City of Tacoma
Olympic View Resource Area

Habitat Monitoring Report: Year 1

Olympic View Resource Area

December 2004

Tacoma City of Tacoma
Public Works Department

January 3, 2005

Jennifer Steger
NOAA DARC-NW
7600 Sand Point Way NE
Seattle, WA 98115-0070

RE: Olympic View Resource Area Monitoring Report: Year 1

Dear Ms. Steger:

Pursuant to Paragraph 21 of the City/Trustee Consent Decree we are submitting Habitat Monitoring Report: Year 1 for the City of Tacoma Olympic View Resource Area Restoration Project. Also enclosed is the eelgrass monitoring video and monitoring pictures on CD.

Due to expense, video and CD are supplied only to the addressee. If those persons copied on this letter desire these resources or if you have any questions regarding the enclosed report, please feel free to contact me at 253.502.2126 or email: dpooley@cityoftacoma.org.

Sincerely,

Desiree K. Pooley

Desiree K. Pooley
Environmental Services Science & Engineering Division

DKP:psng(File: OVRA/Year 1 Mon Report Trans)
Enclosures
cc:
Chief, Environmental Enforce. Sect., DoJ
Robert Taylor, NOAA GC NR-NW
John Carlton, WA Dept. of Fish & Wildlife
Judy Lantor, USFWS
Bill Sullivan, Puyallup Tribe of Indians
Glenn St. Amant, Muckleshoot Indian Tribe
David Adams, Site Steward
Karen Keeley, Environmental Protection Agency
Colin Wagoner, Ridolfi Engineering
John O'Loughlin, Tacoma Public Works Dept.
David Templeton, Anchor Environmental
Craig Thompson, WA Dept. of Ecology
Tom Gibbons, WA Dept. of Natural Resources
Karen Larkin, Tacoma Public Works Dept.
James Parvey, Tacoma Public Works Dept.
Doug Mosich, Tacoma Legal Dept.
Steve Karavitas, Tacoma Public Utilities Legal Dep
John Lewis, Foss Maritime Company
Bill Stowell, Shore Terminals LLC
Lindie Schmidt, WA Dept. of Natural Resources
Stan Cummings, Citizens for a Healthy Bay

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Olympic View Resource Area Restoration Project

1.0 Introduction

The City of Tacoma (City) performed a habitat restoration on 12.4 acres of vacant industrial shoreline and tidelands on the north end of the peninsula separating the Foss and Middle Waterways in Tacoma, Washington (See Figure 1). Of those 12.4 acres, approximately 10.9 acres is intertidal or shallow subtidal property. The project is located on both lands leased from the State of Washington and City owned property. The primary objectives of the restoration action were to remove the dilapidated warehouse and the 600+ associated pilings, create a public access walkway, vegetate the adjacent upland area, restore the productivity and slope of the beach, and protect the eelgrass habitat located just off shore.

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. This project is also regulated under an Environmental Protection Agency (EPA) Removal Action.

Phased restoration activities included demolition of a dilapidated warehouse and walkway construction, extensive excavation and capping, slope stabilization, fencing, and planting of native vegetation. All restoration activities were completed by October 2002.

The City has conducted two qualitative monitoring events since completion of construction: July 14, 2003 and January 13, 2004; one quantitative monitoring event: August 30, 2004, as well as eelgrass video monitoring and mapping during August/September 2004. Additional monitoring (April 8, 2004) and sampling (August 11, 2003 and September 10, 2004) events have occurred concurrently as part of the EPA Removal Action commitments.

[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 The Muckleshoot Indian Tribe.

1.1 Physical Site Description

The 12.4 acre restoration site is bordered by Superior Oil and Capital Lumber property on the south, Foss Maritime properties to the east, the Thea Foss Waterway to the west, and Commencement Bay and state aquatic lands to the north. The site is composed of two general areas: the City owned parcel and the property leased from Washington State Department of Natural Resources (DNR).

The City owned parcel is approximately 0.7 acres and is located north of the Capital Lumber warehouse (202 East F Street). This parcel includes approximately 0.4 acres of upland (Riparian Area A) and 0.3 acres of intertidal property. A public walkway traverses this area along the north edge of the warehouse.

The remaining 11.7 acres is leased from DNR and is located north of Superior Oil (250 East D Street) at the end of the peninsula just west of the City owned parcel. Of those 11.7 acres, approximately 10.6 acres is intertidal or shallow subtidal property. The remaining 1.1 acres is riparian upland (Riparian Area B). The riparian area is separated from the beach and intertidal area by a sheet-pile bulkhead or large riprap armoring.

Riparian areas of both parcels were planted and mulched by the contractor, in October 2002. Goose exclusion devices (GED) were installed around the Riparian Area A plantings in order to discourage plant predation by geese and other wildlife. Irrigation for the riparian plantings was not installed.

Various degrees of excavation and capping occurred over the majority of intertidal and shallow subtidal lands that were not colonized by eelgrass but within the project boundary. Coarse sands and gravels were placed as beach substrate.

Just off the beach but within the project boundary, approximately between elevations –5 and –11 MLLW, lies one of the few existing eelgrass beds in Commencement Bay. Eelgrass habitat is valuable as it provides spawning and rearing habitat for commercially important fish and crustacean species, is home to a highly diverse community of benthic invertebrates, and together with associated epibenthic flora provides the primary source of carbon and energy in the shallow coastal habitats where it occurs.

Two derelict vessels, the M/V Cactus (a retired Naval buoy tender) and the M/V Victoria M (a wooden hulled pleasure boat) were moored to pilings just off shore of the restoration site. Both vessels posed environmental hazards to the restoration site, the capped areas, and surrounding eelgrass beds. The vessels have since been removed. See Section 5.1 Completed & On-Going Activities for more detail on this topic.

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, these personnel are Desiree Pooley, Senior Environmental Specialist, John O'Loughlin, P.E., and Lindsay Guzzo, Project intern. The City has retained David Adams as a site steward, and his observations are also included.

2.1 Photo Points

Photo points were established as described in the Monitoring Plan and depicted in Figure 2. The location of each point was marked by a stake and surveyed (See Table 1).

Table 1. Photo Point Locations

Photo Point	Northing	Easting
1	709461	1160316
2	709416	1160209
3	709513	1160309
4	709382	1160126
5	709476	1160224
6	709530	1160293
7	709317	1160118
8	709115	1159699

A digital photo was taken from each photo point in the appropriate directions (see Figure 2) during monitoring events. Photos are presented in Appendix A. A battery malfunction prohibited the photography of photo positions 8B and 8C during the April 8, 2004 monitoring event. Due to the shifting beach substrate, photo points 4 and 6 were not located during the April 8th, 2004, or the August 30th, 2004, monitoring event. Locations were estimated based on the monitoring map (Figure 2) and in-field measurements. As we expect this to be a continuing issue, these photo points will be located in the future by measuring from fixed points as noted on the August 30th field sheets (Appendix B).

Photos of the riparian areas show the general good health of the plantings. The meager showing of volunteer plants could be attributed to adjacent land use (industrial/commercial) and proximity of parental seed sources.

2.2 Vegetation

Several general trends have been observed over the course of the past monitoring events.

- Baldhip rose, red alder, black cottonwood, shore pine and sitka willow have shown the most growth.
- Douglas fir, sitka spruce, and bigleaf maple have not thrived.
- Due to shifting beach substrate and deposition of large woody debris, the Riparian Area A GED installed at the time of planting failed to protect the beach plants – many were lost or stunted by geese and rabbit predation.
- All plants were subject to extensive herbivory and damage by rabbits especially during the winter months.
- One area within Riparian Area B near the monitoring wells does not drain adequately in the winter (e.g. standing water averaging 3"). The plants in this vicinity have died.
- Himalayan blackberries, scot's broom and knapweed have not re-established to any significant extent. Butterfly bush, pearly everlasting, maple leafed goosefoot and thistle are evident and could potentially be invasive.

In general, plants located in Riparian Area A (City parcel) have shown greater growth than those planted in Riparian Area B (leased parcel). This could be a result of the shade provided by the warehouse building versus the full sun conditions on the leased parcel. Another difference between the two areas is soil type. The soil of Riparian Area B is clay-like and very compact whereas the soil of Riparian Area A is relatively sandier and well drained.

2.3 Sediment

No observations of extreme erosion have been noted in riparian, beach, or capped areas. Some areas of minor erosion were noted behind the bulkhead bordering Riparian Area B.

2.4 Eelgrass Video Monitoring

A scoured hole associated with past land use and business practices bisected the two areas of eelgrass and prevented the eelgrass from colonizing that area as it was then no longer the proper elevation. During restoration activities, the hole was filled with clean sediments (Area E). It's hoped that by restoring this area to a similar grade as the existing eelgrass bed, the eelgrass will spread and bridge the gap between the two existing areas. Eelgrass video monitoring was conducted on both August 23rd, 2004 and September 3rd, 2004 (See Appendix C for video). Mapping data shows that eelgrass continues to

thrive in the known areas and although it appears that eelgrass has begun to colonize Area E, it has yet to bridge the gap completely. Figure 4, Eelgrass Map: OVRA Monitoring Results, illustrates the data. Monitoring of this element will be repeated during Year 3 (2006) monitoring event.

2.5 Wildlife

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

- rabbits
- geese
- caspian terns
- gulls
- crows
- ducks
- crabs
- mussels
- fish
- sculpin

2.6 Local Environment

In Summer 2004, adjacent property owners, Foss Maritime (225 East "F" Street) performed cleanup and restoration of the beach and sediments. In conjunction with this effort, a small earthen berm was created and planted in Fall 2004. This addition complements the Olympic View Resource Area (OVRA) restoration site and adds habitat value to the area. For project details please contact John Lewis, Foss Maritime, (253) 672-0372.

The NRDA Trustees have allocated funding to proceed with further restoration on the OVRA restoration site. In partnership with DNR and Ridolfi Engineers, the Trustees are designing project plans and working with adjacent property owners. For more information, contact Jennifer Steger, National Oceanic Atmospheric Administration, (206) 526-4363.

The Thea Foss Waterway remediation has commenced. Work will proceed from the head of the waterway towards the mouth. These actions should have no direct impact on the restoration site. For more project details, contact John O'Loughlin, P.E., City of Tacoma, (253) 502-2108.

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

Quantitative vegetation monitoring for Year 1 was conducted on August 30, 2004. Eight quadrats were established at random; three located in Riparian Area A (RA1 - RA3) and 5 in Riparian Area B (RB1 - RB5). Quadrats were sampled using a circular, 28.3m^2 (3m radius) quadrat. The locations of each quadrat were surveyed and the location information is supplied in Table 2 below.

Table 2. Quadrat ID, Location, and Elevation

Quadrat ID	Northing	Easting	Elevation
RA1	709452.3	1160266	9.3
RA2	709443.6	1160242	8.9
RA3	709415	1160187	8.1
RB1	709316	1160114	11.0
RB2	709230.5	1159949	10.4
RB3	709284.8	1160020	10.4
RB4	709056.8	1159816	9.7
RB5	709186.1	1159905	9.8

For each quadrat, the Daubenmire cover class (i.e. 0-5%, 5-15%, 15-25%, 25-50%, 50-75%, 75-95% or 95-100%) was estimated for plants found within that quadrat as well as the amount of bare substrate. This data is presented in Table 3. Also presented in this table are the corresponding Daubenmire cover class midpoint values (i.e. 2.5%, 12.5%, 20.5%, 35%, 65%, 85%, or 97.5%).

Plants were categorized as "native" according to Plants of the Pacific Northwest Coast (Pojar & MacKinnon, 1994). The total native vegetative cover is calculated for each quadrat.

3.2 Sediment

Quantitative sediment monitoring consisted of recording the sediment elevation at each of 6 sediment stakes. The stakes were installed on July 1, 2003 in the areas shown on Figure 3. The stakes were driven into the soil in surveyed locations and the initial reading was taken. Locations and initial readings are presented in Table 4.

Table 4. Sediment Stake Locations and Initial Reading

Sediment Stake	Northing	Easting	Initial Reading (cm)
1	709340.49	1159979.48	80.8
2	709449.93	1159949.67	79.9
3	709482.69	1160056.42	65.5
4	709481.78	1160166.82	89.9
5	709533.23	1160213.17	73.2
6	709602.24	1160168.10	91.5

4.0 Quantitative Monitoring Results

The Monitoring and Adaptive Management Plan (MAMP) established performance goals for the quantitative measures presented in the previous section. These goals were established for 12 months of growth and development. As of August 2004, when the quantitative data was collected, the riparian plants had been in place for 23 months. Therefore, the observations will be compared with Year 1 performance goals.

4.1 Vegetation

Performance goals for vegetation are split into three categories: Plant cover, diversity, and invasive species.

4.1.1 Plant Cover

Total areal cover within each quadrat and mean percent cover are two measures used to evaluate the successful establishment of the planted areas. Because much of the energy of the first few years of growth is spent on development of below ground biomass the first year's goals should be modest.

The Year 1 performance goals for the riparian area are:

1) Between 20 and 40% total areal cover of the total target area by native or naturalized non-native plants
2) Greater than 20% average areal cover for all quadrats.

Table 3 shows that all quadrats have meet the first goal. The range of average aeral coverage by native and non-native vegetation is 20% to 125.5%. Table 3 also shows that quadrats located within Riparian Area A have considerable more "coverage" (117% average) than those quadrats in Riparian Area B (37.3% average). This could be due to soil type differences (sandy and well drained vs. compacted clay; respectively) or differences in site conditions (shade/part sun vs. full sun; respectively). The second performance goal has also been achieved. 67.8% is the average areal coverage of all riparian quadrats.

Success in the riparian areas could be attributed to:

- Regular maintenance
- Lack of disease

4.1.2 Diversity

Species diversity is another measure in the ecological evaluation of this project. The long-term goal is for the project site to have a comparable diversity to the original habitat it is trying to recreate. Hypothetically, many riparian plants are able to re-colonize sites as a result of animal and wind dispersion. The diversity values provided are targets only and are not criteria by which success will be judged.

The riparian area diversity target for Year 1 is at least six species of native shrubs and trees present and abundant; species will be considered abundant if they occur in 50 to 60% of the quadrats. Applying this definition to the data in Table 3 shows that the following six plants are abundant on the restoration site: red alder, shore pine, pearly everlasting, St. John's wort, Watson's willowherb, and grass. Thus the target diversity value has been achieved.

No adaptive management recommendations are appropriate under this measurement index. However as a noxious weed, St. John's wort (2% average in 75% of the quadrats) should be controlled through weeding efforts to prevent it from becoming invasive.

4.1.3 Invasive Species

Areal coverage of invasive species is the final measure used to evaluate the success of this project. As native vegetation matures it is expected to out compete the invasive vegetation. Relatively rapid and aggressive colonization by non-native or invasive species may occur during the first few years of site establishment, however, with equally aggressive weeding and management, the presence of undesirable species should decline or stabilize by Year 5.

The riparian zone performance goal for invasive species is not more than 20% areal cover of knapweed, Scot's broom and Himalayan blackberry. Referring to Table 3, the riparian zone has no knapweed or Scot's broom present while Himalayan blackberry is present at an average of 0.9% aeral coverage in 38% of the quadrats. This data is representative of overall site conditions. Therefore, this invasive species performance goal has been met.

However, other observed invasives that should be controlled include, but are not limited to: Japanese knotweed, pepperweed, poison hemlock, maple-leafed goosefoot, burdock, butterfly bush, and bittersweet nightshade.

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 following construction. Table 5 presents the initial readings, Year 1 readings, and the net change in centimeters.

Table 5. Sediment Stake Readings: Initial vs. Year 1

Sediment Stake	Initial Reading (cm)	Year 1 reading (cm)	Net change (cm)
1	80.8	missing*	unknown*
2	79.1	80	-0.9
3	65.5	66.5	-1.0
4	89.9	93	-3.1
5	73.2	74	-0.8
6	91.5	84	+7.5

* Stake was replaced on September 10, 2004 at same location with new initial reading of 74 cm.
Readings are in centimeters from the sediment surface to the top of the stake.
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.

The first MAMP performance goal for sediment erosion or accretion states:

- Less than 20 cm of erosion or accretion per year between Year 1 and Year 2 monitoring events.

As we have not completed the Year 2 monitoring event, this performance measure is not applicable. Regardless, the Year 1 net change does not exceed the performance measure. Sediment stake #6 is located nearest to the recent Foss Maritime beach restoration. The related work and re-establishment of beach grades were sure to have caused some equilibrium of sediments. All stakes will continue to be monitored during monitoring events.

