

**DES MOINES WAY NURSERY MITIGATION PLAN  
SEATTLE-TACOMA INTERNATIONAL AIRPORT  
MASTER PLAN UPDATE IMPROVEMENTS**

Prepared for

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## 1. INTRODUCTION

Seattle Tacoma International Airport Master Plan Update improvements directly affect streams and wetlands, and the *Natural Resource Mitigation Plan Master Plan Update Improvements Seattle Tacoma International Airport* (NRMP) has been prepared to mitigate these impacts.

This report describes additional wetland mitigation (restoration and enhancement), upland buffer restoration, stream enhancement, and stream buffer restoration as additional supplemental mitigation. The additional mitigation (5.79 acres) has been planned at the request of the US Army Corps of Engineers (ACOE) to further assure the no net loss of wetland functions result from the Master Plan Update projects.

## 2. DES MOINES WAY NURSERY MITIGATION PROJECT

This section describes on-site mitigation activities at Des Moines Way Nursery. The mitigation is designed to restore and enhance physical and biological functions in Miller Creek riparian wetlands and associated buffers areas. This mitigation supplements other on-site mitigation described in the NRMP that are designed to compensate for unavoidable project impacts to wetland, stream, and hydrologic functions. In developing this plan, the Port of Seattle (Port) used agency guidance to identify in-basin mitigation activities that will compensate for project impacts to wetland and stream functions. Elements of the mitigation plan are specifically targeted to restore in-basin functions that will be impacted by the project, and include sediment and nutrient retention (water quality), organic carbon production and export, and aquatic habitat functions (e.g., instream aquatic habitat and riparian habitat for fish and amphibians).

The mitigation plan will result in increased functional performance of the wetlands, streams, and buffers at mitigation site relative to their degraded existing conditions. For example, wetlands currently dominated by non-native ornamental vegetation and turf grasses will be restored to shrub and forested systems containing a greater diversity of native species and habitats. Along with nutrient and sediment retention, instream habitat and non-avian wildlife habitat functions will be improved relative to existing conditions.

The mitigation plan is based upon Ecology guidance (Ecology 1994). The mitigation plan, goals, and objectives are introduced first (Section 3), followed by a description of the project site (Section 4), including existing ecological conditions, the rationale for selecting the project, and constraints on the proposed mitigation. Next the mitigation design is described in detail (Section 5), with reference to figures and the plan sheets in Appendices F of the NRMP where detailed design drawings are provided. Performance standards and monitoring requirements describe how the project will be monitored during a 15-year post-construction period (Section 6). Legal protection of the site is described in Section 7, and maintenance and contingency actions are described in Section 8. The final report section (Section 9) describes the specific construction steps, methods, and sequencing required to implement the mitigation design.

### 3. MITIGATION GOALS AND PERFORMANCE STANDARDS

In reviewing project impacts to wetlands and the ecological benefits provided by on-site mitigation, the ACOE requested that the Port increase on-site mitigation by enhancing and restoring riparian wetlands. The Des Moines Way Nursery site was selected to achieve this general goal.

The goal of the Des Moines Way Nursery site mitigation is to increase the hydrologic linkages between historic wetlands and to Miller Creek without creating habitat for birds that pose a threat to aircraft safety. This goal will be accomplished by:

- Restoring historic topography, hydrology, and vegetation communities.
- Enhancing the floodplain, wetland, and stream functions by restoring forested, riparian, and upland buffers.
- Grading and replanting the emergent wetland (lawn) area to reduce or eliminate habitat for waterfowl and flocking birds.

The specific objectives and design criteria to achieve these wetland mitigation goals are listed in Table N-1.

**Table N-1. Mitigation goals, design objectives, and design criteria for the Des Moines Way Nursery wetland restoration project.**

<b>Goals and Design Objectives</b>	<b>Actions</b>
<b>Increase hydrologic linkages between historic wetlands and Miller Creek</b>	
Remove existing commercial and residential uses from the wetland, riparian, and upland areas of the Des Moines Way Nursery site.	Eliminate commercial and residential activities and remove existing structures and fill from the restoration site.
Restore wetland hydrology to filled wetlands. Improve hydrology in emergent (lawn) wetlands.	Remove ditches and drains from lawn areas. Remove fill from historic wetlands. Grade restored wetlands to elevations that restore wetland hydrology. Install large woody debris (LWD) in Miller Creek to improve stream habitat conditions.
Restore wetlands and riparian areas with native trees and shrubs.	Restore 2.20 acres of wetland with native vegetation. Enhance 0.86 acre of existing wetland with native vegetation. Plant native shrub species in the wetland area at a density greater than 2,100 per acre. Intersperse native trees in the area at densities of 80 trees per acre. Plant upland and riparian buffer areas with native trees at densities of 280 per acre. Plant understory shrubs in these areas at densities of 2,100 per acre.

## 4. MITIGATION SITE DESCRIPTION

### 4.1 LOCATION AND GENERAL DESCRIPTION

The Des Moines Way Nursery site is located at the northeast quadrant of the intersection of State Route (SR) 518 and Des Moines Memorial Drive (Figure N-1). The site is bounded by private property to the north and east, Des Moines Memorial Drive to the west, and the right-of-way (ROW) for SR 518 to the south. The east side of the site is bordered by baseball fields on land owned by the Port of Seattle.

Miller Creek flows through from north to south through about the eastern third of the site. The topography on either side of the stream channel rises gradually to elevations of 284-ft mean sea level in the western portion of the site and more steeply to 287 ft in the eastern portion of the site. Much of the eastern portion of the site, and portions that border Des Moines Memorial Drive appear to have up to several ft of fill that has been placed on historic wetlands.

A landscape nursery business is located in the northwest portion of the site. The nursery contains parking areas, a retail store, several storage buildings, and a graveled outdoor retail area. A residence and associated lawn, gardens, and landscaping are located in the southwest portion of the site (Figure N-2).

### 4.2 ECOLOGICAL CONDITIONS

Ecological conditions important to the mitigation design are summarized in this section.

#### 4.2.1 Soils

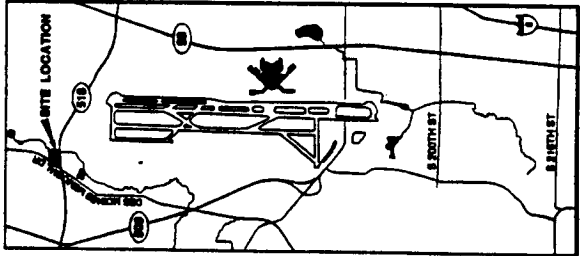
Soils on the project site were mapped as Everett, Norma, Rifle peat and Indianola soil series by the 1952 *Soil Survey of King County, Washington* (USDA 1952). The Everett gravely sandy loam soil type is mapped in north and central portion of the site. These soils typically form on rolling and hilly upland areas and terraces at elevations below 500 ft. Norma fine sandy loam is mapped in the northwest portion of the site (currently occupied by the nursery operation) and is identified a hydric (wetland) soil by the *Hydric Soils of Washington* (USDA 1991). These soils occur in glacial basins and depressions that have been modified by erosion and deposition. A small portion of Rifle peat is mapped in the south central portion of the site. Rifle peat is distributed in depressions throughout occurring in flat bottom positions or swampy areas marginal to streams and lakes. The Indianola soil series occurs in the southwest portion of the site, where an existing residence and orchard is present. The *Soil Survey of King County Area Washington* (Snyder et. al. 1973) excluded the Nursery site from soil mapping, but the peat area was mapped by Rigg (1958) as the Miller Creek Peat Area, which was estimated to be 56 acres in size.

Results of on site investigations show that soils on the site consists of fill soils throughout developed areas and along the east side of the site. Peat and/or muck soils are present in much of the lawn area located in the north central portion of the site. A gravelly loamy sand soil is present along the southern portion of the site.

#### 4.2.2 Upland Vegetation

A variety of native and non-native plant species occur on the site (Table N-2). Upland areas on the Des Moines Way Nursery site primarily consist of retail development, mowed lawn, vegetable

**VICINITY MAP**



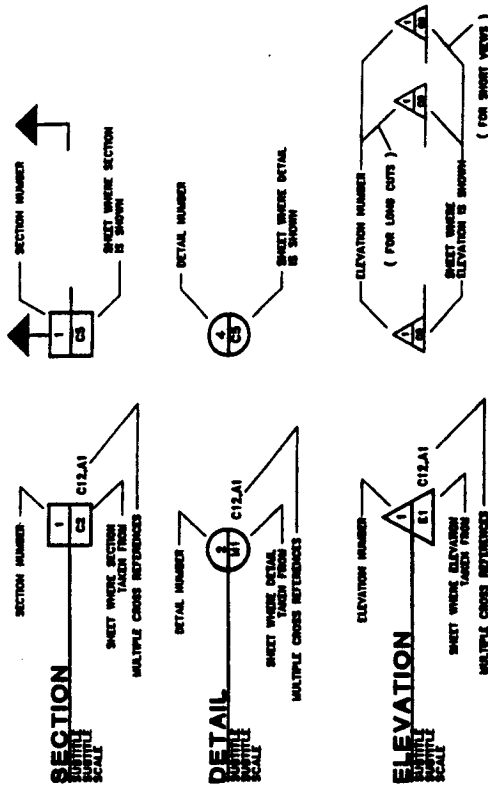
**LEGEND**

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CULVERT<br>SPOT ELEVATION<br>KEY NOTE NUMBER REFERENCE<br>SURFACE WATER DITCH<br>EXISTING CONTOUR<br>PROPOSED CONTOUR<br>EXISTING GRAVEL (SECTION)<br>SPAWNING GRAVEL (SECTION)<br>CURBED SURFACE BASE COURSE (SECTION)<br>QUARRY SPALLS<br>CONCRETE<br>DISMANTMENT<br>NATIVE SUBGRADE<br>GRAVEL<br>PAVEMENT (PLAN)<br>SLOPE INDICATOR<br>CONTROL POINT<br>1/4" FENCE<br>3/4" CURB/WALL<br>SEDIMENT<br>EROSION CONTROL MATTING<br>STORM DRAIN MARKER<br>EXISTING STORMWATER WELL<br>CHAIN LINK FENCE<br>PRIVATE PROPERTY BOUNDARY<br>POINT OF INTERSECTION<br>STORM<br>CHANNEL CENTERLINE AND STATION<br>EXISTING SANITARY SEWER LINE<br>PROPOSED SANITARY SEWER LINE<br>LIMIT OF CONSTRUCTION (PROJECT)<br>SURVEY CONTROL POINT<br>LIMIT OF RESTRICTED AREA<br>EXISTING STORM DRAIN |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**GENERAL LEGEND**

