDON; The News Tribune

Volunteers have lifted thick mats of pickle weed, nootka roses and a few shore pines from the south end of the Middle Waterway, setting the stage for the finish of its $17 million Superfund cleanup.

Tacoma resident Valerie Anderson, who does landscaping for a living, lent a hand to help the birds, fish and other critters that inhabit the area. "It's just one little thing I can do," she said.

Next month, workers are scheduled to dig up the last toxic hot spot in the waterway, one of the polluted canals in Tacoma's industrial Tideflats. A pocket of sediment saturated with cancer-causing compounds called polycyclic aromatic hydrocarbons or PAHs - commonly found in asphalt, soot, crude oil and roofing tar - lies about a foot below the surface of the mud flat, just north of East 11th Street.

To get to it, heavy equipment will roll through an area where volunteers labored three years ago to plant thousands of native plants: pines, madronas, maples, alders, roses, hazelnuts, willows and salt marsh vegetation, such as pickle weed.

Last month, Anderson and other volunteers for Citizens for a Healthy Bay began digging up and moving some of the plants to the west side of the canal. After the cleanup is complete, volunteers probably will return to replant and salvage as much vegetation as possible, said Leslie Ann Rose, senior policy analyst for the 900-member bay advocacy group.

"We will have a very nice functional habitat at the head of the waterway and it will be cleaner," she said. "It's a small cleanup by Commencement Bay standards, but it's a very important one because of what this area represents."

The city's original habitat restoration took place before the U.S. Environmental Protection Agency and state officials firmed up plans to remove the last toxic hot spot. Initially, EPA officials were willing to leave the pollutants in place, but state officials - who manage the land - refused.

The Middle Waterway's mud flats are a remnant of what was once a vital estuary at the mouth of the Puyallup River. Biologists estimate that development has destroyed 99 percent of the thousands of acres of marshes and mud flats that once defined the delta.

Cleaning up the hot spot - between 2,000 and 4,000 cubic yards of contaminated sediment - will cost about $1.5 million in state and city money, said environmental engineer Tim Goodman, who works for the state Department of Natural Resources. Work will likely be done within six or eight weeks.

The excavation will encompass a little more than a half-acre of mud flat. After the sediment is removed, workers will haul it to a landfill, probably in Eastern Washington, Goodman said.

Besides digging up the most heavily polluted sediment, workers will cover more than 2 acres of mud flat with about a foot of clean fill. "The stuff at the surface is mildly contaminated," he said.

The Middle Waterway is part of a 12-square-mile area along Commencement Bay that was designated a federal Superfund cleanup site in 1983. EPA officials have estimated the overall cleanup cost at $185 million. The whole job won't be done until at least 2006.

Most of the harmful compounds and metals that contaminate waterway sediments - besides PAHs, they include mercury, arsenic and copper - ended up there after decades of Tideflats industrial activity.

Officials aren't certain about the origin of the Middle Waterway's PAH hot spot, but they believe it might have come from the J.E. Berkheimer Manufacturing Co., which did business at the end of the waterway for eight years ending in 1917. Berkheimer used coal tar - a byproduct of coal gasification - to make roofing materials, creosote, paints and pitch.

The building Berkheimer once occupied is gone and the company went out of business in 1940.

Most of the Middle Waterway cleanup bill - about $15.5 million - has been shouldered by the Middle Waterway Action Committee, made up of three enterprises that agreed to pay for the work required by EPA. They are tugboat operator Foss Maritime Co., the shipbuilder Marine Industries Northwest and painting contractor Pioneer Industries.

Most of the work started about a year ago and was completed in February.

At the mouth of the waterway, the change has been dramatic. Last year, crews dismantled a run-down dock and buildings once known as Cook's Marine Specialties, a ship repair outfit that shut down in 1993. In addition, workers tore down a dilapidated Foss pier and a Marine Industries shed, said Bruce McDonald, an engineer for Anchor Environmental, a consulting firm that works for the action committee.

McDonald said the Middle Waterway Action Committee paid for the removal of:

•865 creosote-treated pilings.

•1.6 acres of over-water structures.

•107,658 cubic yards of contaminated sediment, now confined in the Port of Tacoma's Blair Slip 1.

In addition, workers covered almost 4 1/2 acres at the bottom with clean fill.

Besides improving the waterway's appearance, removal of the derelict structures allows natural light to shine into the water, making it easier for young salmon to hide from predators, EPA officials said.