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

As no irrigation system exists, the plants were watered manually twice by the City sponsored Washington Conservation Corps (WCC) crew during Summer 2003. The WCC crew also spent 2 days removing invasive vegetation (i.e. Himalayan blackberry, Japanese knotweed) from the riparian areas. No watering occurred during Summer 2004, however, the plants showed little signs of stress.

Over the initial 2002-2003 winter, the beach substrate shifted and caused the failure of the GED enclosing Riparian Area A. It is believed that some of the

plants were lost because of this or subsequent predation. Judy Lantor, U.S. Fish and Wildlife Service and Natural Resource Trustee board member, was consulted on-site in July 2003. It was decided to reassess the situation in spring 2004 with hopes that the beach would equalize over the winter and after the adjacent Foss Maritime restoration actions were completed.

The goose exclusion devices (GED) consisting of rebar with string wrapped around the top and sides as well as chicken wire along the shoreward edge enclosed the planted area that ran parallel to the walkway. The string was reasonably effective at excluding geese, however rabbits were able to get in to feed upon the grasses. In Spring 2004, chicken wire and rebar enclosures were installed around all areas of plantings. This has appeared to slow down the rabbit predation and encouraged volunteer plant species.

Derelict vessels, M/V Cactus and M/V Victoria M., were posted on September 23, 2003 in accordance with RCW Ch 79.100. A hired City contractor took possession of the M/V Victoria M. and scuttled the vessel on November 23, 2003. The M/V Cactus was voluntarily moved by the owner to Maury Island as allowed by law.

The City contracted with David Adams to be the site steward. David frequently visits the site and 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 good. As much of the plant's resources during the first few years are spent on root growth - modest vegetation growth has been observed.

As discussed in several sections above, there are several plant species that could crowd out the desirable species if they are not controlled. Therefore, we intend to continue the weeding effort targeted at thistle and butterfly bush, maple leafed goosefoot, St John's wort, poison hemlock, pepperweed, and Japanese knotweed.

Also the green, nylon erosion control matting has not started to break down. The netting is not bird friendly as they have gotten caught in it. During future maintenance activities, exposed matting will be cut and removed and the newly exposed edges covered with mulch/soil.

It is also recommended that the following activities continue:

- Monitor soil moisture
- Maintain GED
- Continue periodic trash removal
- Monitor sedimentation and erosion
- Continue general monitoring efforts

6.0 Acknowledgements

Many organizations and individuals have contributed to this project and the City would like recognize: Hart Crowser, Inc and Pentec Environmental for design services; Foss Maritime for continued cooperation and access during construction, and the Environmental Protection Agency and Corps of Engineers for oversight.

Appendix B:

Field Sheets

Photo Points: Disk Count: 1 2 3

1A 1-1	1B 1-2	2A 1-20	2B 1-21	2C 1-22	3A 1-3
3B 1-4	4A 1-17	4B 1-18	4C 1-19	5A 1-7	5B 1-8
5C 1-9	5D 1-10	6A 1-5	6B 1-6	7A 1-11	7B 1-12
7C 1-13	8A 1-14	8B 1-15	8C 1-16		

Quantitative Measurements: Year 0 Year 1 2 5

Sediment Stake #	Current Measurement (cm)	Starting Measurement (cm)
T1-1 1	~~90.8 T-1 or 81.7 (T-2)~~	91.5
T1-3 2	~~81.7 T-2~~ 79.6 cm	79.9
T2-2 3	66	65.5
T3-2 4	90.8	89.9
T4-2 5	[illegible] 73	73.2
T4-3 6	88.2	91.5

Bottom Sediment Notes:

#5 - stake leaning; @ bottom of stake are rocks (smaller 1-3.5 inches)

#4 rocks @ bottoms 2-3 inches

~~T1-1 - Sm. gravel~~ Stake #2 7/16/03 2.61' => cm.

T-2 - sm gravel

#6 - algae

#3 algae/dirt sand mix

1in = 2.54 cm

1cm = 0.0328 ft.

$\frac{2.61 ft}{1} \frac{1 cm}{0.0328} = 79.57 cm$

2.61 in 1in

arrived ~2pm
left 3pm

Olympic View Resource Area Restoration
Monitoring Report Form

Date 7/14/03 Year 0A 0B 1A 1B 2A 2B 3 4 5

Tide: approx -1

Staff Present: Lindsay Guzzo Desireé Pooley

Weather Conditions: sunny, hot

Overall health and vigor of plants: Excellent Fair Poor
other plants Grasses

Qualitative Observations:

	Riparian Area (A/B)	Salt Marsh Area	Comments
Erosion	no	no	
Sedimentation		X	Possible - on HW mark
Wildlife			Geese in water
Vegetation			
Invasive	Yes A/B		A Butterfly Bush - St. john's wort B - Blkberry
Volunteer	Yes		
Survival (%)	90%	10%	Grasses doing poorly
Animal Damage			N/a
Disease			n/a
Trash	Yes-A	no	Floating debris
Vandalism			n/a
Large Organic Debris	Yes-A		Logs - wood debris

Wildlife Oberserved:
Geese, gulls, other birds

Soil/Sediment Quality -
Odor: n/a
Sheen: n/a
Color: gray
Texture: Very rocky (A) Dirt packed in rip B.

General Comments:
Survival - grass & maple - bad - dead.
Alder / cottonwood good
rose - good.
firs - ok
Pine, shore - good.

Very dry - needs water
cut Blkberries

GED needs Maint.

Photo Points: Disk Count: 1 2 3

1A	1B	2A	2B	2C	3A

3B	4A	4B	4C	5A	5B

5C	5D	6A	6B	7A	7B

7C	8A	8B	8C		

Quantitative Measurements: Year 1 2 5

Sediment Stake #	Current Measurement (cm)	Starting Measurement (cm)
1		
2		
3		
4		
5		
6		

Olympic View Resource Area Restoration
Monitoring Report Form

Date Jan 13, 2004 Year 0A (0B) 1A 1B 2A 2B 3 4 5

Staff Present: Desiree Pooley
Weather Conditions: cold, overcast.
Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations: intertidal

	Riparian Area (A/B)	~~Salt Marsh~~ Area	Comments
Erosion			not notable areas
Sedimentation	A - created berm of beach		
Wildlife	see below.		
Vegetation			
Invasive	n/a		
Volunteer	— not a lot of		volunteer
Survival (%)	— can't tell @ this pt of season.		
Animal Damage	B - rose looks pruned.		
Disease	n/a		
Trash	A — some trash - removed		
Vandalism	—		locks have been broken & warehouse vandalized
Large Organic Debris	A - Yes.		

Wildlife Oberserved: geese, one dead fish, seagulls

Soil/Sediment Quality - upland compact
Odor: n/a
Sheen:
Color: light brown
Texture: fines, some gravel.

General Comments: Sign installed today
Plants are dormant.
no sign of invasives (minimal Blkberry)
Standing water is 5" deep in places.
— perhaps plant wetter species
Possible geese predation on trees (rabbits)
Shoreline look good.
tide not low enough to see capped areas
GED - not holding up to LWD & sand/beach movement.

Photo Points: Disk Count 1 2 3

1A	1B	2A	2B	2C	3A
1	2	12	13	14	3

3B	4A	4B	4C	5A	5B
4	15	16	17	8	9

5C	5D	6A	6B	7A	7B
10	11	7 (5)	6	18	19

7C	8A	8B	8C		
20	31	not taken			

Quantitative Measurements: Year 1 2 5

Sediment Stake #	Current Measurement (cm)	Starting Measurement (cm)
1		
2		
3		
4		
5		
6		

Olympic View Resource Area Restoration
Monitoring Report Form

Visual Inspection per LMRP

Date April 8th, 2004 — Year 0A 0B 1A 1B 2A 2B 3 4 5

Staff Present: Desirée Pooley — Survey (Al, Dan) also here.
Weather Conditions: sunny, no rain for days.
Overall health and vigor of plants: Excellent | Fair | Poor

Qualitative Observations:

	Riparian Area (A/B)	Salt Marsh Area	Comments
Erosion	—	—	no extreme erosion — same ↑
Sedimentation	—	—	
Wildlife	see below		
Vegetation			
Invasive	A	—	→ blkberry, butt. bush
Volunteer	n/a	seaweed	
Survival (%)	90%	n/a	
Animal Damage	A & B	n/a	herbivory on plants event.
Disease	—	—	
Trash	minor	minor	
Vandalism	n/a	n/a	
Large Organic Debris	RipA	Yes.	

contours look very similar to last mon.

Wildlife Oberserved:
nesting goose, lots of geese activity in waves, seagulls, crows

Soil/Sediment Quality -
Odor: n/a
Sheen: n/a
Color: brown w/ much brow algae some green.
Texture: small rocks w/ fine mud, see pics for others.

General Comments:
GW seeps? — no
Sea weed growing — see pics.
Plants survived herbivory well → almost all have new spring buds — many Doug. Fir died.
Pepperweed needs to be removed.

Photo Points: Disk Count: 1 2 3

1A	1B	2A	2B	2C	3A
D1, 1	D1, 2	D1, 3	D1, 4	D1, 5	D1, 10

3B	4A	4B	4C	5A	5B
D1, 11	D1, 14	D1, 15	D1, 16	D1, 6	D1, 7

5C	5D	6A	6B	7A	7B
D1, 8	D1, 9	D1, 12	D1, 13	D1, 17	D1, 18

7C	8A	8B	8C		
D1, 19	20	21	22		

12:25
-0.2
8/31/04

Quantitative Measurements: Year (1) 2 5

Sediment Stake #	Current Measurement (cm)	Starting Measurement (cm)
1	—	91.5
2	80 cm	79.9
3	66.5 cm	65.5
4	93 cm	89.9
5	74 cm	73.2
6	84 cm	91.5

(2) – 6ft from ~~the~~ end of concrete/log portion along walkway.

(3) In line w/ fence corner approx 10 feet west

(6) A.2

(4) At corner of walkway

NOTES:

this Spring had MED placed/repositioned around Area A & B plantings – look good. Mulch also added.

Olympic View Resource Area Restoration
Monitoring Report Form

& LMRP

Date: Aug 30, 2004 — Year 0A 0B (1A) 1B 2A 2B 3 4 5

Staff Present: D Pooley — Time: 11:32

Weather Conditions: sunny, ≃ 75°C — TIDE: -1.1 @ 11:43

Overall health and vigor of plants: Excellent (Fair) Poor

Qualitative Observations:

	Riparian Area (A/B)	Salt Marsh Area	Comments
Erosion			none noticed
Sedimentation	X	X	beach constantly changing
Wildlife			birds in water
Vegetation	O	n/a	doing ok w/o water
Invasive	yes		pearly ever & orache
Volunteer			wild native blkberry, gumweed.
Survival (%)			~~80%~~ 85+%
Animal Damage			rabbits - although better since GED install
Disease			n/a
Trash	X		assoc w/ high tide
Vandalism			n/a
Large Organic Debris	X		@ high tide. / good recruitment

Wildlife Oberserved: caspian terns, geese, ducks, crows, pigeons,

Soil/Sediment Quality -

Odor: n/a

Sheen: n/a

Color: brown.

Texture: sandy, coarse gravel to cobbles.

General Comments:

Pics: 23 \
24 } Overview from [illegible] side
25 /
26 - T23
27 - [illegible] D area?
28 - CAP (w/ birds)
29 -
30 - from 28 looking towards beach

D2-1 - beach slope
2 - rock w/ [illegible]

CITY OF TACOMA
PUBLIC WORKS DEPARTMENT

BOOK _____
PAGE _____
SHEET _____ OF _____

PROJECT _____ SUBJECT _____
COMPUTATION _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

RA1* little brown bunny

blk cottonwood	25-50
Curly dock	5-15
common groundsel	0-5
pearly everlasting	0-5
madrone.	5-15
shorepine	0-5
St. john's wort	0-5
thistle	0-5
dandelion	0-5
bare ground	50-75
native blkberry	0-5
Watson's willowherb	0-5
hairy nightshade	0-5

* madrone volunteers seen nearby & within

maple leafed goosefoot.	15-25
fileweed.	0-5

RA2

curlydock	0-5
alder	5-15
blk cottonwood	5-15
fireweed.	15-25
pnly everlasting	5-15
rose, baldhip	5-15
BLM	0-5
~~goose~~foot, maple leafed.	0-5
Watson's willowherb	5-15
grass	0-5
madrone.	0-5
native blkberry.	0-5
curly dock	0-5
common groundsel	0-5
butterfly bush	0-5
hairy nightshade	0-5
bare ground	50-75
broadleafed clock	5-15
clover	0-5
smooth hawksbeard	0-5

St John's wort 0-5

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PUBLIC WORKS DEPARTMENT

BOOK _____
PAGE _____
SHEET _____ OF _____

PROJECT Olympic View Res Area SUBJECT 9/30/04
COMPUTATION D. Pooley - sunny
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

RA1 9 ft radius

T4-2 (5) 74 cm sand, coarse sand/gravel

T4-3 (6) 84 cm fines, seaweed, mud, shell debris,
* rebar encrusted w/ barnacles
Sm. crab seen
coarse sand.

T3-2 (4) 93 cm large gravel
some coarse sand

T2-2 (3) 66.5 cm barnacles, muscles.
barnacles on rebar
Sm. gravel, fines/mud, coarse sand

12:05 pm

T1-2 (1) – missing – no longer in ground.

T1-3 (2) – under water 3" – encrusted w/ barnacles
and seaweed.
Coarse sand/fines/seaweed,
Shell bits

80 cm

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PUBLIC WORKS DEPARTMENT

BOOK _____
PAGE _____
SHEET ____ OF ____

PROJECT _____ SUBJECT _____
COMPUTATION _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

RB5 —

pearly ever	0-5
blkberry	0-5
fireweed	0-5
Tansy	0-5
butterfly bush	0-5
Shorepine	0-5
Watson's willowherb.	0-5
Sitka spruce	0-5
St. John's wort	0-5
mullein	0-5
nootka rose	0-5
alder	0-5
grass	0-5
moss	5-15
bare ground	75-95

RB2

St. John's wort	0-5
Shore pine	05
nootka rose	0-5
willow, Sitka	5-15
alder	5-15
bare ground	95-100
blackberry	0-5

RB3

Grass	0-5
bare ground	95-100
Alder	0-5
Sitka willow	15-25
Pearly everlasting	0-5

RA3 -

maple leafed goosefoot	75-95
pearly everlasting	5-15
~~boxe~~ burdock	0-5
alder	5-15
St johns worts	0-5
walkway	0-5
deadly nightshade	0-5
LWD	5-15
smooth hawksbeard	0-5
butterfly bush	0-5
thistle	0-5
bare ground	0-5

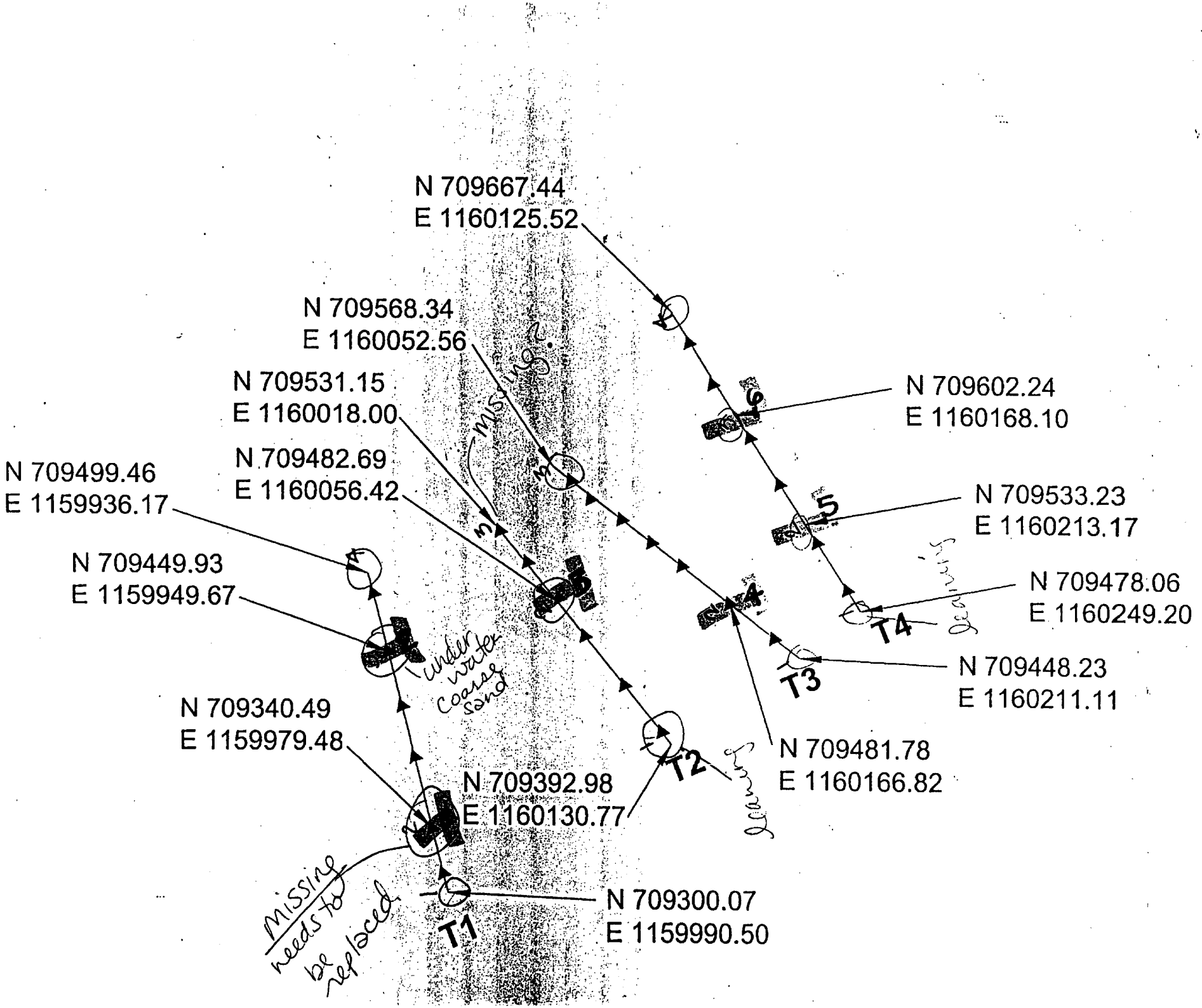
mulch washed away.

gumweed nearby.