**DRAWING TITLE:**  
**PLAN**  
 1/8" = 1'-0"  
 NORTH

**REFERENCE SYMBOL:**



**GENERAL ABBREVIATIONS**

- |                                                                                                                        |                                                                                                                                                                                                                    |                                                                                                                                                                        |                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| C.P. APPROX.<br>CAP<br>DN<br>E<br>E. OR ELEV<br>EXIST.<br>EXIST<br>HORIZ./N<br>HORIZ<br>L<br>L.T.<br>M<br>M.L.<br>M.S. | ASPHALT CONCRETE PAVEMENT<br>APPROXIMATE CENTERLINE<br>COMBUSTIBLE METAL PIPE<br>EAST/WESTING<br>ELEVATION<br>EXISTING<br>EXIST (FEET)<br>HORIZONTAL<br>HORIZONTAL<br>LINEAR FEET/FOOT<br>MANHOLE<br>MISCELLANEOUS | NORTH/NORTHWARD<br>NORTH SCALE<br>ON CENTER<br>POWER POLE<br>SANDWICHED CONCRETE PIPE<br>SOUTH<br>STORM DRAIN<br>TYPICAL<br>STATION<br>TYPICAL<br>VERTICAL<br>VERTICAL | H.<br>H.S.<br>I.C.<br>P<br>P.P.<br>P.P.<br>R.C.P.<br>S<br>S.P.<br>S.P.<br>S.P.<br>S.P.<br>STA<br>TYP<br>V<br>V<br>VERT./N |
|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|

**SURVEY CONTROL POINTS**

- 9704-2 = REBAR WITH YELLOW CAP MARKED PNE CONTROL NEAR THE SOUTHWEST CORNER OF LINA LANE, 11' SOUTHERLY OF A DOUBLE TRACK (12' x 14') FROM A SANITARY SEWER MANHOLE.
- 9704-3 = REBAR WITH YELLOW CAP MARKED PNE CONTROL NEAR THE SOUTHWEST CORNER OF A DOUBLE TRACK (12' x 14') ALONG THE WEST SIDE OF THE SANITARY SEWER MANHOLE.
- 9704-4 = REBAR WITH YELLOW CAP MARKED PNE CONTROL IN THE NORTHWESTLY CORNER OF A BLACKSMITH PATENT 8' x 4' EASTERLY OF THE MOST NORTHWESTLY CORNER OF A WOODEN STORAGE SHED.

NOTE: SEE C2 FOR SURVEY CONTROL POINT COORDINATES AND ELEVATIONS.

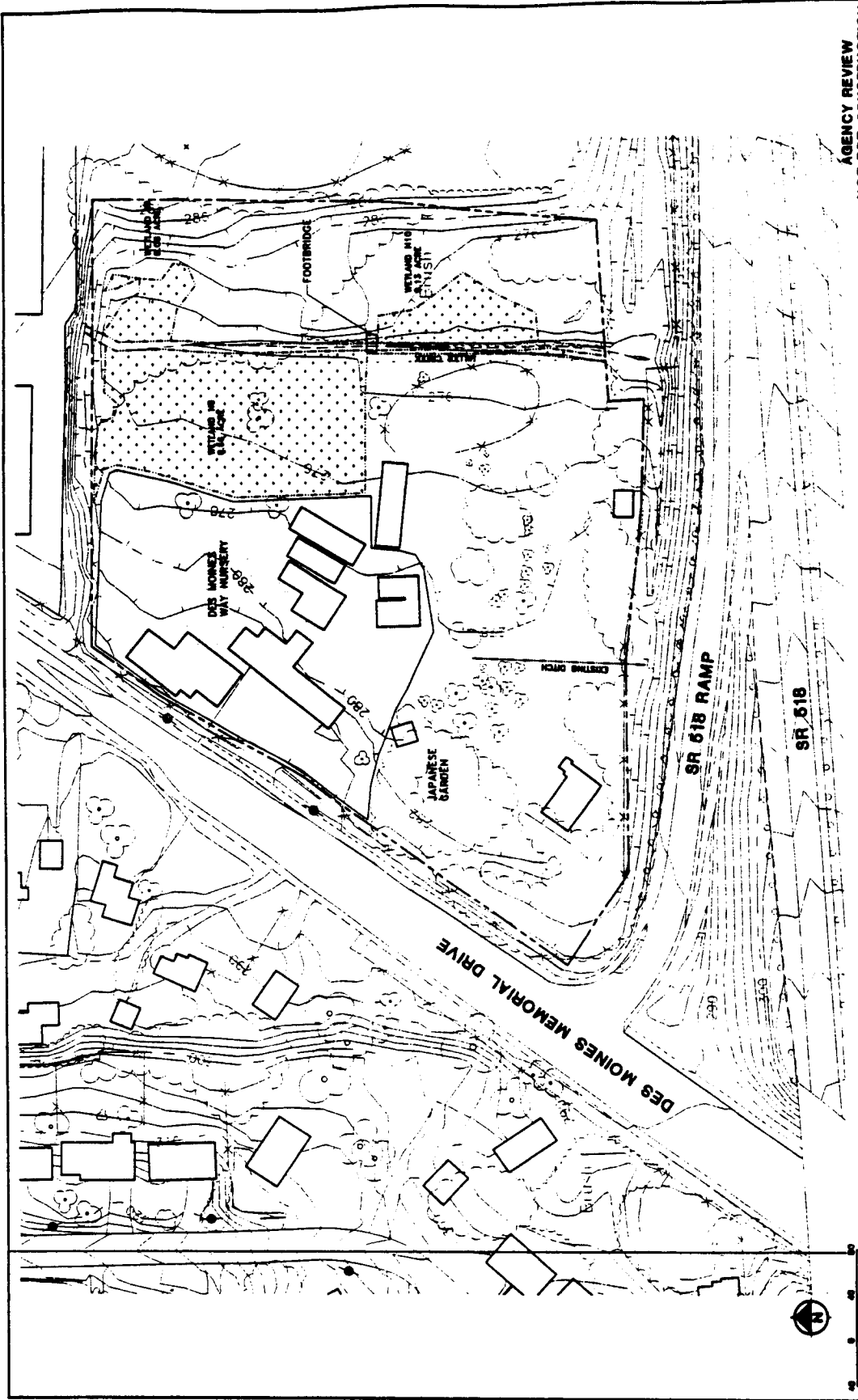
**GENERAL NOTES**

1. CALL "TOP-JACK" (1-800-458-8845) PRIOR TO COMMENCING ANY GRADING OR EXCAVATION WORK ON THE SITE.
2. INSTALLATION OF TEMPORARY EROSION AND SEDIMENT CONTROLS SHALL BE COMPLETED PRIOR TO SITE WORK.

AGENCY REVIEW  
 NOT FOR CONSTRUCTION

Figure N-1.  
 Location of the Des Moines Way Nursery Mitigation Area.





AGENCY REVIEW  
NOT FOR CONSTRUCTION

Figure N-2.  
Existing Conditions on the Des Moines Way Nursery Mitigation Area.

NO.	DATE	REVISIONS	BY	CHECKED	DATE	NO.	DATE	REVISIONS	BY	CHECKED	DATE	NO.	DATE	REVISIONS	BY	CHECKED	DATE

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gardens, ornamental landscaping, blackberry thickets, and immature black cottonwood forest. Dense Himalayan blackberry thickets occur on upland fill along the western portion of the property.

Table N-2 Plant species present on the Des Moines Way Nursery site.

Common Name	Scientific Name	Indicator Status	Non-Native (x)
<b>TREES</b>			
black cottonwood	<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	FAC	
red alder	<i>Alnus rubra</i>	FAC	
Douglas fir	<i>Pseudotsuga menziesii</i>	FACU	
<b>SHRUBS</b>			
Himalayan blackberry	<i>Rubus discolor</i>	FACU	x
salmonberry	<i>Rubus spectabilis</i>	FAC+	
Scot's broom	<i>Cytisus scoparius</i>	UPL	x
Sitka willow	<i>Salix sitchensis</i>	FACW	
Pacific willow	<i>Salix lucida</i> ssp. <i>lasiandra</i>	FACW	
<b>HERBS</b>			
American vetch	<i>Vicia americana</i>	FAC	x
bedstraw	<i>Galium</i> sp.	FACU	
bentgrass	<i>Agrostis</i> sp.	FAC	x
bittersweet nightshade	<i>Solanum dulcamara</i>	FAC+	x
bluegrass	<i>Poa</i> sp.	FAC	x
bracken fern	<i>Pteridium aquilinum</i>	FACU	
Canada thistle	<i>Cirsium arvense</i>	FACU+	x
clover	<i>Trifolium</i> sp.	FAC	
colonial bentgrass	<i>Agrostis capillaris</i> ( <i>tenuis</i> )	FAC	x
common velvet-grass	<i>Holcus lanatus</i>	FAC	x
creeping bentgrass	<i>Agrostis stolonifera</i>	FAC	x
creeping buttercup	<i>Ranunculus repens</i>	FACW	x
curly dock	<i>Rumex crispus</i>	FAC	x
dandelion	<i>Taraxacum officinale</i>	FACU	x
fescue	<i>Festuca</i> sp.	NL	
field horsetail	<i>Equisetum arvense</i>	FAC	
fireweed	<i>Epilobium ciliatum</i>	FACW-	
giant mannagrass	<i>Glyceria grandis</i>	OBL	
Kentucky bluegrass	<i>Poa pratensis</i>	FAC	x
orchardgrass	<i>Dactylis glomerata</i>	FACU	x
perennial ryegrass	<i>Lolium perenne</i>	FACU	x
quackgrass	<i>Agropyron repens</i>	FACU	x
red clover	<i>Trifolium pratense</i>	FACU	x
red fescue	<i>Festuca rubra</i>	FAC+	
redtop	<i>Agrostis gigantea</i> ( <i>alba</i> )	FAC	x
reed canarygrass	<i>Phalaris arundinacea</i>	FACW	x
smartweed	<i>Polygonum</i> sp.	FACW-OBL	
soft rush	<i>Juncus effusus</i>	FACW	
tall fescue	<i>Festuca arundinacea</i>	FAC-	x
thistle	<i>Cirsium</i> sp.	FACU	x
white clover	<i>Trifolium repens</i>	FACU+	x