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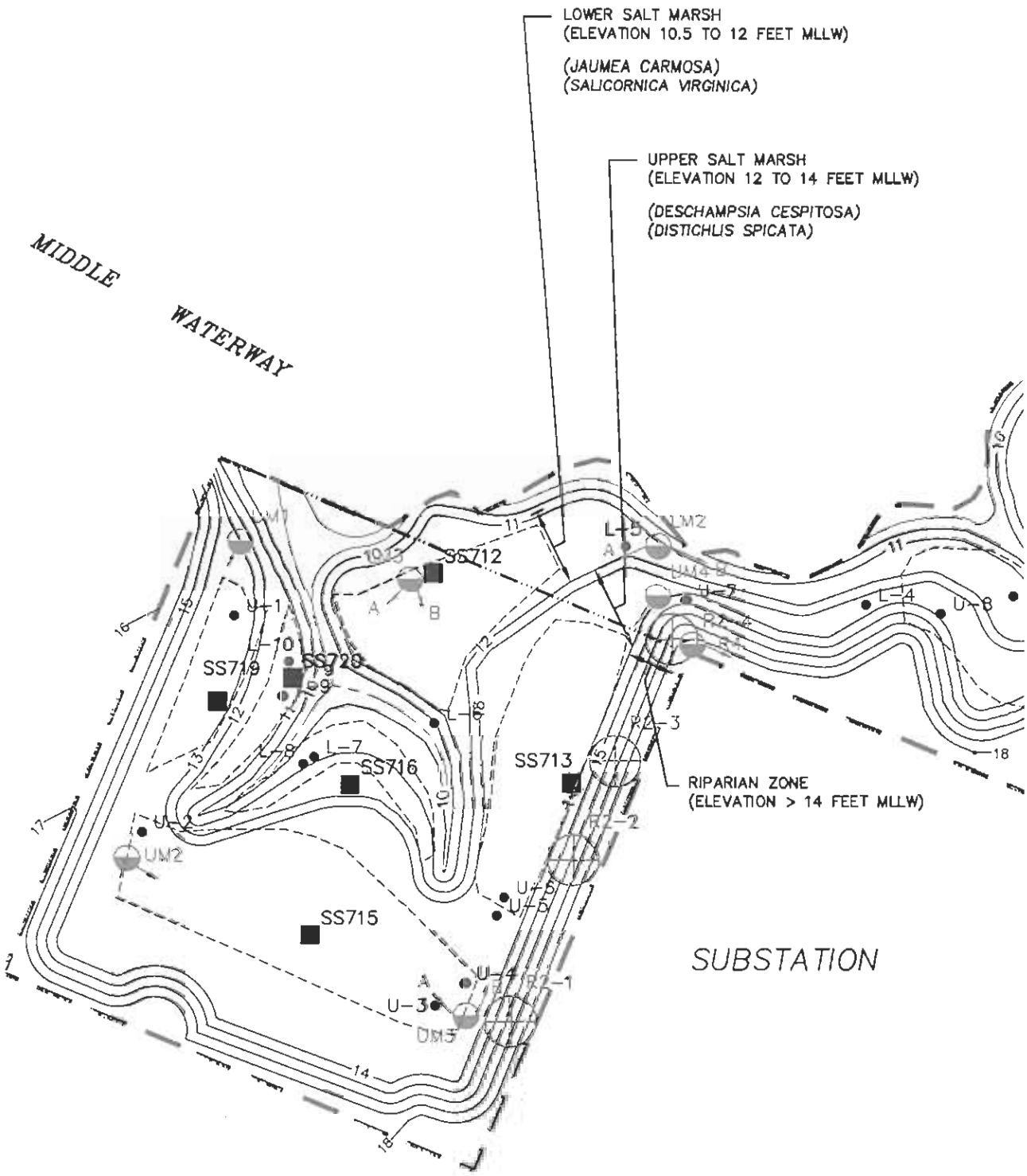
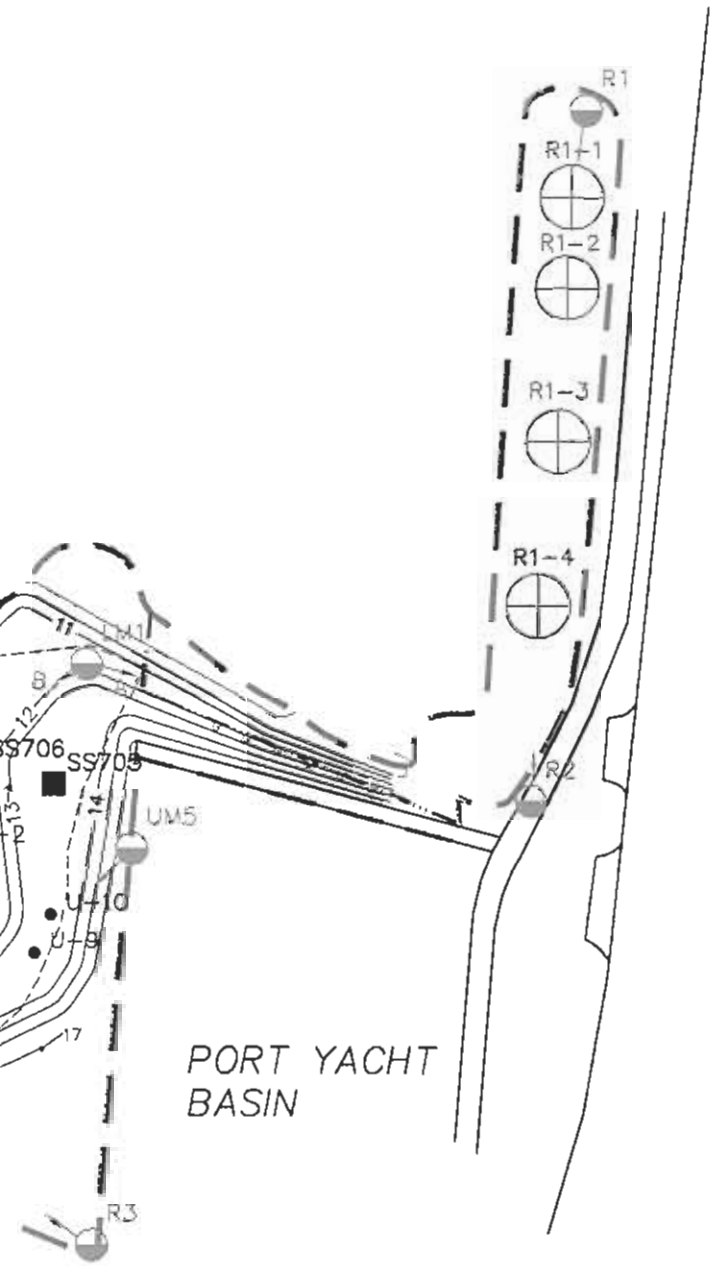
FIGURE 1