RB4.

Plants in RB ≃ 6' oc.

Shore pine	0-5
Alder	0-5
Blk cottonwood	0-5
St johns worts	0-5
Blkberry	0-5
pearly everlast	0-5
Grass	0-5
Watsons willowherb	0-5
Bare ground	95-100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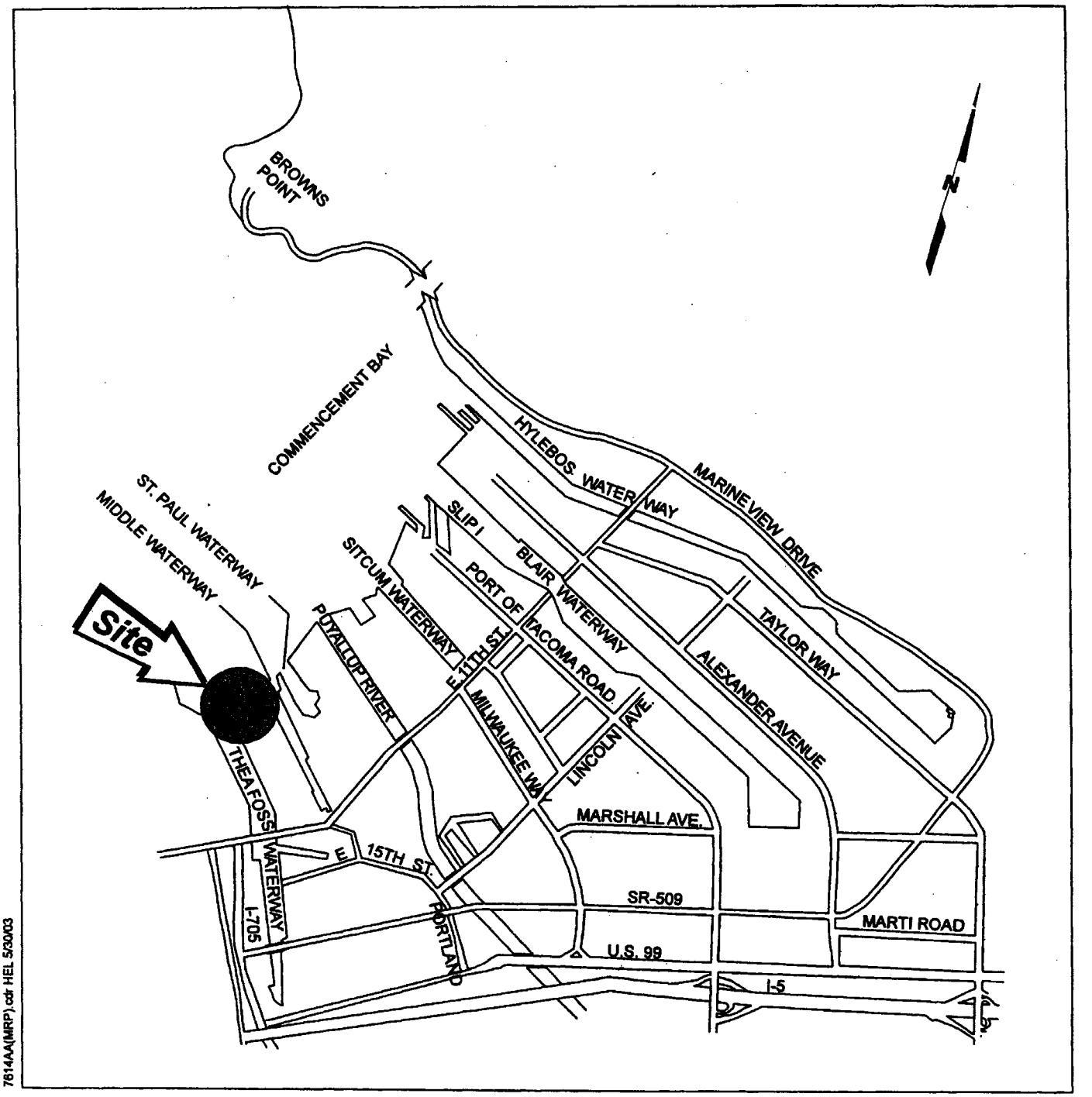
E 1160249.20
N 709448.23
E 1160211.11
N 709481.78
E 1160166.82
T1
T2
T3
T4
T5
T6
missing
under water coarse sand
missing needs to be replaced

Table 3
Quantitative Vegetation Monitoring Results
Year 1

	Area:	Riparian A (City owned)			Riparian B (leased from WA DNR)					Riparian A (City owned)			Riparian B (leased from WA DNR)					Year 1	Year 1
	Quadrat #	RA-1	RA-2	RA-3	RB-1	RB-2	RB-3	RB-4	RB-5	RA-1	RA-2	RA-3	RB-1	RB-2	RB-3	RB-4	RB-5	Avg Cover	Frequency
		Daubenmire Cover Class								Daubenmire Midpoints								%	
Native Trees																			
Scientific name	*Common name*																		
Acer macrophyllum	**Big leaf maple**	0	0-5	0	0	0	0	0	0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13%
Alnus rubra	**Red alder**	0	5-15	5-15	0	5-15	0-5	0-5	0-5	0.0	12.5	12.5	0.0	12.5	2.5	2.5	2.5	5.6	75%
Arbutus menziesii	**Pacific madrone**	5-15	0-5	0	0	0	0	0	0	12.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.9	25%
Pinus contorta var. contorta	**Shore pine**	0-5	0	0	0-5	0-5	0	0-5	0-5	2.5	0.0	0.0	2.5	2.5	0.0	2.5	2.5	1.6	63%
Populus balsamifera	Black cottonwood	25-50	5-15	0	0	0	0	0-5	0	35.0	12.5	0.0	0.0	0.0	0.0	2.5	0.0	6.3	38%
Picea sitchensis	Sitka spuce	0	0	0	0	0	0	0	0-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.3	13%
Native Shrubs																			
Scientific name	*Common name*																		
Rosa nutkana	**Nootka rose**	0	0	0	0	0-5	0	0	0-5	0.0	0.0	0.0	0.0	2.5	0.0	0.0	2.5	0.6	25%
Rosa gymnocarpa	**Baldhip rose**	0	5-15	0	15-25	0	0	0	0	0.0	12.5	0.0	20.5	0.0	0.0	0.0	0.0	4.1	25%
Salix sitchensis	**Sitka willow**	0	0	0	15-25	5-15	15-25	0	0	0.0	0.0	0.0	20.5	12.5	20.5	0.0	0.0	6.7	38%
Other Native Flora																			
Rubus ursinus	Trailing blackberry	0-5	0-5	0	0-5	0	0	0	0	2.5	2.5	0.0	2.5	0.0	0.0	0.0	0.0	0.9	38%
Anaphalis margaritacea	Pearly everlasting	0-5	5-15	5-15	0-5	0	0-5	0-5	0-5	2.5	12.5	12.5	2.5	0.0	2.5	2.5	2.5	4.7	88%
	Total Native Vegetative Cover									55.0	57.5	25.0	48.5	30.0	25.5	10.0	12.5	33.0	
Non-native Species																			
Scientific name	*Common name*																		
Rubus discolor	Himalyan blackberry	0	0	0	0	0-5	0	0-5	0-5	0.0	0.0	0.0	0.0	2.5	0.0	2.5	2.5	0.9	38%
Cirsium arvense	Canada thistle	0-5	0	0-5	0	0	0	0	0	2.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.6	25%
Hypericum perforatum	St. John's wort	0-5	0	0-5	0	0-5	0-5	0-5	0-5	2.5	0.0	2.5	0.0	2.5	2.5	2.5	2.5	1.9	75%
	Butterfly bush	0	0-5	0-5	0	0	0	0	0-5	0.0	2.5	2.5	0.0	0.0	0.0	0.0	2.5	0.9	38%
Verbascum thapsus	Common mullein	0	0	0	0	0	0	0	0-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.3	13%
Chrysanthemum leucanthemum	Oxeye daisy	0	0-5	0	0	0	0	0	0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13%
Senecio jacobaea	Tansy ragwort	0	0	0	0	0	0	0	0-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.3	13%
Epilobium watsonii	Watson's Willowherb	0-5	5-15	0	0-5	0	0	0-5	0-5	2.5	12.5	0.0	2.5	0.0	0.0	2.5	2.5	2.8	63%
Epilobium angustifolium	Fireweed	0-5	15-25	0	0	0	0	0	0-5	2.5	20.5	0.0	0.0	0.0	0.0	0.0	2.5	3.2	38%
	Grass	0	0-5	0	0-5	0	0-5	0-5	0-5	0.0	2.5	0.0	2.5	0.0	2.5	2.5	2.5	1.6	63%
	Moss	0	0	0	0	0	0	0	5-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	1.6	13%
Arctium minus	Burdock	0	0	0-5	0	0	0	0	0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.3	13%
Senecio vulgaris	Common groundsel	0-5	0-5	0	0	0	0	0	0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	25%
Trifolium	Clover	0	0-5	0	0-5	0	0	0	0	0.0	2.5	0.0	2.5	0.0	0.0	0.0	0.0	0.6	25%
Rumex crispus	Curled dock	5-15	0-5	0	0	0	0	0	0	12.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.9	25%
Rumex obtusifolius	Broadleaf dock	0	5-15	0	0	0	0	0	0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	1.6	13%
Chenopodium gigantospermum	Maple leaved goosefoot	15-25	0-5	75-95	0	0	0	0	0	20.5	2.5	85.0	0.0	0.0	0.0	0.0	0.0	13.5	38%
Crepis capillaris	Smooth hawkbeard	0	0-5	0-5	0	0	0	0	0	0.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.6	25%
Solanum sarrachoides	Hairy nightshade	0-5	0-5	0	0	0	0	0	0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	25%
Solanum dulcamara	Bittersweet nightshade	0	0	0-5	0	0	0	0	0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.3	13%
Taraxacum offininale	Common dandelion	0-5	0	0	0	0	0	0	0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13%
	Total Vegetative Cover									105.5	125.5	125.0	56.0	35.0	30.5	20.0	45.0	67.8	
Other																			
Large Woody Debris		0	0	5-15	0	0	0	0	0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	1.6	13%
Walkway		0	0	0-5	0	0	0	0	0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.3	13%
Bare substrate		50-75	50-75	0-5	50-75	95-100	95-100	95-100	75-95	65.0	65.0	2.5	65.0	97.5	97.5	97.5	85.0	71.9	100%

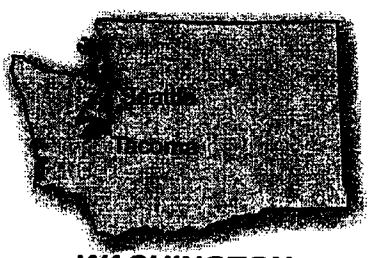
Bold - Indicates plants that were planted as per the planting plan on October 2002
Underline - Indicates plants that are on the Pierce County or Washington State Noxious weed list

FIGURE 1



7614AA(MRP).cdr HEL 5/30/03

NOT TO SCALE



WASHINGTON

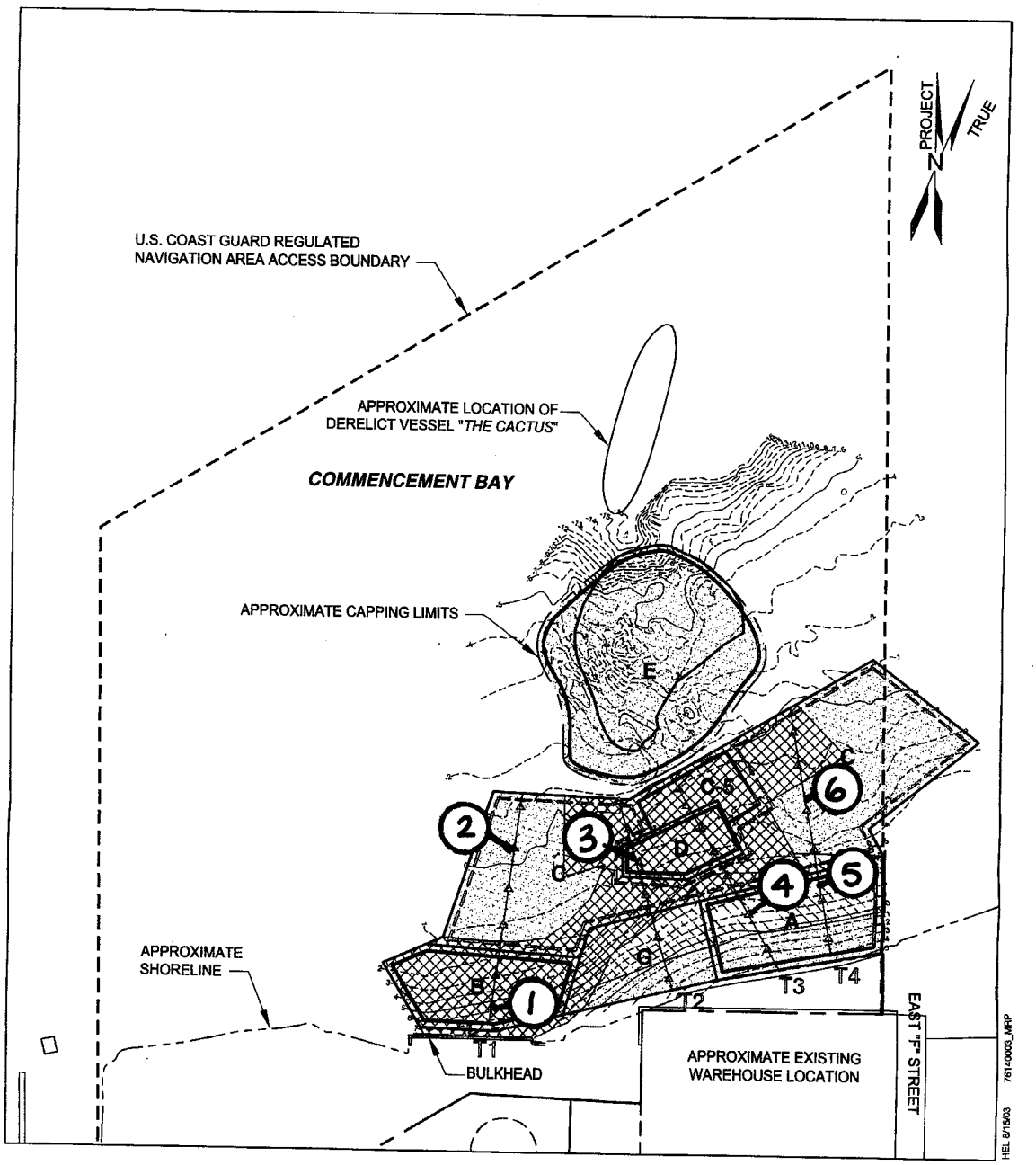
HARTCROWSER

7614 8/03

Figure 1 LMRP

OVRA Site Areas and Survey Monitoring Transects

FIGURE 3



UPPER BEACH EROSION PROTECTION-EROSION PROTECTION MATERIAL B PLACED OVER SAND MATERIAL

LOWER BEACH EROSION PROTECTION-EROSION PROTECTION MATERIAL A PLACED OVER SAND MATERIAL

SAND MATERIAL

-10- POST-CONSTRUCTION ELEVATION CONTOUR IN FEET (CORPS DATUM)