### 4.2.3 Forest, Shrub, and Emergent Wetland Vegetation

Three wetlands (Wetlands N8, N9, and N10) and one stream (Miller Creek) are located on the Des Moines Way Nursery site. The three wetlands are located in the eastern portion of the site and are associated with Miller Creek. The following sections describe the wetlands, associated uplands, and stream habitats located on site.

#### 4.2.3.1 Wetlands

Field investigations of the Nursery site to identify and delineate wetlands occurred on October 10, 2001. During this field investigation the project area was inspected for wetland characteristics using the wetland delineation methodology described in the *Wetland Delineation Report Master Plan Update improvements Seattle-Tacoma International Airport* (Parametrix 2000a).

Subsequent to the field investigation, ACOE staff (Gail Terzi and Muffy Walker) examined the wetland and upland conditions on the site. This evaluation included examinations of fill soils, native upland soils, native wetland soils, natural and managed vegetation types, and hydrologic conditions. Several areas of shallow surface drains (pipe and ditches) and the ditched channel of Miller Creek were also examined. On October 11, 2001, the ACOE confirmed the wetland boundaries. Following these evaluations, the wetland boundaries were mapped and surveyed by licensed surveyors (see Figure N-2).

Three riparian wetlands were mapped on the site. Hydrologic, soil, and vegetation data documenting the wetland delineation were collected and are provided on wetland delineation data sheets in Attachment A. The wetlands are described in detail below.

#### Wetland N8

USFWS Classification: PEM  
Size: 0.66 acre

Wetland Data Plots: 1W  
Upland Data Plot: 3U-2

Wetland N8 is a palustrine emergent wetland, located in the north central portion of the site, and on the west side of Miller Creek. The wetland extends south as a narrow fringe of riparian wetland along the west side of the Miller Creek channel (see Figure N-2).

Soil: Soils within the wetland were mapped by the 1952 Soil Survey of King County, Washington (USDA 1952) as Everett gravelly sandy loam. Everett gravelly sandy loam typically forms on rolling and hilly upland areas and terraces at elevations below 500 ft.

Soil observed at Data Plot 1W was black (10YR 2/1) loam from 0 to 6 inches in depth. From 6 to 18 inches in depth, the soil consisted of olive gray (5Y 5/2) silty clay with common course yellowish brown (10YR 5/8) mottles. Soils observed on the site did not match the description of the Everett soil type, and more closely matched soils classified as peat or muck. The low chroma color and high organic content meet the criteria for hydric soils.

Vegetation: The majority of the vegetation within this wetland consists of mowed grass species. Dominant plant species present (Data Plot 1W) are common velvetgrass (*Holcus lanatus*) with lesser amounts of red fescue (*Festuca rubra*). Scattered plants of dock (*Rumex* ssp.) and rush (*Juncus* sp.) also occur in the wetland. Small red alder (*Alnus rubra*) trees, Himalayan blackberry (*Rubus discolor*), salmonberry (*Rubus spectabilis*), and reed canarygrass (*Phalaris arundinacea*)

dominate the northeast corner of the wetland. Despite the ongoing disturbance (mowing) that occurs in the wetland, the area is dominated by hydrophytic vegetation and meets the wetland vegetation criterion.

**Hydrology:** During the site investigation, soil saturation was observed in portions of the wetland. Remaining portions were assumed to have wetland hydrology based upon the presence of hydric soil indicators, topographic position, and hydrophytic vegetation. Hydrology in the wetland appears to be maintained by a high groundwater table and precipitation.

**Upland:** Typical upland areas next to Wetland N8 consist of a gravel storage area to the west, a steep fill slope and block wall covered with blackberry to the north, lawn and garden areas to the south, and an area of bare soil that is disturbed by remote-controlled model race cars. Vegetation identified within upland areas (Data Plot 3U-2) consist of common velvetgrass and quackgrass (*Agropyron repens*) with lesser amounts of dandelion (*Taraxacum officinale*) and hairy-cat's ear (*Hypochaeris radicata*).

Upland soils observed at Data plot 3U-2 are a very dark brown (10YR 2/2) loam from 0 to 12 inches in depth. From 12 to 18 inches, soil was dark brown (10YR 3/3) silt loam. These soils do not meet any hydric soil criteria. No evidence of wetland hydrology was present within this area. Some gravel storage areas to the west of the wetland occur on buried hydric soil, which is present at 10 to 24 inches beneath the fill.

#### **Wetland N9**

**USFWS Classification: PFO**  
**Size: 0.08 acre**

**Wetland Data Plots: 2W**  
**Upland Data Plot: 2U**

Wetland N9 is located on the east side of Miller Creek, in the northeast portion of the site. This is a palustrine forested wetland.

**Soil:** Soil within this wetland was mapped as Everett gravelly sandy loam (USDA 1952). Soils observed during the field investigation were black (10YR 2/1) sandy loam with a high percentage of organic matter in the upper 15 inches. From 15 to 18 inches, the soil was very dark brown (10YR 2/2) with common coarse black mottles (10YR 2/1). The lower portion of the soil horizon contained a high percentage of fibrous organic matter. In addition, a very strong sulfidic odor was present. Soils identified in the field did not match the mapped soil types, and meet the criteria for hydric soil based on their low chroma color and high organic matter.

**Vegetation:** Dominant vegetation within the wetland includes a tree canopy of red alder, with Sitka willow (*Salix sitchensis*) and Himalayan blackberry dominating the shrub stratum. Lesser amounts of salmonberry are also present. Giant horsetail (*Equisetum telmateia*) and lady fern (*Athyrium filix-femina*) are dominant in the herbaceous layer. The dominant plants on the site are adapted to wetland conditions, and the hydrophytic vegetation criterion is met.

**Hydrology:** During the October 2001 site visit, the soils were saturated at a 15-inch depth. Wetland hydrology is presumed to be present based upon the presence of hydric soil indicators, topographic position, and hydrophytic vegetation. During the typically wet period in the early portion of the growing season, it is highly probable that the groundwater table is several inches higher, and saturation extends to the surface. Hydrology in the wetland appears to be maintained by a high groundwater table and precipitation.

**Upland:** Upland areas immediately north, east, and south of Wetland N9 contained forest vegetation. Dominant canopy species was red alder with Himalayan blackberry, and lesser amounts

of beaked hazelnut (*Corylus cornuta*) in the shrub layer. Giant horsetail was dominant in the herbaceous layer with swordfern (*Polystichum munitum*) and English ivy (*Hedera helix*) also present. This vegetation was not dominated by wetland adapted species, and the hydrophytic vegetation criterion is not met.

Soils in the upland area, from 0 to 12 inches in depth, were dark grayish brown (10YR 4/2) gravelly loam. Below 12 inches the soil profile (10YR 5/1) consisted of gravelly loam with clay inclusions. The soil profile appeared to be imported fill material due to the presence of mixed gravel sizes and clay inclusions. Soil colors in the surface horizons do not meet the hydric soil criteria, and no indicators of wetland hydrology were found.

#### **Wetland N10**

**USFWS Classification: PEM**  
**Size: 0.13 acre**

**Wetland Data Plots: 3W**  
**Upland Data Plots: 3U-1, 3U-2**

Wetland N10 is a 0.13-acre palustrine emergent wetland located in the southeast portion of the site. The wetland is located on the east side of Miller Creek.

**Soil:** Everett sandy loam was mapped in this portion of the site (USDA 1952). On-site field investigation revealed that from 0 to 10 inches in depth, the soil was dark gray (10YR 4/1) loam and from 10 to 18 inches the soil was gray (10YR 6/1) silt loam. Layers of diatomaceous earth were present below 10 inches. Soils identified in the field did not match the mapped soil types.

**Vegetation:** The majority of this wetland contains palustrine emergent vegetation with reed canarygrass being the dominant plant species. Lesser amounts of common horsetail and Himalayan blackberry were also present within the wetland.

**Hydrology:** As with the Wetlands N8 and N9, precipitation and a high groundwater table support wetland hydrology within this wetland. No standing water was observed in this soil test pit, however oxidized rhizospheres were observed, therefore indicators of wetland hydrology were present.

**Upland:** Data plots 3U-1 and 3U-2 characterizes the upland areas next to Wetland N10. Refer to Wetland N9 for a description of Data Plot 3U-2. Vegetation identified at Data Plot 3U-1 was dominated by Himalayan blackberry and reed canarygrass. Other species in this area included red alder, Scot's broom (*Cytisus scoparius*), evergreen blackberry (*Rubus laciniatus*), common velvetgrass, and dandelion.