LOWER SALT MARSH
(ELEVATION 10.5 TO 12 FEET MLLW)
(JAUMEA CARMOSA)
(SALICORNICA VIRGINICA)
UPPER SALT MARSH
(ELEVATION 12 TO 14 FEET MLLW)
(DESCHAMPSIA CESPITOSA)
(DISTICHLIS SPICATA)
MIDDLE WATERWAY
RIPARIAN ZONE
(ELEVATION > 14 FEET MLLW)
SUBSTATION
SS712
SS719
SS720
SS716
SS713
SS715
UM1
UM2
UM3
UM4
L-5
L-4
L-7
L-8
L-10
U-1
U-2
U-3
U-4
U-5
U-6
U-7
U-8
R2-1
R2-2
R2-3
R2-4
A
B



LEGEND

- RIPARIAN QUADRANTS 28.3 m
- SALT MARSH QUADRANTS 0.25 m
- SEDIMENT STAKES
- PHOTO POINTS
- SALT MARSH PLANTED AREAS WITH GOOSE EXCLUDER
- PROJECT BOUNDARY

N

0 30 60
Scale In Feet

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

MIDDLE WATERWAY
RESTORATION PROJECT

DATE 10-12-01		SCALE 1"=30'
DES JOL	MANAGER ENGINEERING DIVISION	
DR REG	CITY ENGINEER	SHEET 1 OF 1
CK JGP	DIRECTOR OF PUBLIC WORKS	YEAR-Q.DWG DWG NAME

Appendix A:

Middle Waterway Monitoring Photos

Appendix A - Middle Waterway Monitoring Photos 8/30/2004

Photo Point: R1

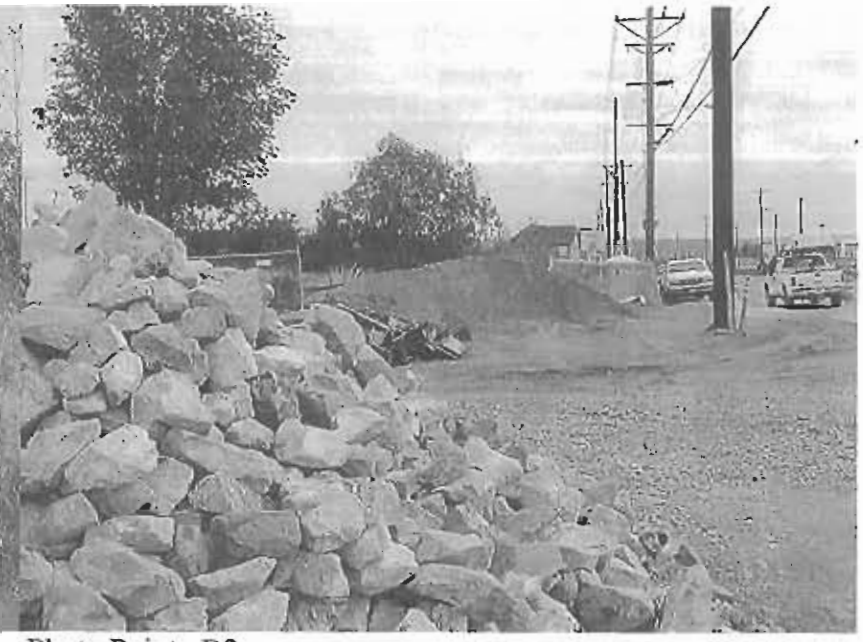


Photo Point: R2

Photo Point: R3

Photo Point: R4

Appendix A - Middle Waterway Monitoring Photos 8/30/2004

Photo Point: UM1

Photo Point: UM2

Photo Point: UM3A

Photo Point: UM3B

Appendix A - Middle Waterway Monitoring Photos 8/30/2004

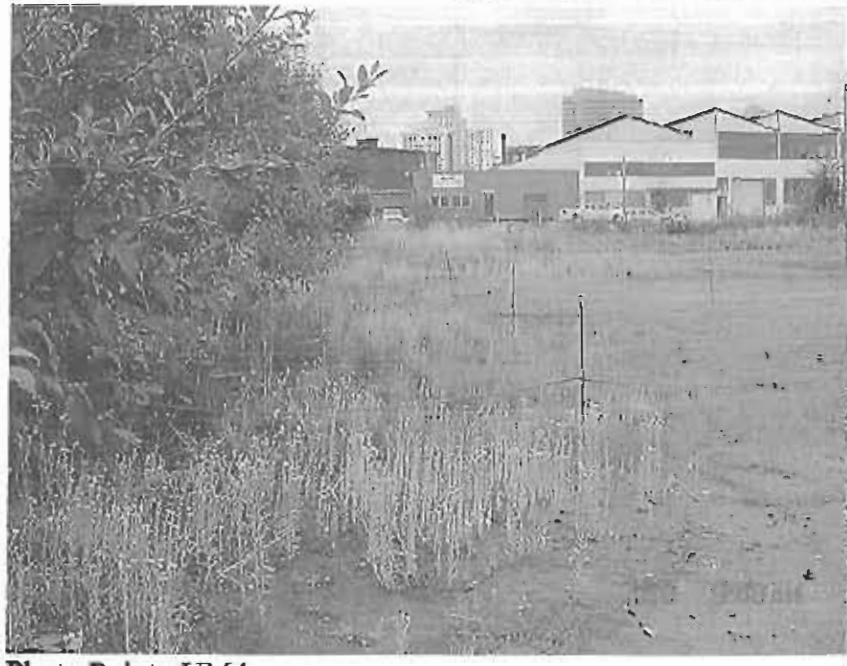


Photo Point: UM4

Photo Point: UM5

Photo Point: LM1A

Photo Point: LM1B

Appendix A - Middle Waterway Monitoring Photos 8/30/2004

Photo Point: LM2A

Photo Point: LM2B

Photo Point: LM3A

Photo Point: LM3B

Appendix B:

Middle Waterway Article and Pre-Salvage Photos

Appendix B – Middle Waterway Pre-Salvage Photos 5/20/2004

Appendix B – Middle Waterway Pre-Salvage Photos 5/20/2004