C OVRA SITE AREA DESIGNATION

BACKFILLED AREA

CAPPED AREA

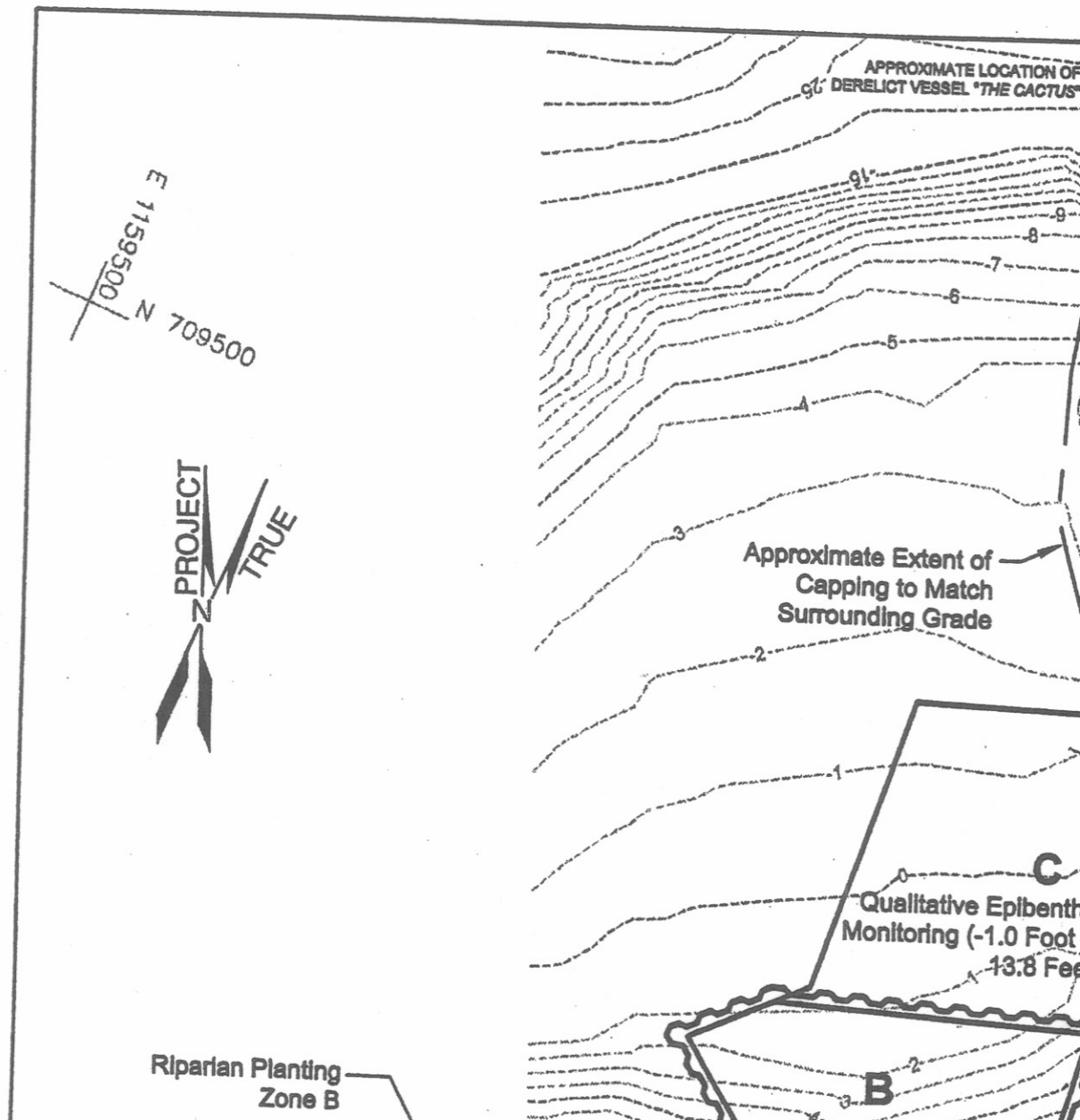
T1 INTERTIDAL TRANSECT LOCATION AND NUMBER

INTERTIDAL SURVEY POINT

0 120 240
SCALE IN FEET

FIGURE 2

Post-Construction Habitat Restoration Monitoring



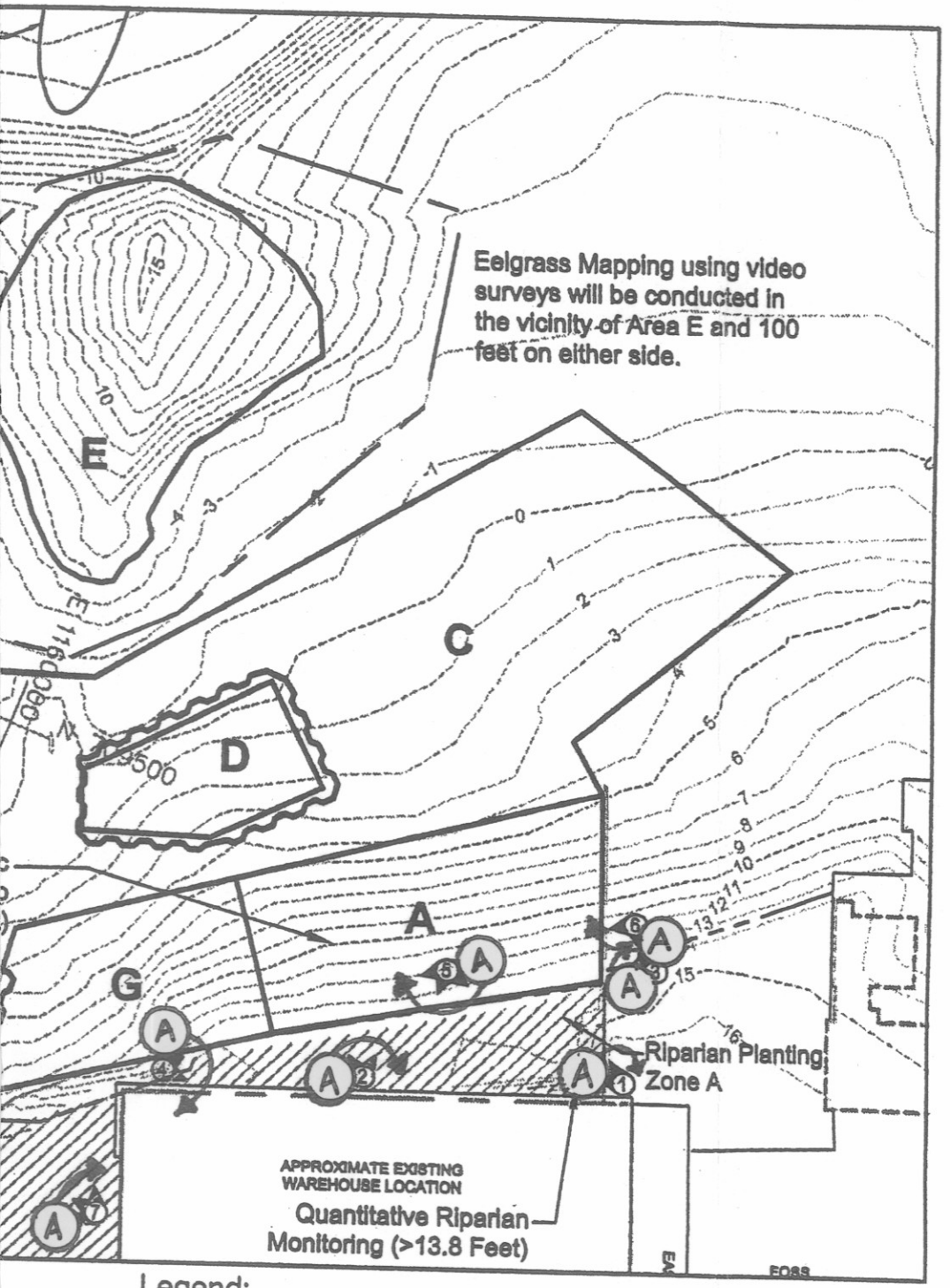
Note: See Plan Sheet 9 for location of intertidal erosion protection areas.

0 50 100 200

Scale in Feet

HARTCROWSER 7614 12/01 MAMP

.ocation Plan



Legend:

① Approximate Photo Point Location and Number

A Site Area Boundary and Designation

Riparian Planting Zones (See Plan Sheet 9)

709500
OUTER HARBOR LINE
COMMENCEMENT
'B'
E 1159500
N 709500
GOVERNMENT PIERHEAD LINE
OUTER HARBOR/PIERHEAD LINE
E 1159500
N 709000
THEA FOSS WATERW
BULKHEAD
INNER HARBOR LINE
100' 50' 0 100
1"=100'

FIGURE 4

LEGEND:

1994 ESTIMATED EEL GRASS AREAS *

2004 EEL GRASS TRANSECTS

* SHOWN AS ILLUSTRATED IN CITY OF TACOMA NRDA CONSENT DECREE

200'

DATE 11-24-04	SCALE 1"=100	
DESIGNED DEP	CHECKED DEP	
DRAWN REG	PROJECT NAME OLYMPIC VIEW	
DRAWING NAME EAL-GRASS-REV1		

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

OLYMPIC VIEW

EEL GRASS TRANSECTS

FIGURE 4

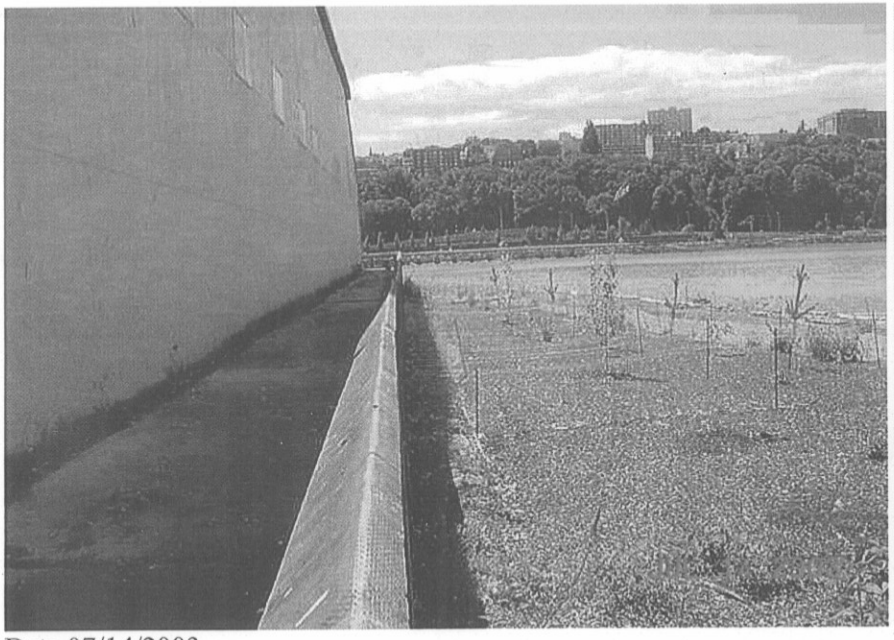
SHEET NO. SHEET 1 OF 1

Appendix A:

Photo Point Pictures

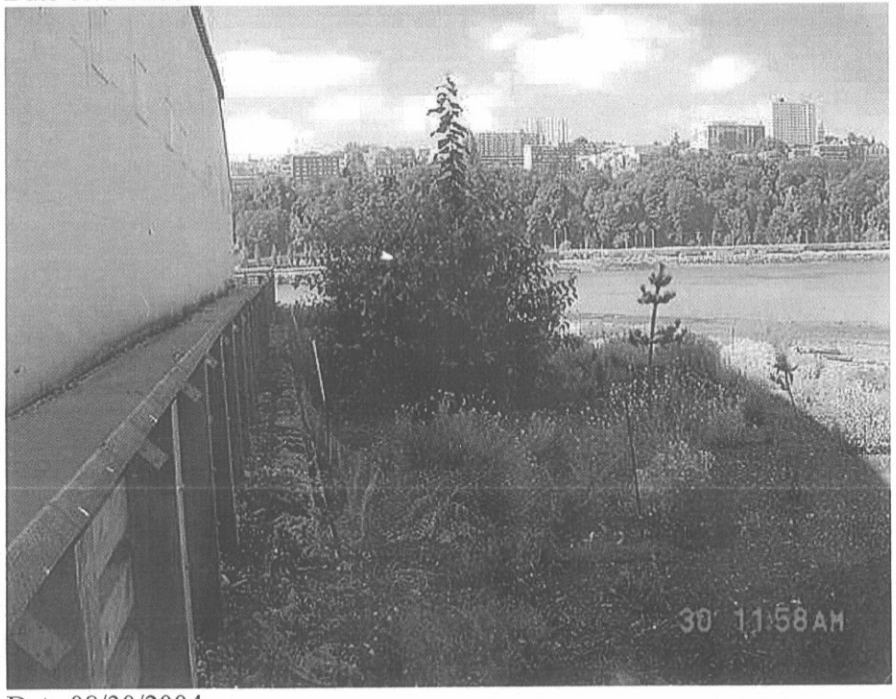
Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P1A



Date 07/14/2003

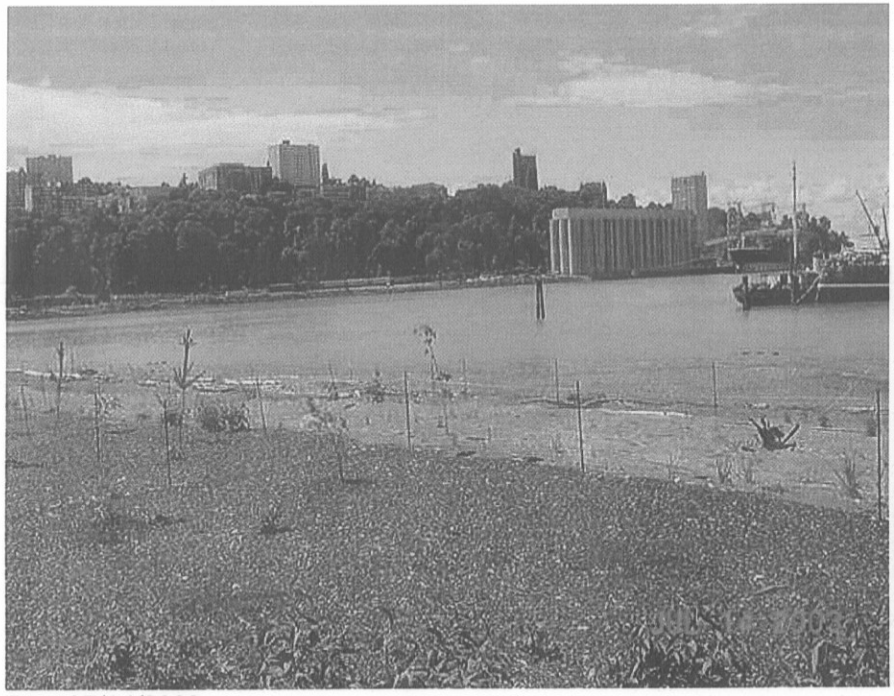
Date 04/08/2004



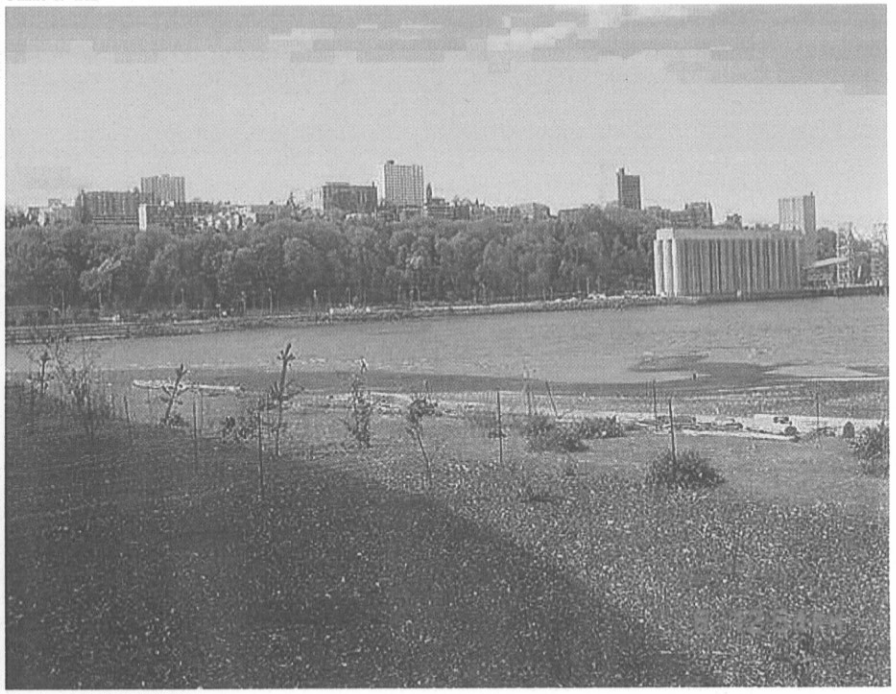
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