Soils from 0 to 18 inches in depth were dark brown (2.5Y 4/3) sandy loam with crushed rock. Similar to Data Plot 2U, these soils appeared to include imported fill material.

#### **4.2.4 Wetland Classification**

These wetlands are all riparian to Miller Creek, and are classified by the Department of Ecology (Ecology 1993) as Class III wetlands (Attachment B).

#### **4.2.5 Stream**

Miller Creek flows from north to south across the site in a linear channel. The stream is in a shallow ditched channel that is approximately 6 to 10 ft wide. The streambed substrate consists primarily of cobble sized rock. The northern and extreme southern portion of the channel banks are vegetated with red alder deciduous forest communities, while over most of the site, the channel banks are vegetated with reed canarygrass, or mowed lawn. The NRMP (Section 5.1) and the

*Biological Assessment* (Parametrix 2000b) provide detailed information on the distribution of fish and aquatic habitat descriptions of Miller Creek.

The ordinary high water mark of the stream was flagged and surveyed during October 2001, and is accurately portrayed on Figure N-2.

Hydrologic evaluations of the creek, the Miller Creek Regional Detention Facility located south of SR 518, and the two 48-inch culverts that cross SR 518 demonstrate the creek generally stays within the excavated channel banks during flood events. (Attachment C provides flood evaluation and channel cross-section details.)

#### **4.3 RATIONALE FOR SELECTION**

The Des Moines Way Nursery site allows restoration and enhancement of significant wetland functions in proximity to, and in the same basin as project impacts to wetlands and streams. Similar to the Vacca Farm mitigation area, the site is located upstream of impacts to wetlands, and thus the benefits to the stream are realized throughout the project area.

Mitigation at this site provides the opportunity to restore wetland hydrology and wetland habitat to areas that historically were wetlands, but have altered hydrology due to prior agricultural activities and ongoing commercial or residential land uses. Because the existing wetlands are riparian to Miller Creek restoration and enhancement will increase the linkage between the wetlands, riparian areas, and upland buffers with the creek and aquatic habitat.

#### **4.4 CONSTRAINTS**

No constraints have been identified that would preclude implementing this plan on the Nursery site. A small Japanese garden is present on west edge of the site, adjacent to Des Moines Memorial Drive. This area may be excluded from demolition and preserved. A 15-ft sewer easement is present along the north, east, and southeast property boundaries. These easements and Japanese Garden (if retained) are peripheral to the riparian enhancement, wetland enhancement, and wetland restoration and will not interfere with the desired ecological functions for the site.

## 5. WETLAND RESTORATION DESIGN

Mitigation actions at the Des Moines Way Nursery site (Table N-3) are designed to enhance or restore approximately 5.79 acres of upland, aquatic, and riparian habitats. Mitigation actions will enhance riparian and channel conditions in over 450 linear ft of Miller Creek, remove fill from wetlands, restore functions to three degraded wetlands, and restore natural vegetation to poorly vegetated riparian and upland buffers. These actions will enhance fish habitat in Miller Creek, improve water quality (provide shade, ameliorate elevated water temperatures, increase dissolved oxygen, provide inputs of organic matter, improve sediment retention, and remove potential sources of fertilizer or pesticide inputs), and enhance the diversity and complexity of wetland habitats. The mitigation project has also been designed to reduce the potential wildlife hazards that currently exist on the site, in order to be consistent with FAA Advisory Circular 150/5200-33.

Table N-3 Summary of wetland and buffer mitigation areas at Des Moines Way Nursery.

Mitigation	Wetland Area (acres)
Wetland Restoration (remove fill from mapped hydric soil areas)	2.20
Wetland Enhancement (enhancing the functions in Wetlands N8, N9, and N10)	0.86
Buffer Enhancement	2.73
<b>Total Restoration Area</b>	<b>5.79</b>

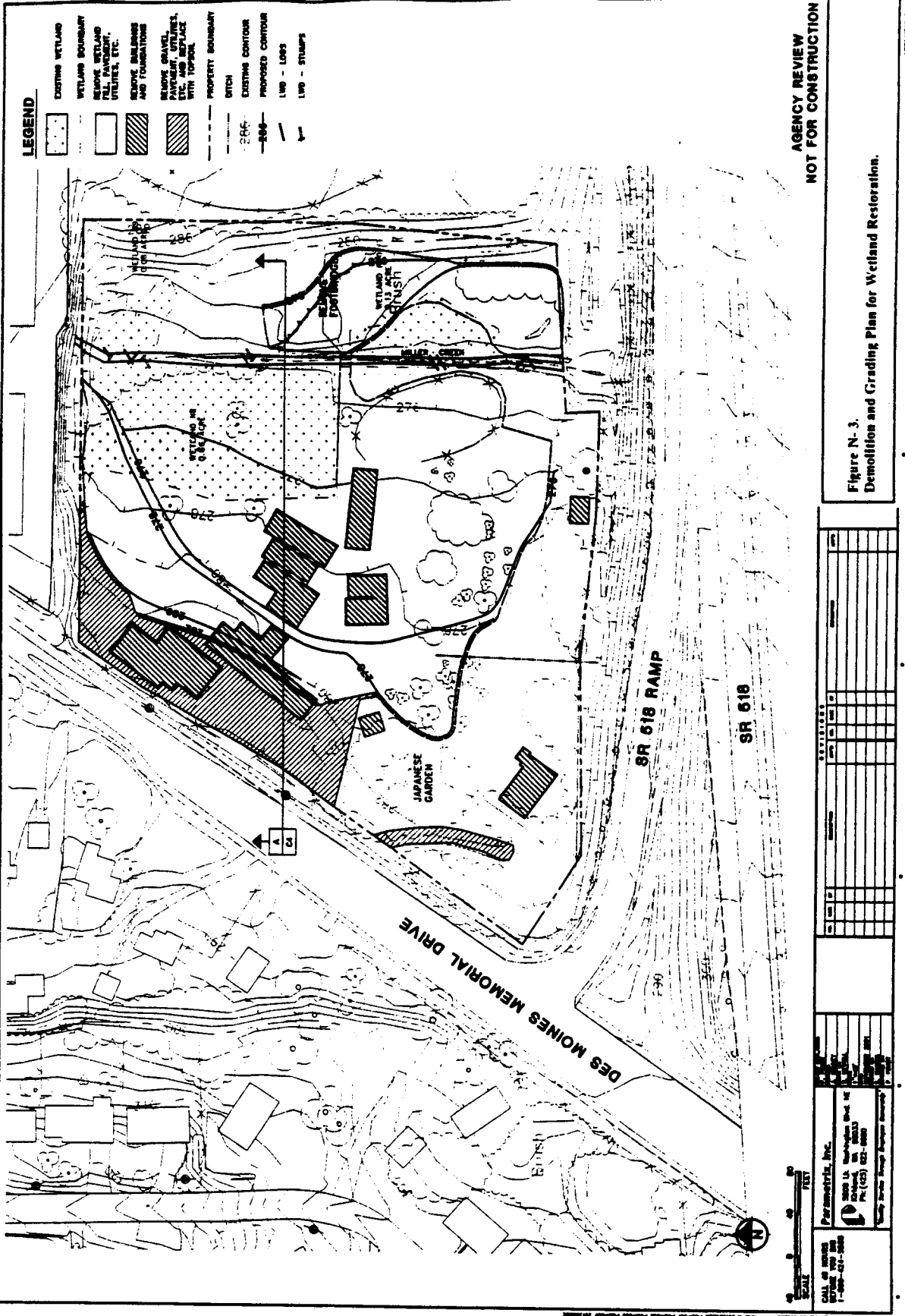
Des Moines Way Nursery contains areas which historically were wetland but have altered hydrology due to prior agricultural activities, residential development, filling, and commercial nursery operation developments. The wetland restoration activities will restore wetland hydrology by removing existing drainage features and excavating fill material to bring seasonal groundwater levels to at least within 10 inches of the soil surface. Existing forested, shrub, and emergent wetlands (Wetlands N8, N9, and N10) will be enhanced by planting native shrubs in areas that are currently dominated by mowed lawn (Wetlands N8 and N10), Himalayan blackberry (portions of Wetland N10), or lack native understory shrubs (Wetland N9). These actions will enhance hydrologic and water quality functions at the Des Moines Way Nursery site, as well as reduce the volume of eroded soil, pesticide, and fertilizer runoff reaching Miller Creek from gardens, parking lots, and retail areas on the site.

To protect aquatic habitat in Miller Creek and protect and enhance functions of existing wetlands, on-site forested buffers will be established and enhanced. An upland-forested buffer area will be established along the perimeter of the wetland restoration and enhancement. The buffers (and protective fencing) will reduce human intrusion into the wetlands and riparian zone, screen riparian habitats from human activity, and protect water quality and aquatic habitat. The forested buffers will also support ecological functions in the adjacent wetland and stream ecosystems.

The mitigation design is presented below. Specific details on construction sequencing and construction methods for the project are included in the implementation section for the project (Section 9).

### 5.1 GRADING DESIGN

The Des Moines Way Nursery site will be graded to restore wetland hydrology (Figure N-3). Prior to grading, existing structures and fences will be removed from the site and existing ditches and



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drains will be filled or removed to restore site hydrology. The mitigation design objectives for the restoration require grading about 2.20 acres of the site to elevations between 276 and 278 ft. Figure N-4 shows a cross section of the site which depicts existing and proposed grades.

Following demolition and grading, all disturbed areas will be examined to determine if topsoil conditions are favorable for plant establishment. In upland areas where demolition has occurred, soils will be examined for compaction, and loosened or tilled as necessary. Following demolition, where exposed soils are fill material or native subsoils, organic matter amendments will be added and tilled into the soil. If necessary, prepared topsoil will be tilled into the subgrade prior to planting. Newly graded slopes will be tracked at right angles to the contour to reduce soil erosion.

In wetland areas, a careful examination of the soil profile will be made to determine the presence of buried hydric soils, and to establish the wetland restoration surface in the A horizon of the original soil. If this horizon is not present, over excavation and amendment with native soils excavated from wetlands at the Vacca Farm site or in Wetland 37 will be made.

Immediately after grading, the wetland planting zones will be hydroseeded with a native grass mix to establish understory plants in these zones. All other areas that have been graded will be hydroseeded with a seed mixture designed to prevent soil erosion and sedimentation to Miller Creek (Table N-4). The seed mixture will stabilize any exposed soils that will not be brought to final grade or permanent vegetation cover within 30 days of exposure. This seed mix should be applied during the period between April 1 through June 30 and September 1 through October 31. If seeding occurs between June 1 and September 30, irrigation may be required to ensure germination and establishment.

Table N-4. Proposed seed mix for erosion control.

Scientific Name	Common Name	Percent by Weight
<i>Agrostis alba</i>	Redtop	10
<i>Lolium multiflorum</i>	Annual rye	40
<i>Festuca rubra</i> var. <i>commutata</i>	Chewings red fescue	40
<i>Trifolium repens</i>	White clover	10

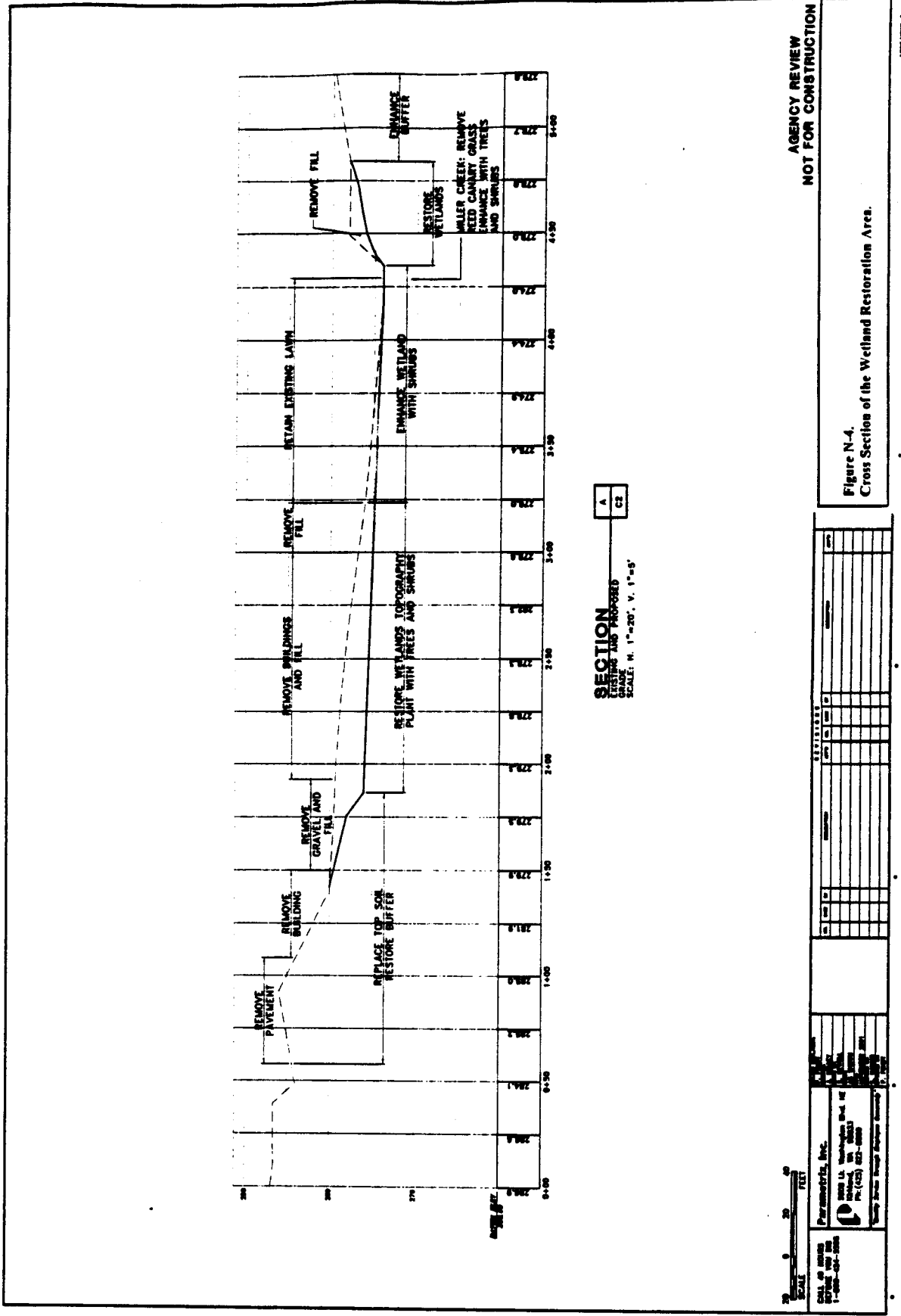
All soils left exposed for greater than 48 hours from October 1 through March 31 (or greater than 7 days from April 1 through September 30) will be covered with jute matting or other appropriate BMPs.

## 5.2 EXPECTED HYDROLOGY

The high groundwater table in the wetlands on the Des Moines Way Nursery site suggests that post-construction hydrology will result in soils that are saturated to the surface from the onset of sufficient autumn rains through mid-spring (April). This hydrologic pattern would support the shrub and forest vegetation planned for the site.

## 5.3 WILDLIFE CONSIDERATIONS

Flocking birds, raptors, and waterfowl pose the greatest concern for aircraft safety at STIA. Therefore, a landscape planting approach has been developed to aid in deterring these species from using the new mitigation sites as foraging areas or roost sites. Guidance obtained from Port wildlife managers and information gathered through literature searches have directed development of the planting plan. For example, Lyon and Caccamise (1981) found that roost stands for European



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Figure N-4.  
 Cross Section of the Wetland Restoration Area.

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starlings were generally composed of deciduous trees 18 to 35 years of age with stem densities greater than 290 trees per acre (average of about 700 trees per acre). The minimum roost size was 0.32 acre, although the average was about 4.5 acres. Conclusions from this study indicate that these birds typically select roost sites composed of dense stands of young trees that allow the birds to roost in a compact formation, and also provide some thermal protection after leaf fall.

Waterfowl typically prefer to forage in open areas, such as open water, emergent marshes, or mowed lawn, because their view of potential predators is unobstructed. An obstructed view is perceived as dangerous and waterfowl will not typically forage in such an area. Therefore, the planting plan will focus on installing dense shrubs with scattered small trees to obstruct views and landing paths. This strategy will also exclude waterfowl during the winter by creating a dense barrier of stems to cover standing water that is likely to be present.

Geese or waterfowl exclusion measures will likely be necessary during the initial years of the mitigation because the site will be dominated by low vegetation and will be fairly open. Geese exclusion measures will include dense planting of trees and shrubs on the restoration site and the elimination of areas of open, ponded water. During the monitoring period, geese exclusion may also include physical barriers to prevent geese from landing or entering the site.

## **5.4 LANDSCAPE PLAN**

### **5.4.1 Planting Plan**

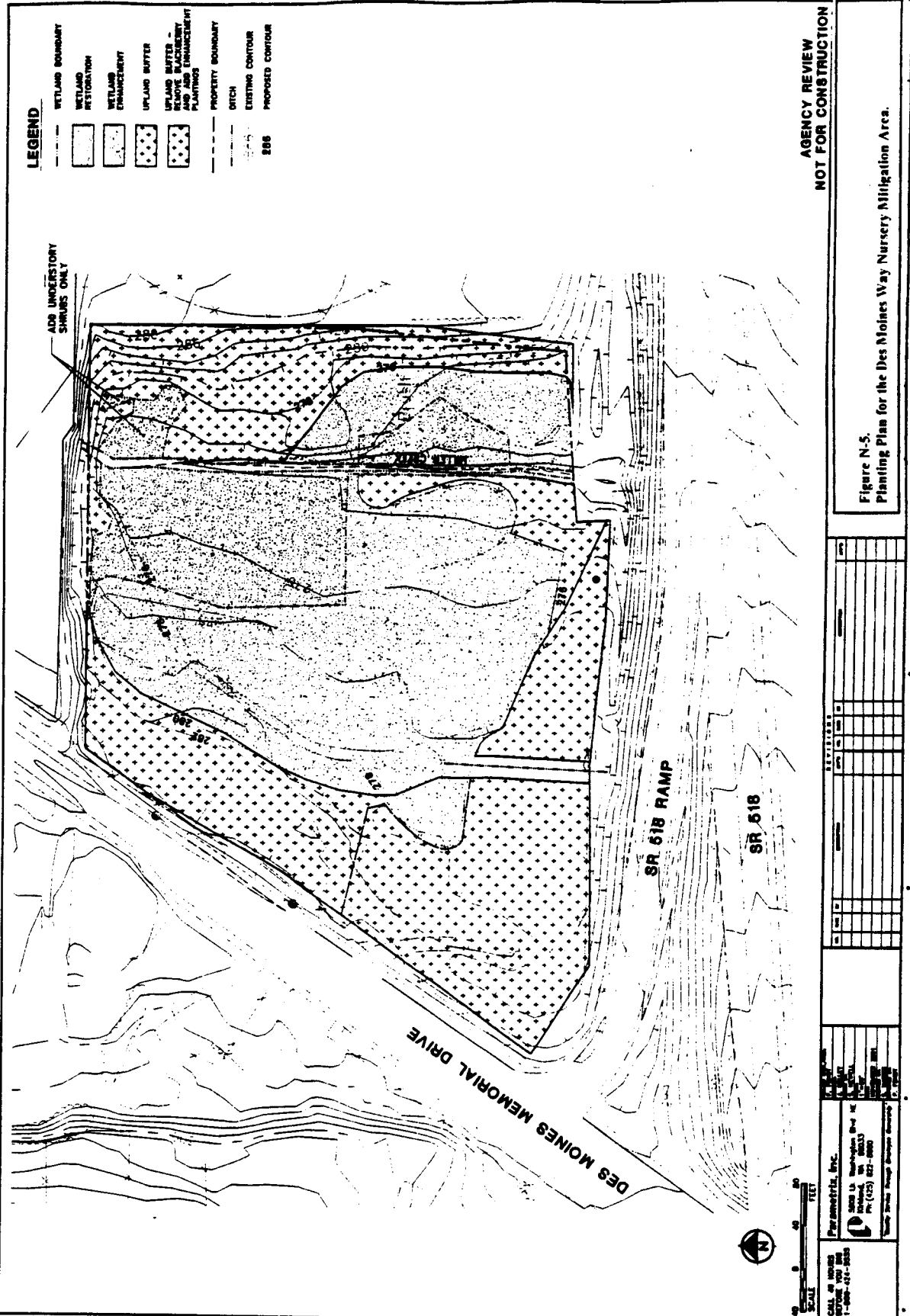
Three planting zones are planned for the mitigation area (Figure N-5). The planting zones for the mitigation are designated for the wetland restoration zone, the wetland enhancement zone, and for the upland/riparian buffer zone. To minimize wildlife hazards, all the planting plans for the in-basin mitigation actions are designed to be unattractive to flocking birds and waterfowl. Plants used in the in-basin mitigation areas produce few fruits, berries, or nuts (Table N-5).