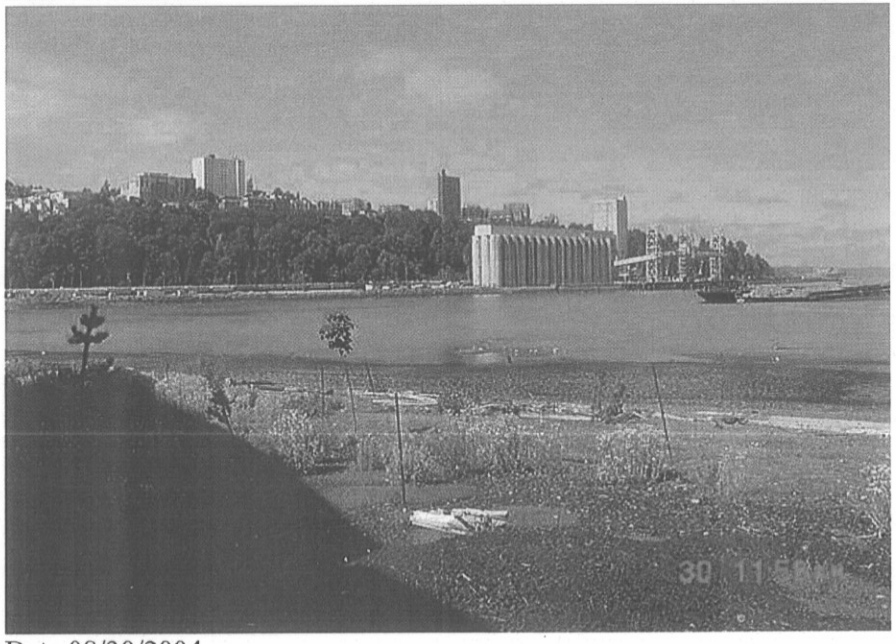
Photo Point P1B



Date 07/14/2003



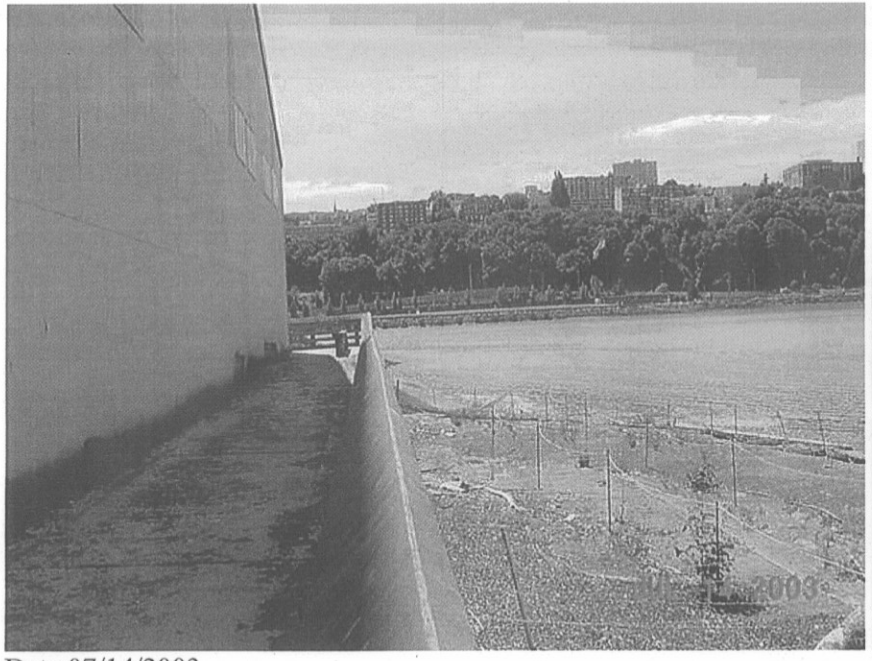
Date 04/08/2004



Date 08/30/2004

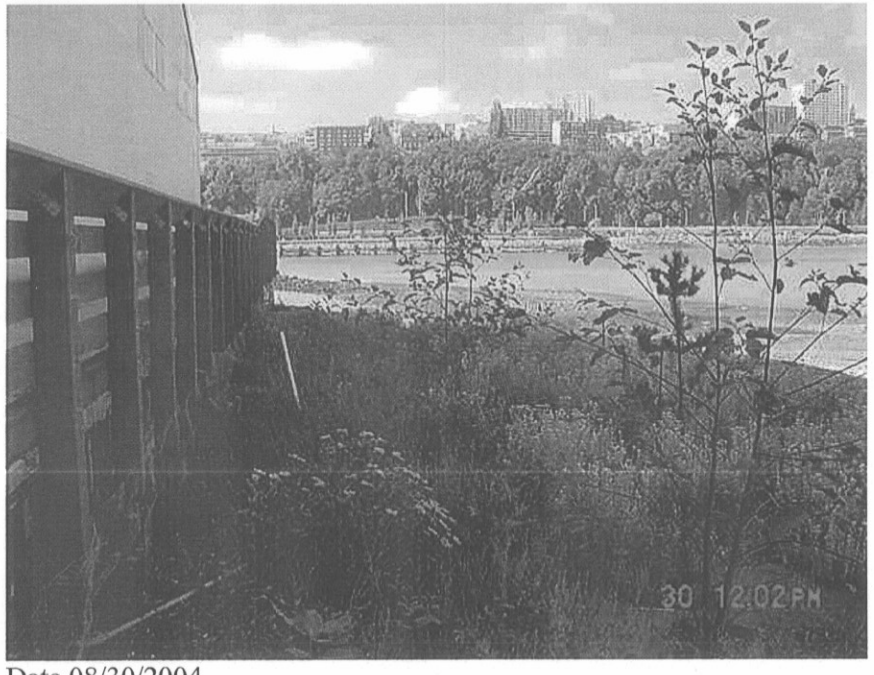
Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P2A



Date 07/14/2003

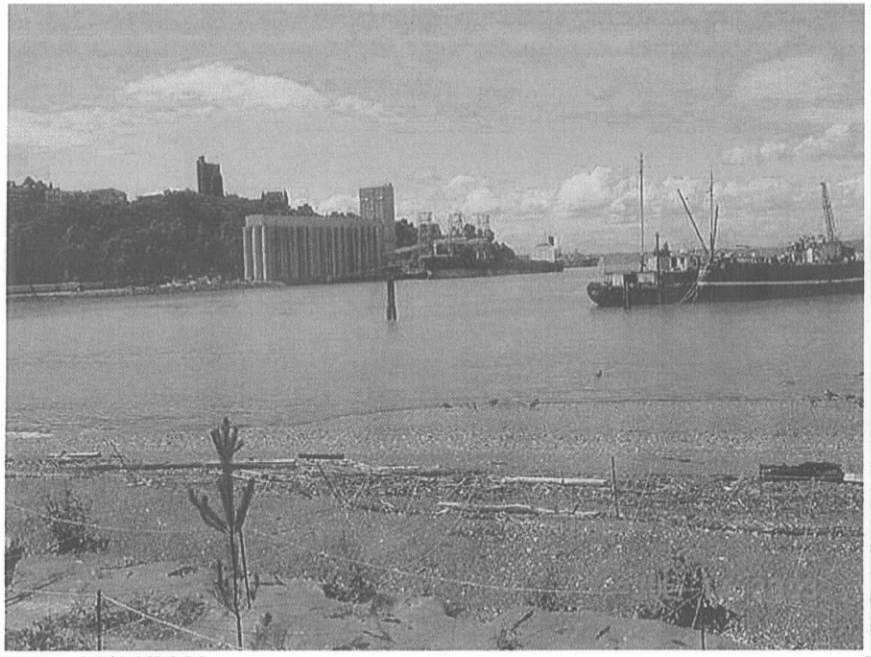
Date 04/08/2004



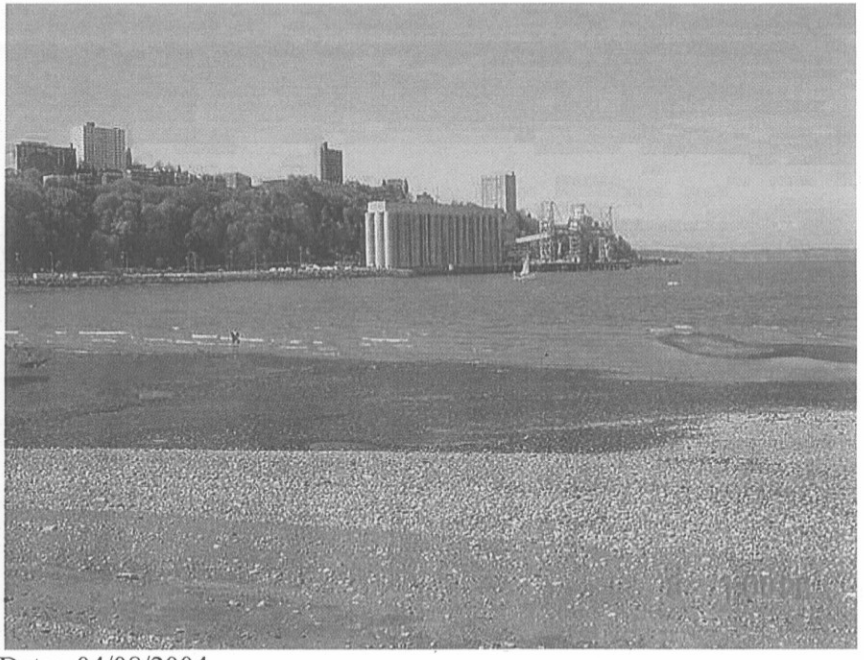
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P2B



Date: 07/14/2003



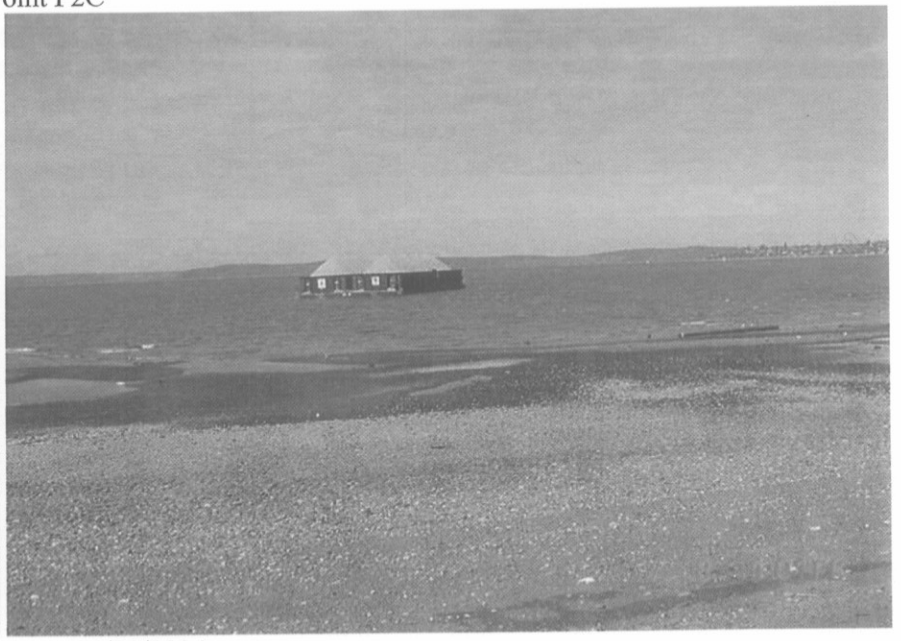
Date: 04/08/2004

Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P2C

Date 07/14/2003



Date 04/08/2004

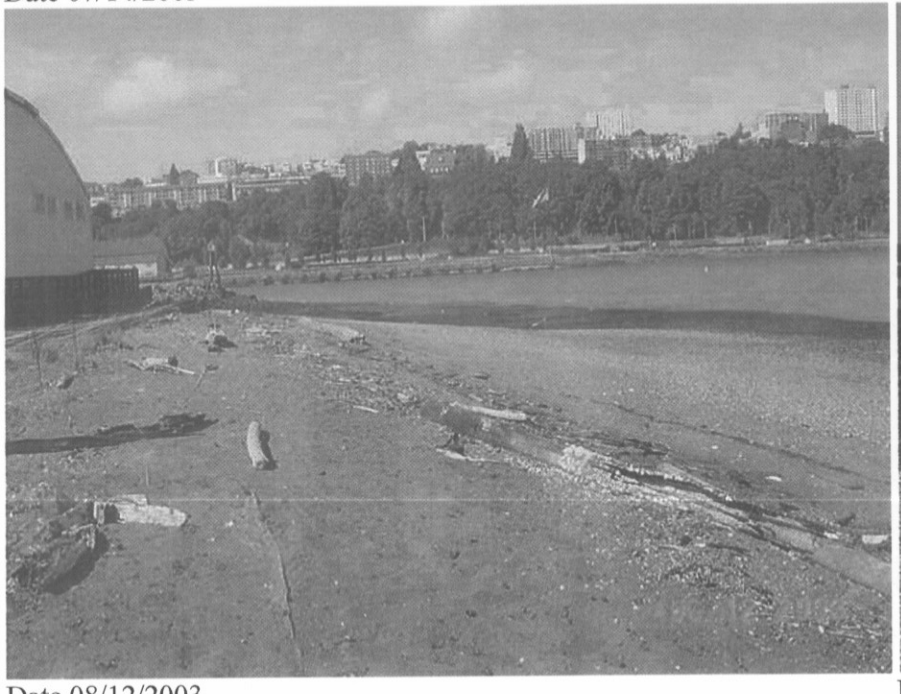
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P3A