The landscape plan for the area shows that planting conifer trees will be phased. It is anticipated that these conifers would be planted in a second planting phase coincident with replacement plantings that may be required to meet the performance standard for plant survival. The trees will be positioned such that they receive some shade from adjacent plants (trees, shrubs, and groundcover). For the first growing season following this planting, soil moisture conditions will be examined closely, and the use of the temporary irrigation system may be used to reduce mortality and promote growth.

#### **5.4.1.1 Existing Wetlands to be Enhanced**

Removing non-native invasive species in selected areas and infill planting with native tree and shrub species will occur in portions of the upland buffer, wetlands, and along much of the riparian area. The enhancement plan for these areas will promote native vegetation by replacing lawn, blackberry and reed canarygrass with tree and shrub species (primarily willows) to create a native shrub/tree community and to reduce cover of non-native species. Planting densities for infill tree planting will be greater than 250 stems per acre and for shrub planting will be greater than 1,700 individuals per acre. Infill planting densities are slightly lower than planting densities in cleared and/or graded areas because some native vegetation already exists in areas to be infill planted.

The enhancement of existing wetlands also includes placing several pieces of large woody debris (LWD) in Miller Creek, as shown in Figure N-5. Woody debris will be placed instream to enhance retention of organic matter in the stream, and improve invertebrate habitat. Over time, this debris



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Table N-5. Proposed plant list for mitigation projects at the Des Moines Way Nursery site.

Scientific Name	Common Name	Size and Condition <sup>a</sup>	Spacing (ft/on center)	Planting Zone			
				Wetland Restoration	Wetland Enhancement	Upland/ Riparian Buffer	
<b>Trees</b>							
<i>Abies grandis</i>	Grand Fir	2-4' in 2 gal.	10 to 15				X
<i>Acer macrophyllum</i>	Big leaf maple	2-4' in 2 gal.	10 to 15				X
<i>Alnus rubra</i>	Red alder	2-4' in 2 gal.	10 to 15	X			X
<i>Picea sitchensis</i>	Sitka spruce	2-4' in 2 gal.	10 to 15	X			X
<i>Populus trichocarpa</i>	Black cottonwood	2-4' in 2 gal.	10 to 15	X			X
<i>Pseudotsuga menziesii</i>	Douglas fir	3-4' in 2 gal.	10 to 15				X
<i>Thuja plicata</i>	Western redcedar	3-4' in 2 gal.	10 to 15	X			X
<i>Tsuga heterophylla</i>	Western hemlock	3-4' in 2 gal.	10 to 15				X
<b>Shrubs</b>							
<i>Acer circinnatum</i>	Vine maple	2 gal.	4 to 6		X		X
<i>Philadelphus lewisii</i>	Mock orange	2 gal.	4 to 6		X		X
<i>Physocarpus capitatus</i>	Pacific ninebark	2 gal.	4 to 6	X			
<i>Rosa nutkana</i>	Nootka rose	2 gal.	4 to 6	X			X
<i>Rosa pisocarpa</i>	Clustered rose	2 gal.	4 to 6	X			X
<i>Salix hookeriana</i>	Hooker willow	live stake <sup>b</sup>	4 to 5	X			X
<i>Salix lucida</i>	Pacific willow	live stake <sup>b</sup>	4 to 5	X			X
<i>Salix sitchensis</i>	Sitka willow	live stake <sup>b</sup>	4 to 6	X			X
<i>Salix scouleriana</i>	Scouler's willow	live stake <sup>b</sup>	4 to 5	X			X
<i>Spiraea douglasii</i>	Hardhack spiraea	2 gal.	4 to 5	X			X
<b>Grasses</b>							
<i>Agrostis exarata</i>	Spike bentgrass	Seed		X			X
<i>Beckmannia syzigachne</i>	Slough grass	Seed		X			X
<i>Calamagrostis canadensis</i>	Canada reed	Seed		X			X
<i>Deshampsia cespitosa</i>	Tufted hairgrass	Seed		X			X

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Table N-5. Proposed plant list for mitigation projects at the Des Moines Way Nursery site (continued).

Scientific Name	Common Name	Size and Condition <sup>a</sup>	Spacing (ft/on center)	Planting Zone			
				Wetland Restoration	Wetland Enhancement	Upland/Riparian Buffer	Upland/Riparian Buffer
Upland Hydroseed		Seed					X
Sedges and Rushes							
<i>Carex amplifolia</i>	Ample-leaved sedge	Seed		X	X		
<i>Carex praticola</i>	Meadow sedge	Seed			X		
<i>Carex stipata</i>	Sawbeaked sedge	Seed		X	X		
<i>Scirpus cyperinus</i>	Wool-grass	Seed		X	X		
Other Herbaceous							
<i>Aster subspicatus</i>	Douglas aster	Seed		X			
<i>Solidago canadensis</i>	Canada goldenrod	Seed		X			

<sup>a</sup> Depending on availability and season, plant condition may be substituted.

<sup>b</sup> Live stake material will typically be used in the wetland restoration and enhancement plantings. Live stakes will range from 12 inches to 24 inches on center and will typically be planted during late fall, winter, or spring.

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could restore natural channel forming processes to the site and promote floodplain development and organic matter export functions.

Woody debris will generally be placed as spanning log structures (see NRMP Appendix B, Sheet C10 for placement details). The locations of logs are shown in Figure N-3, and minor field modifications may be made to optimize the benefits and to provide non-structural anchoring of LWD.

#### **5.4.1.2 Wetland Restoration**

In wetland restoration areas, a herbaceous ground cover will be established by hydroseeding a native grass, sedge and forb hydroseed mix (see Table N-4), following grading and prior to planting with woody trees and shrubs. The hydroseed mix will contain seeds and a wood fiber mulch and tackifier to stabilize soils and enhance germination. Plant species included in the mix are designed to provide for rapidly germinating species that can provide initial cover, as well as later germinating species that will add to the cover and species diversity of the herbaceous vegetation of the floodplain communities.

Newly restored wetlands will be planted with native tree and shrub wetland plant communities following grading. The landscape plan for the wetland restoration area will include shrubs planted in dense patches to provide a continuous shrub cover, with western redcedar and some Sitka spruce trees interspersed in the shrub planting (see Figure N-5).

Wetland restoration plantings will be placed in newly graded areas on each side of Miller Creek between elevations 274 and 280 ft. Installed tree densities will be at least 280 stems per acre. Installed shrub densities will be greater than 2,100 individuals per acre.

#### **5.4.1.3 Wetland Enhancement**

In wetland enhancement areas, existing lawn will be planted with native tree and shrub wetland plant communities following grading. The landscape plan for the wetland restoration area will include shrubs in dense patches to provide a continuous shrub cover, with a variety of native wetland shrub species (see Figure N-5).

Wetland enhancement plantings will be placed in wetlands dominated by existing lawn grasses on located on each side of Miller Creek generally between elevations 272 and 274 ft. Installed shrub densities will at least 2,100 individuals per acre.

In limited areas, existing wetlands contain some native tree and shrub vegetation. In these areas, enhancement will consist of adding wetland understory shrub plantings after removing blackberry and/or reed canarygrass.

Also, in limited areas, patches of reed canarygrass dominate the existing wetland. In these locations, prior to planting shrubs, reed canarygrass would be controlled by mowing and herbicide treatment (see Section 4.2 of the NRMP for information on weed control).

#### **5.4.1.4 Upland Buffers**

Upland buffers (see Figure N-5) are located east, west, and south of the mitigation site. These areas will be planted with species adapted to seasonally wet upland soil conditions. Upland buffers will typically be located above approximately the 278-ft elevation. The landscape plan for the upland area will focus on densely planting trees and shrubs to protect the mitigation area from surrounding land uses and restrict ground foraging birds (including waterfowl). Installed tree densities will be at

least 280 stems per acre. Installed shrub densities will be greater than 2,100 individuals per acre. The planting scheme in the upland areas will place coniferous and deciduous tree species in patches to create a mixed canopy.