Date 07/14/2003

Date 04/08/2004

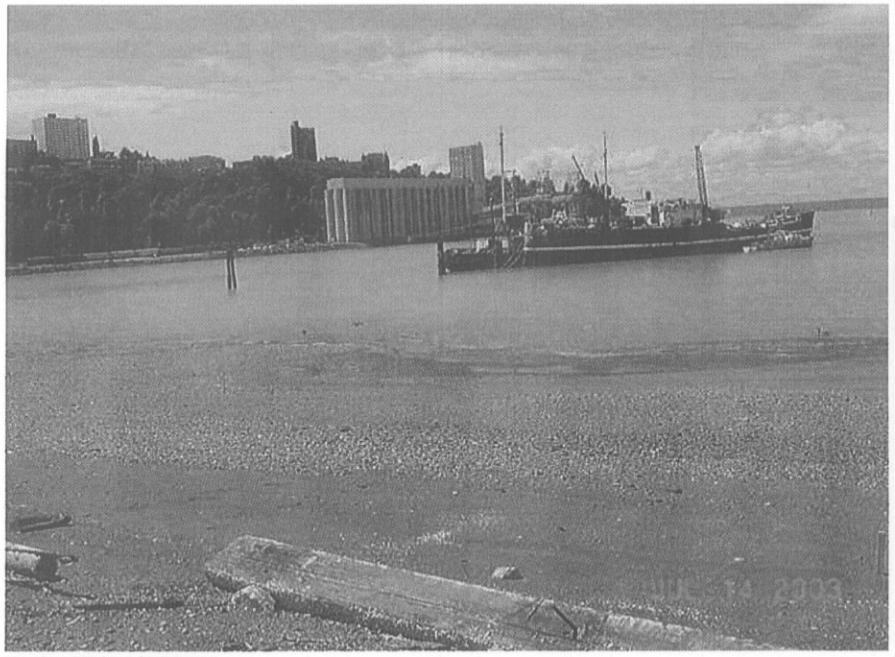


Date 08/12/2003

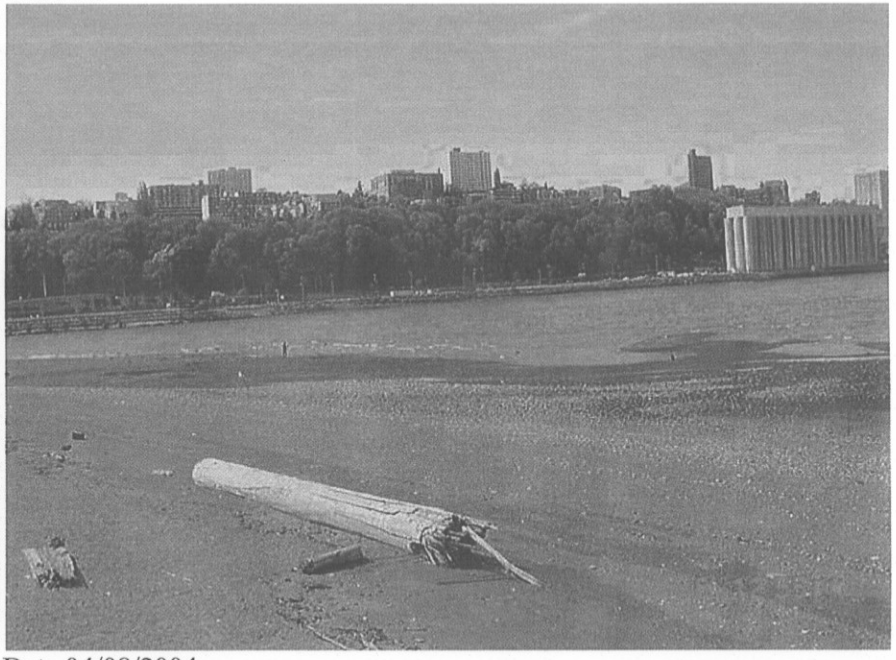
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

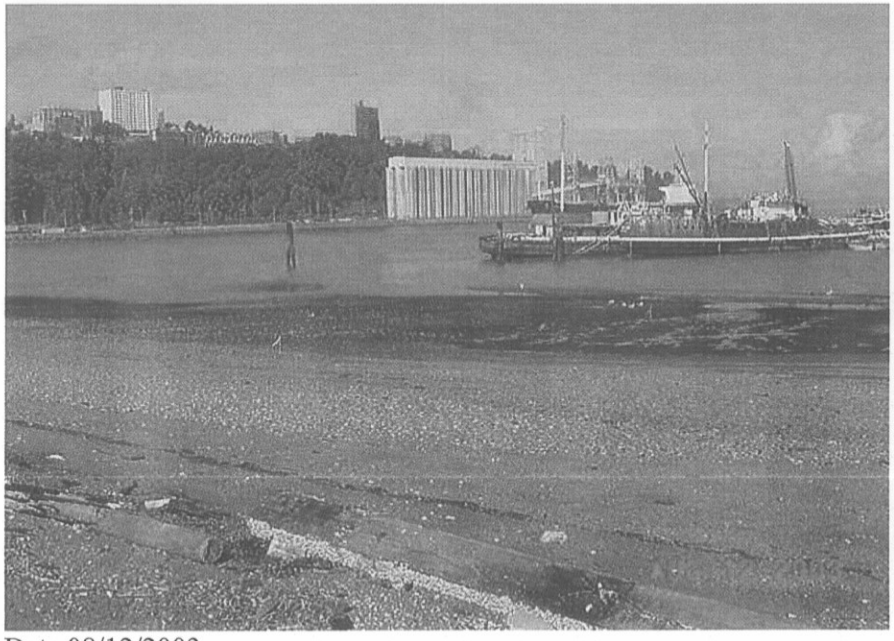
Photo Point P3B



Date 07/14/2003



Date 04/08/2004



Date 08/12/2003

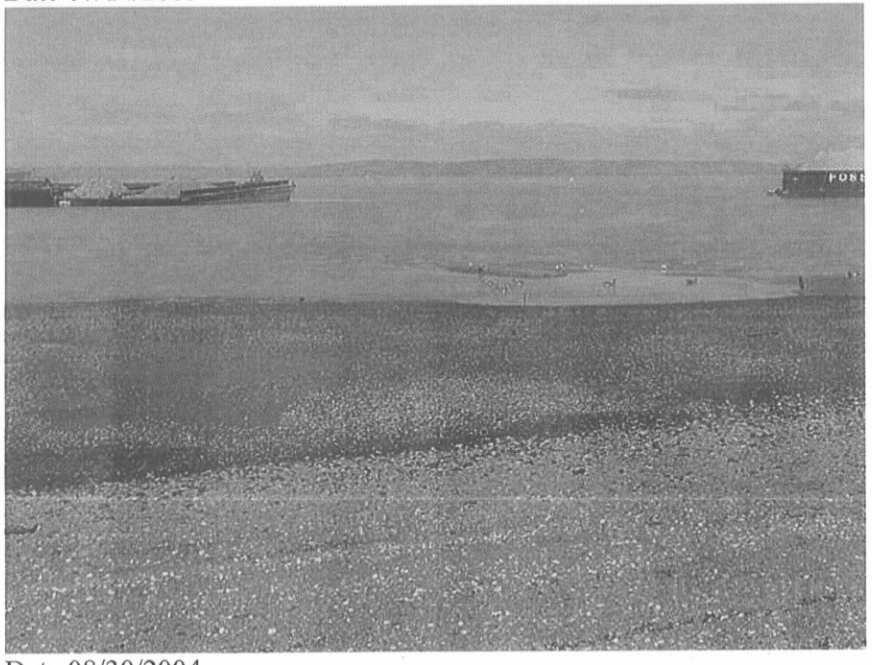
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P4A

Date 07/14/2003

Date 04/08/2004



Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P4B

Date 07/14/2003

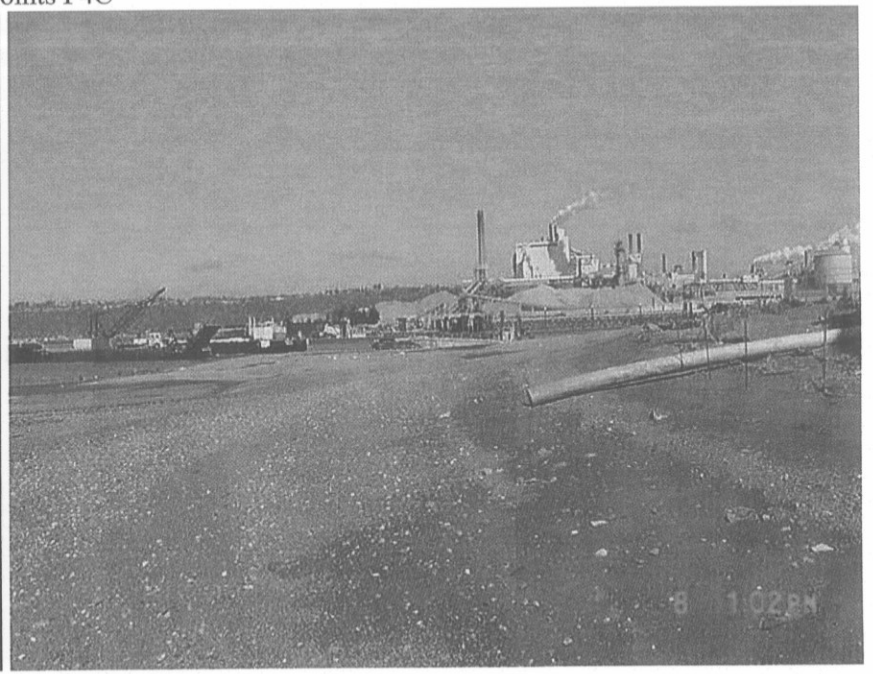
Date 4/08/2004

Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Points P4C

Date 07/14/2003

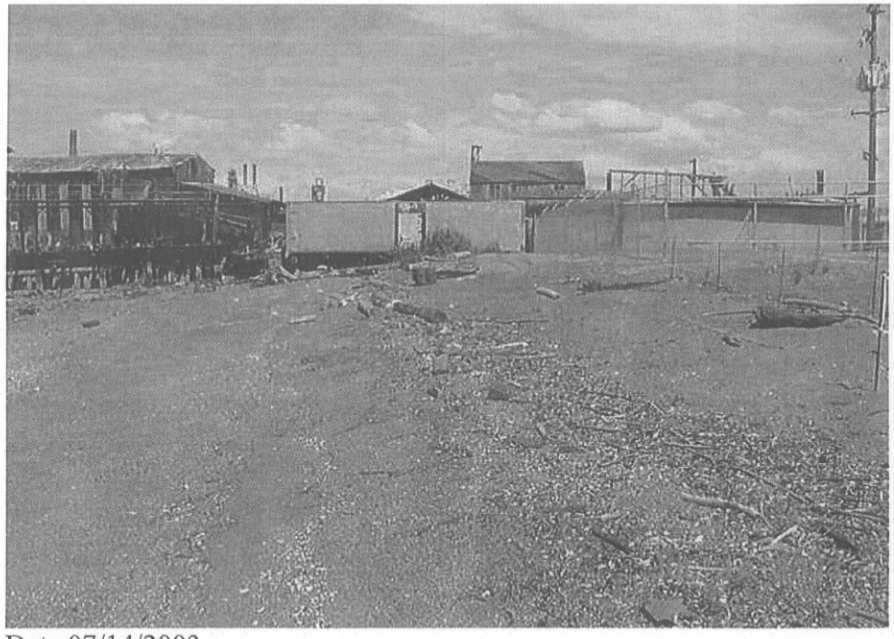


Date 04/08/2004

Date 08/30/2004

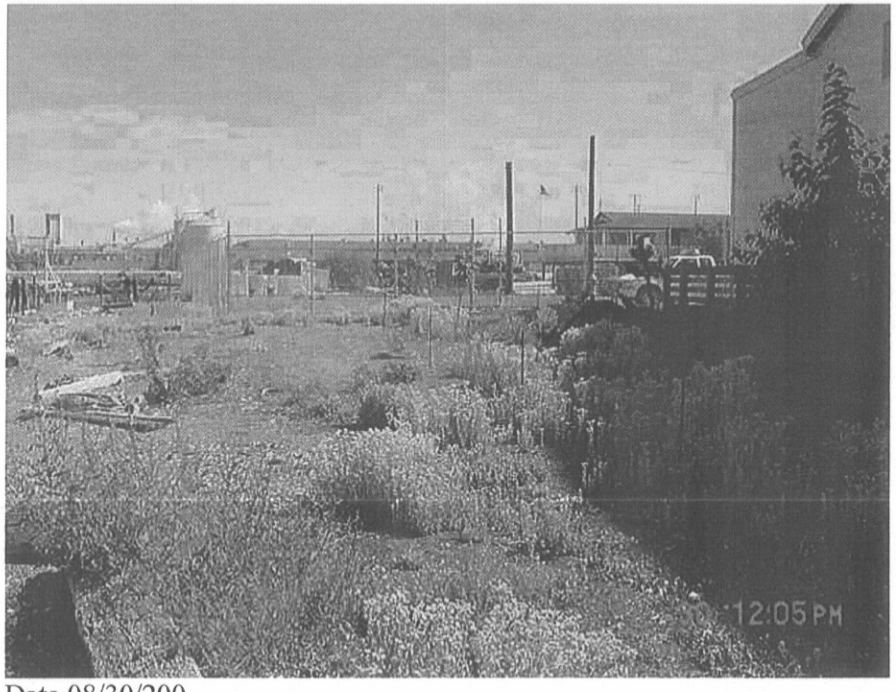
Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P5A



Date 07/14/2003

Date 04/08/2004



Date 08/30/200

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P5B

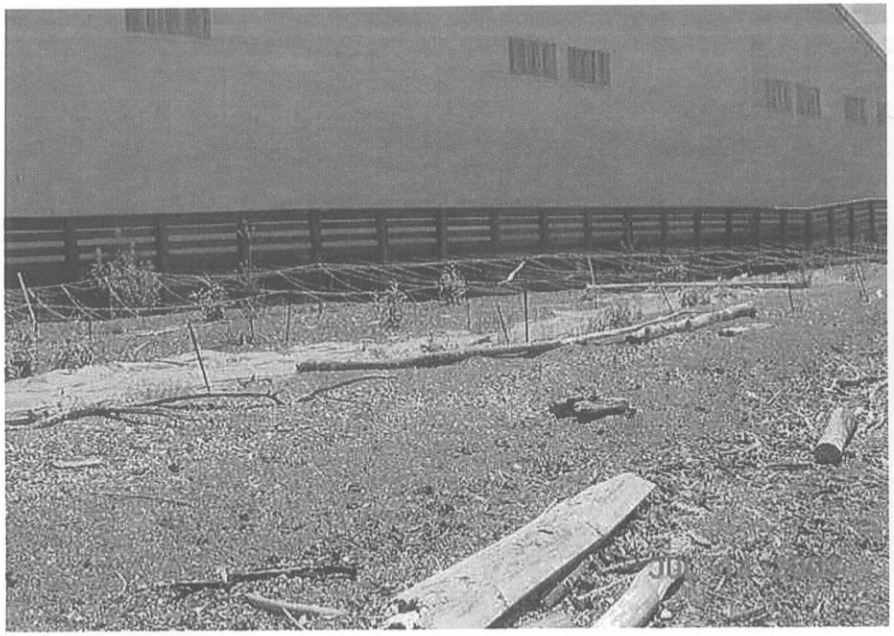
Date 07/14/2003

Date 04/08/2004

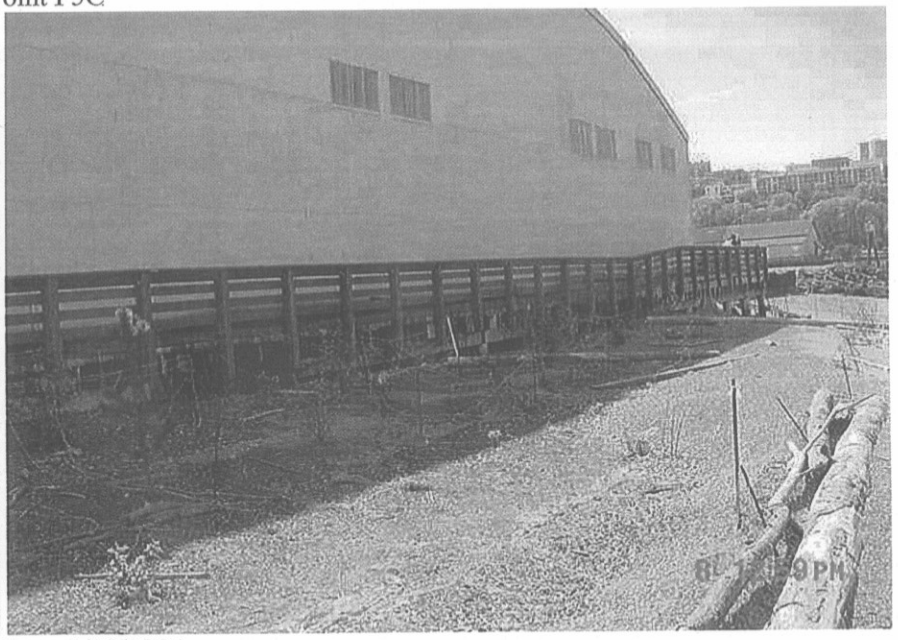
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P5C



Date 07/14/2003



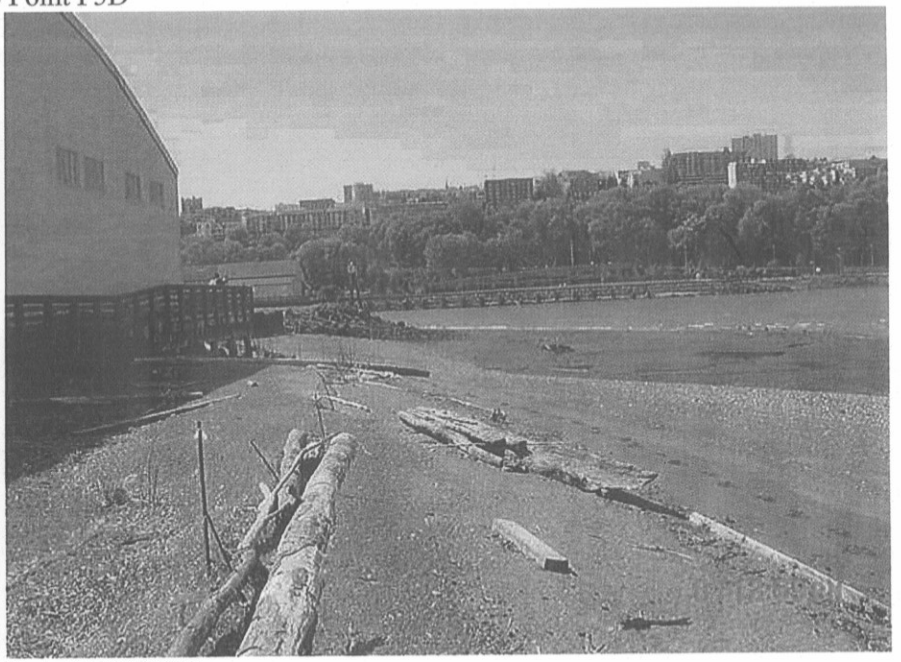
Date 4/08/2004

Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P5D

Date 07/14/2003

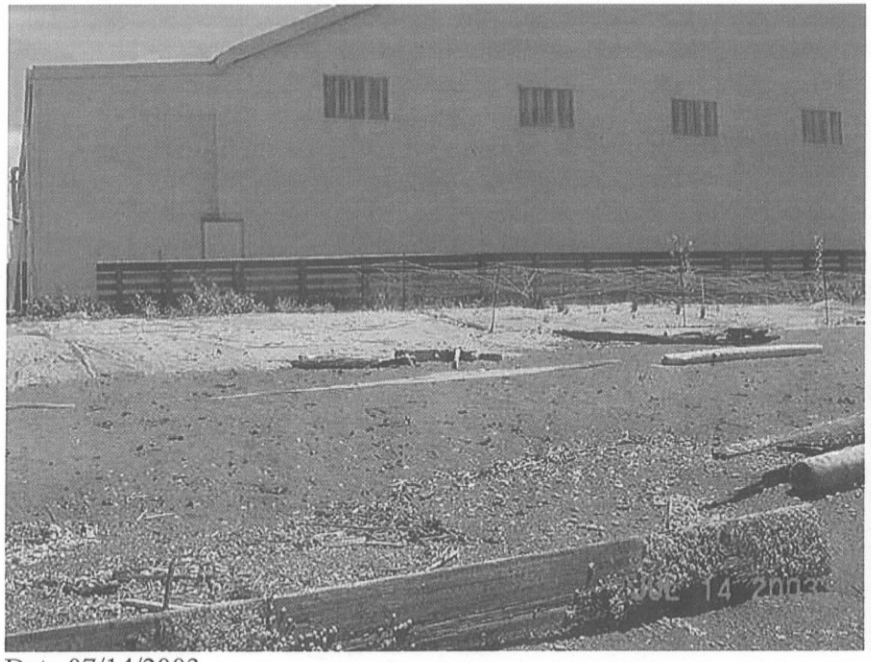


Date 04/08/2004

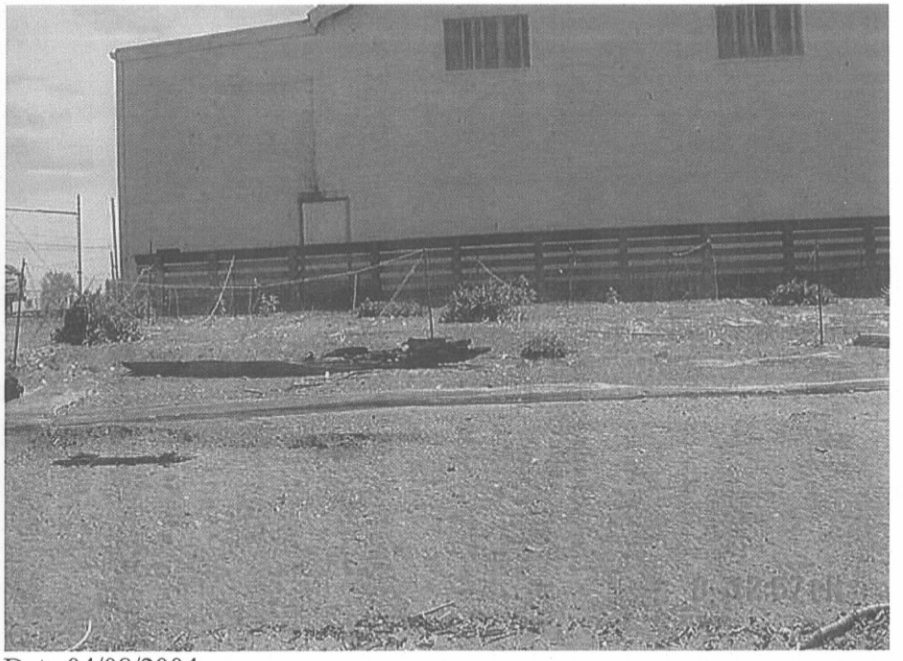
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

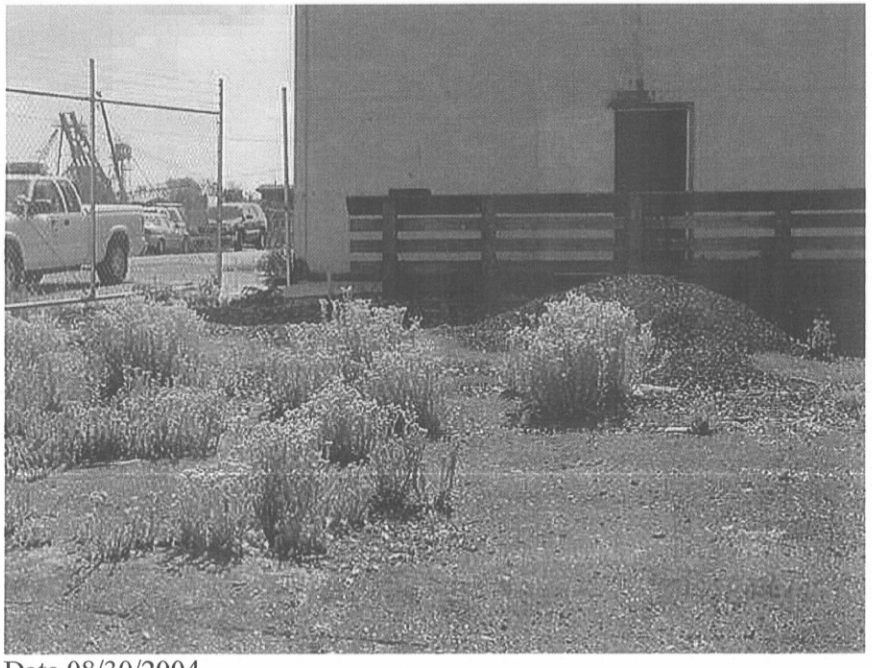
Photo Point P6A



Date 07/14/2003



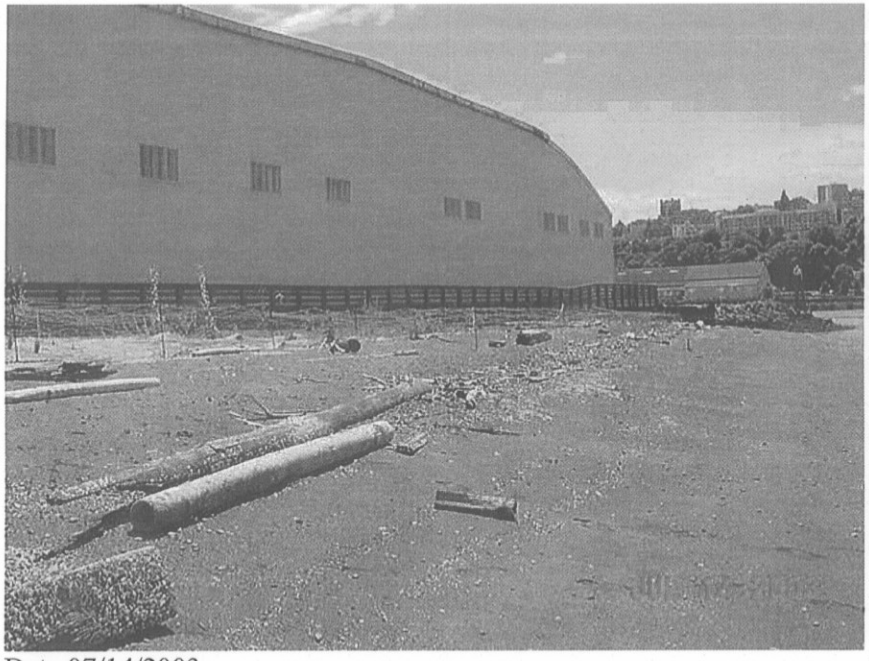
Date 04/08/2004



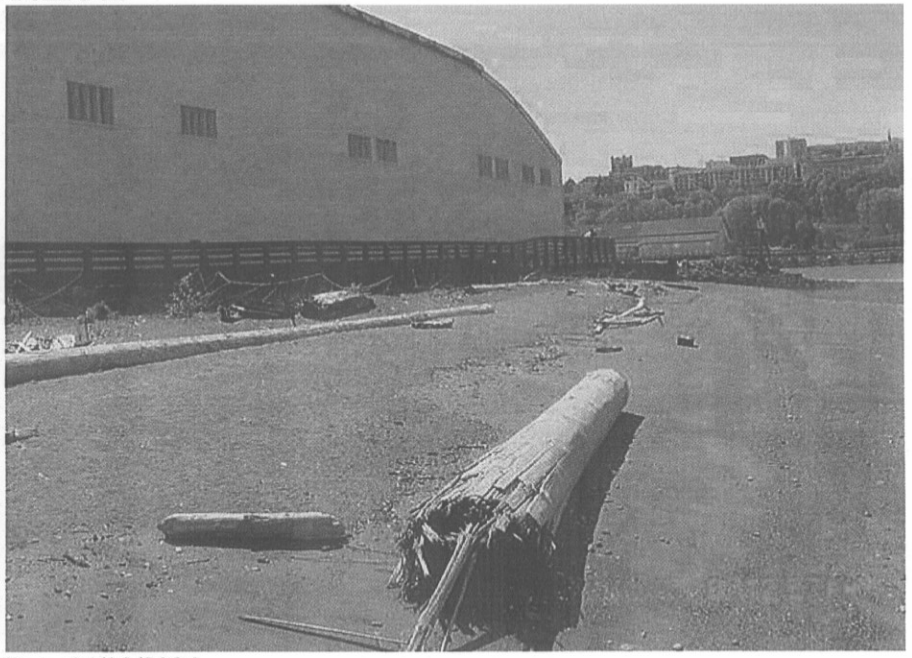
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