#### **5.4.2 Planting Approach**

Planting will occur whenever possible in late fall (October to November) or early spring (March or April), when soil moisture and plant conditions are optimal for installing plants. However, it may not always be possible or desirable to plant only during the winter months. For example, soils could be frozen or too wet at times during the winter months, limiting the amount of planting that can take place.

Trees of varying heights (between approximately 36 and 48 inches) will be planted to provide height diversity, and trees and shrubs will be planted in a mosaic of species and heights to simulate natural patchiness. Trees and shrubs will be planted at densities sufficient to attain the performance standards identified in Section 6. A landscape architect or wetland scientist will be on-site to observe placement and installation of the plant material to ensure that plants are installed according to the planting plan and specifications.



## **6. MONITORING AND PERFORMANCE STANDARDS**

The Des Moines Way Nursery mitigation site will be monitored to be consistent with the approach and schedules outlined in Section 4 of the NRMP. Specific performance standards and contingency measures for the site are included in Table N-6. Interim cover targets and invasive, non-native plant species to be monitored and controlled on the mitigation site are included in Tables N-7 and N-8, respectively. The general monitoring schedule for the site is provided in Table N-8. Monitoring objectives specific to the Des Moines Way Nursery site are designed to evaluate the functioning of the restored and enhanced wetland plant communities (Table N-9).

Monitoring for hazard wildlife will also be conducted at the Des Moines Way Nursery site, as described in Section 4 of the NRMP.

### **6.1 WETLAND HYDROLOGY**

Groundwater hydrology will be monitored at the mitigation site for a 15-year period following completion of all mitigation construction. The primary purpose of monitoring groundwater levels is to verify that shallow groundwater is present to support restored wetland areas and that seasonal groundwater levels are sufficient to support the wetland plant communities on the site. Groundwater hydrology will be monitored consistent with the methods and approach outlined in Section 4 of this document.

### **6.2 VEGETATION MONITORING**

Vegetation will be monitored in all planting zones at the mitigation site to verify that performance standards are being met, and to develop contingency measures as necessary (see Tables N-6 and N-9). Vegetation monitoring will be consistent with the approach, methods, and schedules provided in Section 4 of the NRMP.

Table N-6. Final performance standards, evaluation approaches, and contingency measures for mitigation projects at Des Moines Way Nursery.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
Provide approximately 2.73 acres of vegetated buffer in upland wetland and riparian buffers. Establish native vegetation along channel banks and the riparian zone of the channel.	Establish 2.73 acres of native shrub/forested riparian zone and upland buffers with an average tree density of at least 280 stems/acre and shrub density of at least 2,100 individuals per acre in monitoring years 3, 8, and 15. At Year 1, survival of planted stock will be 100%. Average survival of planted trees and shrubs in the first 3 monitoring years shall be at least 80%; cover of native species will be 80% by year 15. Cover of non-native invasive species <sup>b</sup> will be no greater than 10% during any monitoring year. In monitoring years 3, 8, and 15, the numbers of plant species in the mitigation area shall not decline by more than 10% from the number originally planted.	Vegetation sampling (plots, transects, or plotless techniques) to measure stem density plant cover, count live and dead plants, and measure cover of non-native invasive species will occur.	Install additional plants if necessary. Identify substitute native species that are adapted to site conditions. Eliminate or reduce the abundance of non-native invasive species. Install protective collars to reduce herbivore damage.
Densely plant woody vegetation in riparian areas along Miller Creek to cover the open stream channel and reduce use of the area by waterfowl.	Canopy cover extending over the creek channel will be 80 percent by the end of the monitoring period.	Vegetation sampling to determine tree and shrub cover over the portion of the channel below the ordinary high water mark (OHWM).	Add additional plants if areas of exposed stream channel are present.
Remove fill and restore wetland hydrology to 2.20 acres of historic wetlands and hydric soil.	Grading and fill removal will result in 2.20 acres of wetlands that occur on buried hydric soils. This area will experience a water table within 10 inches of the soil surface for at least the period from March 1 to April 15.	Soil analysis to determine presence of buried hydric soil horizons. Hydrologic monitoring of soil saturation and shallow groundwater conditions.	Regrade restoration area if wetland hydrology criteria are not met. Amend soils with peat or muck soils (excavated from other planned construction at the Vacca Farm site or Wetland 37) if native surface horizons have been removed from filled areas.

Table N-6. Final performance standards, evaluation approaches, and contingency measures for mitigation projects at Des Moines Way Nursery (continued).

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
Plant native trees, shrubs and herbaceous (see Tables N-4 and N-5) species in restored wetlands at densities of greater than 280 trees per acre (trees include willow species) and shrub densities of greater than 2,100 per acre. Intersperse native conifers in this area.	At year 1, survival of planted stock will be 100%. Shrub and tree survival will average at least 80% in the first 3 monitoring years. In monitoring years 3, 8, and 15, at least 280 trees per acre (including willow species) and 2,100 shrubs/acre will remain. Percent cover of native species will be at least 80% by year 15 <sup>a</sup> . In newly planted areas, non-native invasive <sup>b</sup> species cover will be no more than 10% in all monitoring years. In monitoring years 3, 8, and 15, the numbers of plant species in the mitigation area shall not decline by more than 10% from the number originally planted.	Vegetation sampling (plots, transects, or plotless techniques) will be conducted to measure vegetation cover and diversity.	If standards are not met: <ul style="list-style-type: none"> <li>Select species that are better adapted to existing hydrologic conditions.</li> <li>Install additional plant material.</li> <li>Install protective collars to reduce herbivore damage.</li> <li>Control/reduce non-native invasive species.</li> </ul>
Enhance instream habitat in Miller Creek by adding LWD.	A minimum of 6 instream pieces of LWD greater than 12 inches in diameter will be present within the OHWM of the creek channel.	Visual inspection.	Additional woody debris will be added and stabilized if required.
Plant the riparian areas with native trees, shrubs, and grasses to deter waterfowl.	Percent cover of native herbaceous species will be at least 80% by year 15 <sup>b</sup> .	Vegetation sampling (plots, transects, or plotless techniques) to estimate canopy cover.	See above.
Enhance existing forested wetland native shrubs to provide a diverse understory. Total density of native shrubs will be at least 1,700 individuals per acre.	At Year 1, survival of planted stock will be 100%. Average survival of planted stock will be at least 80% in the first 3 monitoring years. In monitoring years 3, 8, and 15, shrub density will be at least 1,700 shrubs per acre. In areas where existing wetland is being enhanced, percent cover of non-native invasive <sup>b</sup> species in the understory will be no more than 10% during any monitoring year. In years 3, 8, and 15, the number of plant species present will not decrease by more than 10% from the number installed at baseline.	See above.	See above.

<sup>a</sup> See Table N-7 for interim cover targets (i.e., from year 3 to year 15).

<sup>b</sup> See Table N-8 for a list of invasive, non-native species to be monitored and controlled on the mitigation site.

**Table N-7. Performance standards for vegetation cover (minimum percent) by vegetation zone and monitoring year.**

Monitoring Year	Vegetation Zone				Invasive Species
	Forest <sup>a</sup>	Shrub <sup>a</sup>	Emergent		
			Hydroseed	Planted	
0	-	-	0	0	<10
1	-	-	50	10	<10
2	-	-	60	20	<10
3	10	10	70	30	<10
5	25	40	80	50	<10
7	40	65	80	70	<10
10	80	80	80	80	<10
12	80	80	80	80	<10
15	80	80	80	80	<10

<sup>a</sup> Vegetation cover will not be monitored in forest and shrub plant communities during monitoring year 0, 1, or 2. During these years, plant survival performance will be monitored and at year 3, survival must be 80 percent of the original numbers planted. Invasive plant species cover will be monitored during all monitoring years.

**Table N-8 Invasive plant species that will be monitored and controlled on the mitigation sites.**

<i>Scientific Name</i>	<i>Common Name</i>
<i>Convolvulus sepium</i>	Hedge bindweed
<i>Cytisus scoparius</i>	Scotch Broom
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Phalaris arundinacea</i>	Reed canarygrass
<i>Polygonum cuspidatum</i>	Japanese knotweed
<i>Polygonum sachalinense</i>	Sachaline
<i>Rubus discolor</i>	Himalayan blackberry
<i>Rubus laciniatus</i>	Evergreen blackberry

Table N-9. Monitoring schedule for wetland restoration and enhancement at Des Moines Way Nursery.

Feature	Activity	Timing	Data Collection Year																	
			0	1	2	3	4	5	6	7	8	9	10	12	15					
Hydrology	Measure the maximum depth and approximate duration of inundation.	Monthly	X	X	X	X														
		Once during winter, late spring/early summer, and fall					X	X	X	X	X	X	X	X	X	X	X	X	X	X
Establishment of Vegetation	Measure depth to groundwater.	Monthly	X	X	X	X														
		Once during winter, late spring/early summer, and fall					X	X	X	X	X	X	X	X	X	X	X	X	X	X
Achieve an early successional wetland plant community	Calculate percent plant survival.	Once late spring to early summer	X	X	X	X														
	Vegetation mapping.	Once in late spring to early summer	X	X						X	X	X	X	X	X	X	X	X	X	X
	Measure tree/shrub cover.	Once in late spring to early summer in year 3, 5, 7, 10								X	X	X	X	X	X	X	X	X	X	X
Wetland delineation	Photographic documentation and walk-through survey.	Once in spring	X	X	X	X														
		Early spring									X	X	X	X	X	X	X	X	X	X

## 7. SITE PROTECTION

The Port will execute and file a restrictive covenant on the mitigation area that will prevent development or other detrimental activities from occurring on the site. Copies of proposed restrictive covenants are included in Appendix G of the NRMP. Fencing approved by ACOE, as shown in Appendix P of the NRMP will protect the perimeter of the mitigation site. Permanent signs that clearly designate the area as a protected wetland mitigation site will also mark site perimeters. Signs will be inspected regularly and maintained in good condition by the Port.