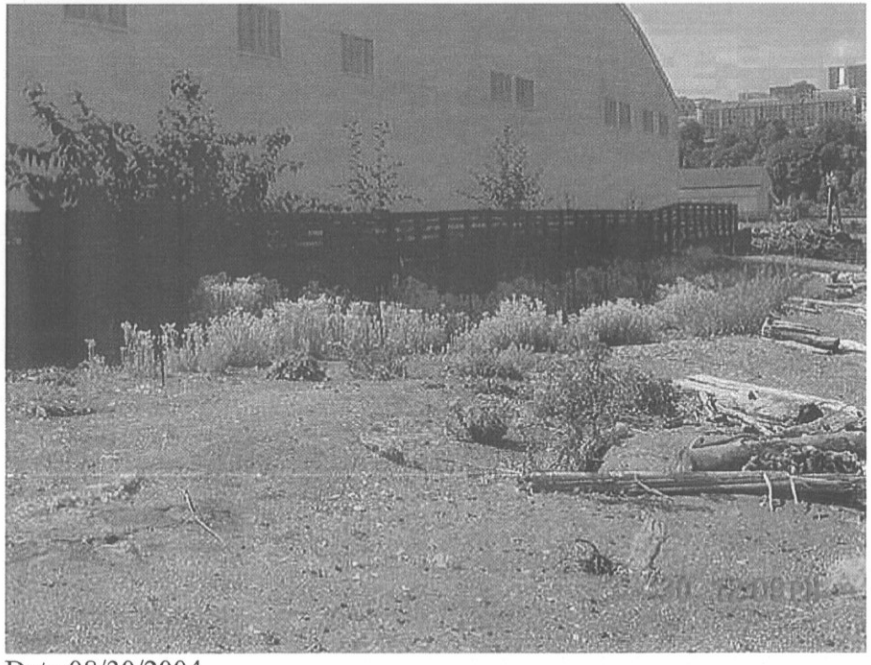
Photo Point P6B



Date 07/14/2003



Date 04/08/2004

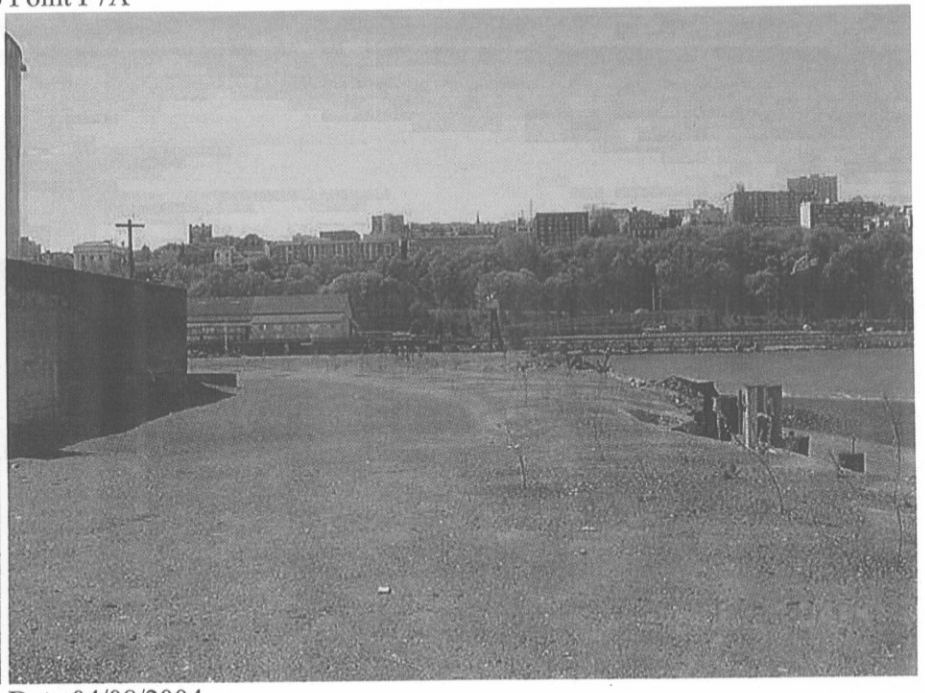


Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P7A

Date 07/14/2003

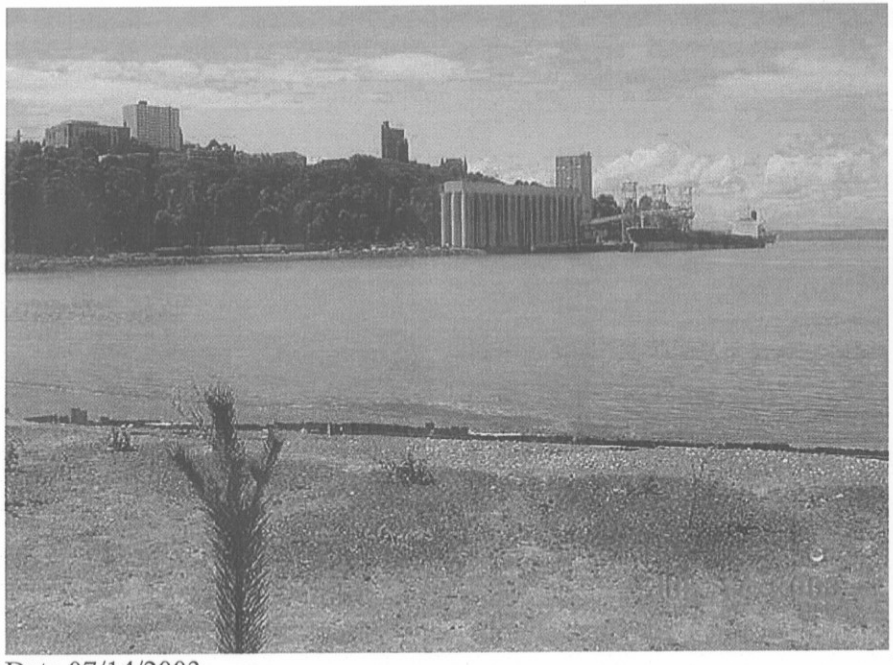


Date 04/08/2004

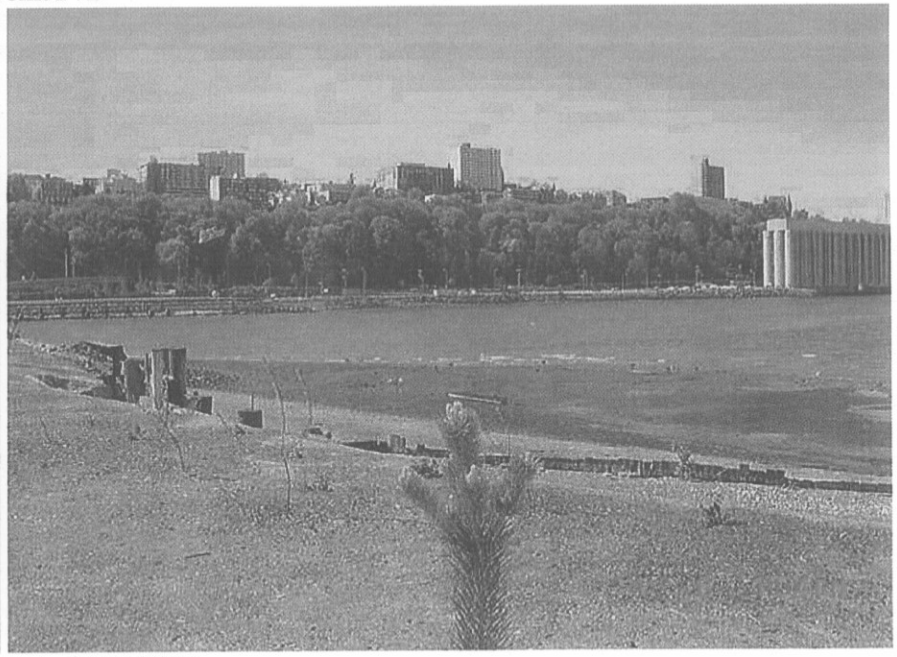
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P7B



Date 07/14/2003



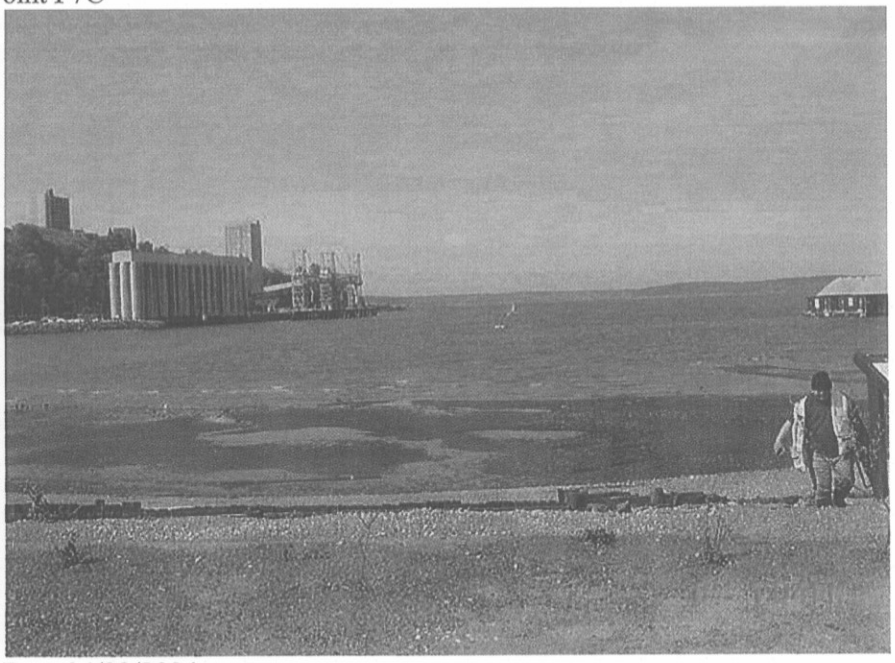
Date 04/08/2004

Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point P7C

Date 07/14/2003

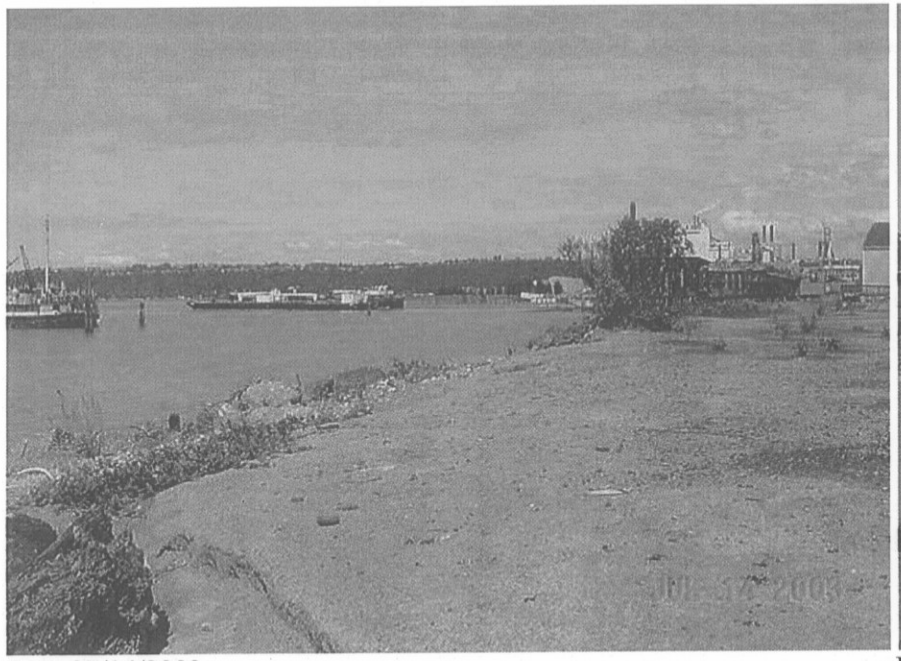


Date 04/08/2004

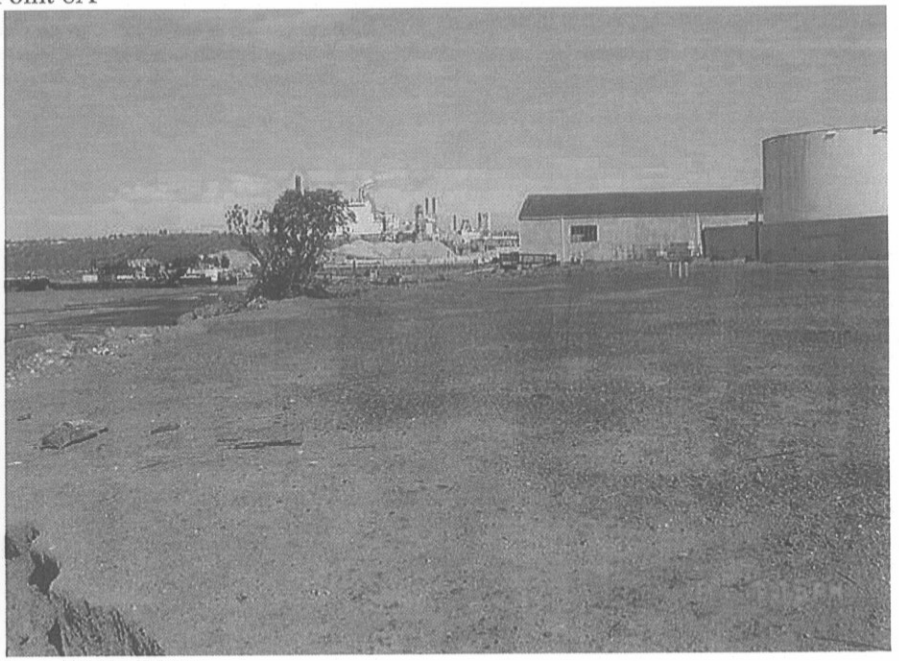
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

Photo Point 8A



Date 07/14/2003

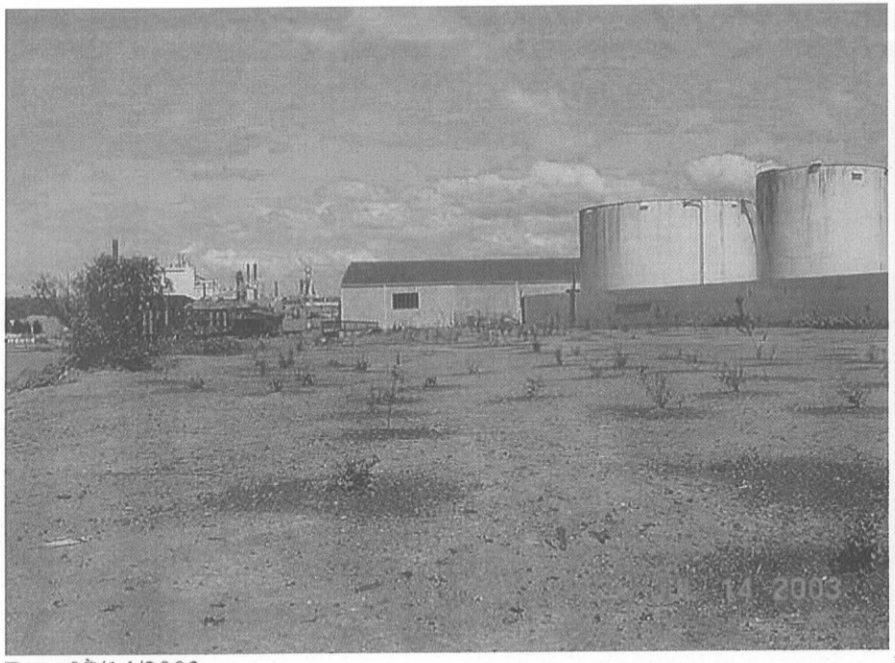


Date 04/08/2004

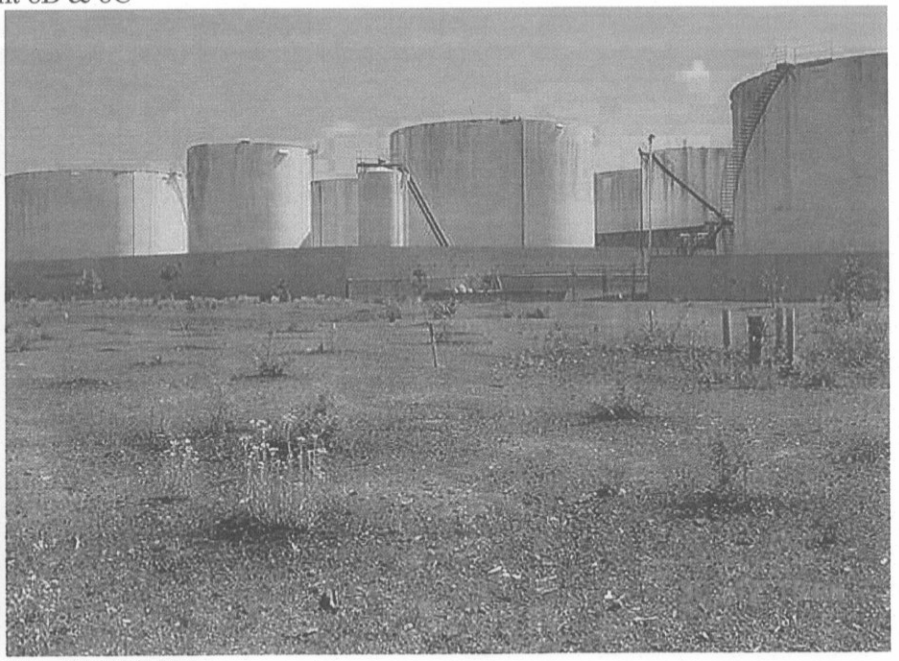
Date 08/30/2004

Appendix A: Year 1 Olympic View Monitoring Photos

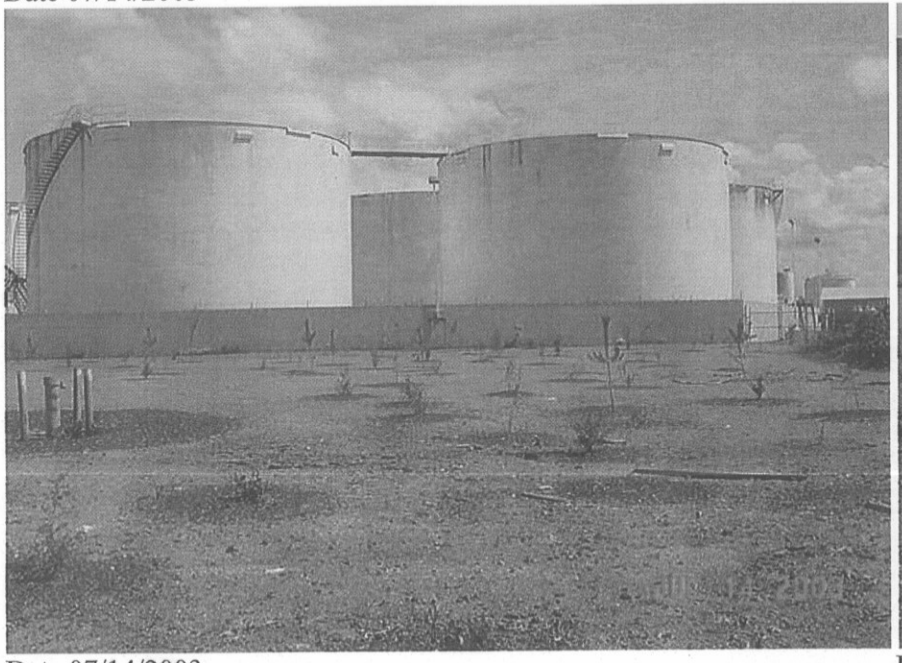
Photo Point 8B & 8C



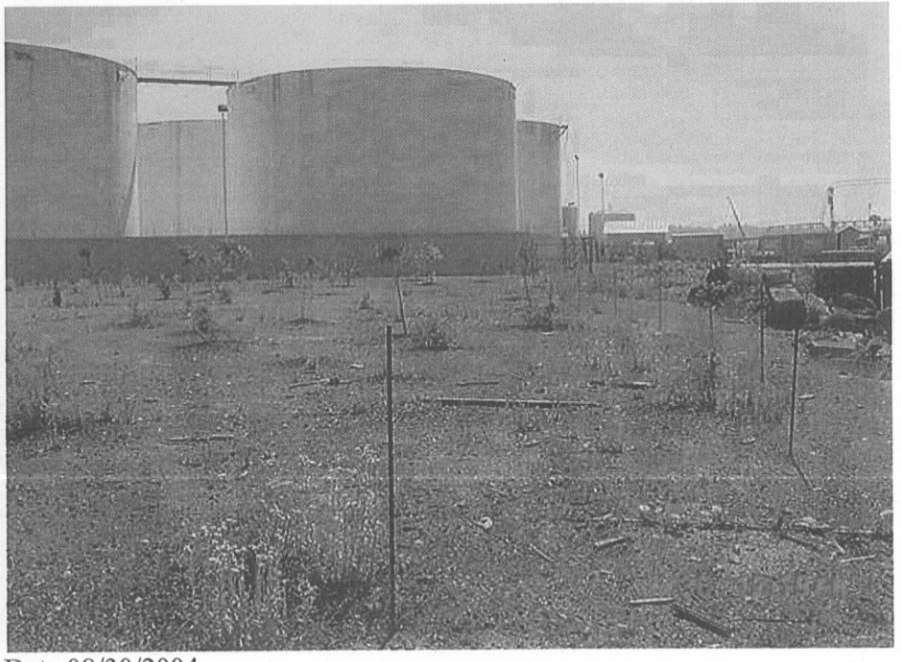
Date 07/14/2003



Date 08/30/2004



Date 07/14/2003



Date 08/30/2004