## 8. MAINTENANCE AND CONTINGENCY PLANS

Routine maintenance tasks (e.g., maintaining irrigation systems, removing trash, mulching, mowing) and adaptive management contingency measures (e.g., re-planting, weed control) will be implemented consistent with the approach outlined in Section 4 of the NRMP. If the Des Moines Way Nursery site does not meet performance standards during the monitoring period, contingency measures will be implemented using the adaptive management approach outlined in Section 4 of the NRMP. Specific contingency measures are provided for each performance standard in Table N-6.

Meeting the performance standards for non-native invasive species at Des Moines Way Nursery will likely require implementation of contingency measures during the 15-year monitoring period. Potential invasive species of concern at the Des Moines Way Nursery site include, but are not limited to, reed canarygrass, Himalayan blackberry, Japanese knotweed (*Polygonum cuspidatum* or *P. sachalinense*), and purple loosestrife (*Lythrum salicaria*). These species are a concern because they already occur at Des Moines Way Nursery and may be difficult to eliminate, or because propagules of these plants are likely to continuously re-invade the site from upstream aquatic sources or from the surrounding area. Successfully establishing native vegetation on the site will be a key component in reducing and controlling invasive species in the long term at the mitigation site. In the short term (i.e., during the 15-year monitoring period), contingency measures specified in Table N-6 will be implemented as necessary to control invasive species on the site.

Possible contingency measures that may be implemented to reduce hazard wildlife attractants specific to Des Moines Way Nursery are included in Table N-6. Contingencies include eliminating areas of standing water on the floodplain by planting shrubs or minor regrading to eliminate depressions. Measures to control wildlife hazards will be consistent with the Port's WHMP approach described in Section 4 of the NRMP.

Examples of the types of contingency actions that may need to be implemented at Des Moines Way Nursery include:

- If invasive species cover is greater than specified in the performance standards, or if native plant survival is reduced by competition with non-native invasive species, then invasive species removal and/or control will be implemented.
- Replacement plants will be installed if survival is less than 80 percent in the first 3 years.
- If plant species exhibit greater than 20 percent mortality within the first 3 years, site conditions would be re-evaluated to determine whether the conditions could support the species. If the site cannot support the original plant species, then those species may be replaced with species of similar form and function and tolerance to hydrologic conditions on the site.
- If standing water persists on the site for extended periods such that waterfowl use of the site is regular, then corrective actions will be taken to plant densely with shrubs or create positive flow of surface water off the site to Miller Creek.

## 9. IMPLEMENTATION OF THE DES MOINES WAY NURSERY MITIGATION PROJECT

The Des Moines Way Nursery Project would be implemented when permit approvals for the Master Plan Update Projects are received. This section describes the implementation process and sequence for the project.

### 9.1 GENERAL CONSTRUCTION SEQUENCING

Construction of the Des Moines Way Nursery projects could begin during the 2002 construction season, but the actual schedule is dependent on receipt of federal, state, and local permits (Table N-10). Demolition, excavation and grading are expected to occur during the dry time of the year, taking approximately 15 weeks. This work would begin in early summer and be completed by early October.

Table N-10. Proposed implementation timeline for Des Moines Way Nursery mitigation projects<sup>a</sup>.

Project/Activity	Year 1 <sup>a</sup>												Year 2					
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Pre-construction meeting				X														
TESC, Site Preparation				X	X													
Building Demolition				X	X	X	X											
Mass grade restoration areas								X	X									
Fine grade restoration areas add topsoil									X	X								
Install LWD in Miller Creek										X								
Install irrigation system										X	X							
Install monitoring wells												X						
Hydroseed graded areas												X						
Closeout (remove construction debris and equipment, staging areas, access roads, etc.)												X						
Install plants in wetland restoration and enhancement areas, install buffer plants. <sup>b</sup>												X	X	X				
Produce as-built drawings																		X
Conduct baseline monitoring																		X
Begin maintenance/monitoring period																		X

<sup>a</sup> Year one starts with the first construction season following issuance of permits and 6-month minimum plant procurement period. Implementing mitigation projects may vary from this proposed schedule depending upon coordination with other Master Plan Update projects, contract obligations, and the timing of final approvals.

<sup>b</sup> Plant procurement for all projects will be started 6 to 12 months prior to the anticipated planting date to ensure that plants in the specified quantities and species are available by the scheduled planting date. Planting will be phased such that coniferous species will be planted following the third year of monitoring if located in open-sunny areas. Under planting conifers in existing forested areas may occur during early planting phases.



### **9.1.1 Demolition, Site Preparation, and Grading**

Earthwork for this phase includes site preparation (including building demolition), installation of sediment and erosion control measures, dewatering if necessary, grading, installation of irrigation, and site stabilization following grading. Building demolition in these areas may be completed before this project is started, consistent with Port policy on security and safety.

#### **9.1.1.1 Site Preparation and Erosion Control**

No work will begin until a Temporary Erosion and Sedimentation Control (TESC) plan is implemented, or until any protected or restricted access areas (e.g., wetlands or streams) have been flagged and/or fenced. The TESC plan includes installation of silt fences around the existing wetlands to be enhanced and Miller Creek. Silt fences will also be placed to protect areas downslope of demolition areas.

TESC measures include placing silt fence around work areas and staging areas, and placing straw bales at key locations within the project limits. Clearing and brush removal will be limited to only those work areas that the contractor is scheduled to begin within the following 2 weeks. Areas where stormwater runoff will concentrate and collect, if any, would include construction sedimentation ponds.

Prior to the start of grading, construction access, staging, and stockpile areas will be set up. Temporary access routes and staging areas identified on the western side of the site will be set up and flagged. The site will be cleared of debris (e.g., existing tile drains, drainage pipe, trash, structures, etc.).

#### **9.1.1.2 Dewatering**

Grading and excavation will occur during the summer and early fall months when seasonally high groundwater is not present. There are no deep excavations or other conditions expected that could require dewatering.

#### **9.1.1.3 Installation of Temporary Irrigation and Site Stabilization**

Temporary irrigation will be installed following grading to provide flexibility in plant installation and to maximize successful establishment, survival, and early growth of hydroseeded cover crops and plant stock. The irrigation system will be used to ensure plant survival and growth during the initial stages of plant establishment. The system will be designed so that above-ground portions can be removed after a few years, when the option to use irrigation will no longer be needed. Irrigation will use municipal water purchased by the Port. Application rates will be at rates that are less than agronomic rates, but sufficient to reduce plant mortality and to promote growth during dry periods.

Once the wetland restoration area has been graded and elevations have been established and verified by field survey, the temporary irrigation system will be installed. This system will be used to provide flexibility in the planting schedule, provide contingencies against periods of dry weather during the first few growing seasons, and to maximize plant survival and growth during the first years following planting. Irrigation is a standard feature of wetland mitigation construction in the Puget Sound Lowlands due to the region's pronounced summer drought. Irrigation will be designed for the entire area; however, it may not be necessary in some areas. If, following grading, the wetland scientist determines that irrigation is not needed in some areas, it will not be installed.

Municipal water will be used for irrigation. It is anticipated that the irrigation system would be used for the months of June through September, but actual timing will be dependent on weather and soil

moisture conditions. Water will be applied at rates less than agronomic rates typically used for crop production, but sufficient to promote high growth rates and to reduce plant mortality.

The irrigation should expedite establishment of shrub cover and shade on the site, production of biomass, vertical habitat structure to reduce waterfowl use, and organic litter production. This will help reduce temporal impacts. In upland buffers that contain well-drained soils, earlier and more frequent use may be required. The irrigation system will be decommissioned and all aboveground parts removed at the direction of the wetland scientist following once plant survival standards have been met.

The site will be stabilized following completion of grading and prior to the onset of winter rains. A hydroseed mix designed to provide temporary erosion control and a weed barrier will be applied to the graded areas by mid-September.

### **9.1.2 Establish Native Vegetation on the Site**

It is anticipated that mitigation site will be planted the first fall (i.e., October or November) following grading. Stem collars or other herbivore deterrents may be installed on plants to reduce damage from rodents and other herbivores.

Plant material used in the mitigation will be obtained from commercial nurseries. Nurseries will be required to certify that the plant material is legally procured and from the appropriate geographic sources. Plant material used for mitigation will be grown in the area that is bounded on the north by the Fraser River Valley of British Columbia, on the east by the 1,000-ft elevation of the Cascades, on the west by the 1,000-ft elevation in the Olympic or Coast ranges, and on the south by the Willamette Valley.

### **9.1.3 Construction Steps**

The following sections outline the construction and post-construction steps necessary to implement the Mitigation Plan for the site.

#### **9.1.3.1 General Conditions**

- On award of the contract, the contractor will provide the Port with any required pre-construction submittals, work plans, and schedules.
- A pre-construction meeting will be held with the contractor, architect/engineer, and wetland scientist to review submittals, work plans, schedules, and permit conditions.
- The contractor will be responsible for ensuring that the work is performed in compliance with all permit conditions and shall maintain a copy of permits on-site.
- Work will be coordinated to avoid re-entry and damage to areas that have previously been planted; work will be conducted so that no other work will impact completed landscape work.
- Areas where any landscape work has been completed will be off limits to all vehicular traffic, and pedestrian traffic will be strictly limited.
- All site work will be performed in accordance with permit conditions; any instream work or work below the ordinary high water mark (OHWM) will take place only during the allowable work times, consistent with HPA permit conditions (i.e., July 15 to September 15).

- Plant procurement shall be coordinated with the grading and irrigation installation schedules and be completed 6 to 12 months prior to the scheduled planting season to ensure that plants are available in the quantities and species required by the planting plan.

#### **9.1.3.2 Site Preparation**

- Establish vertical and horizontal site controls and maintain through construction to record drawings.
- Identify and flag limits of work for mitigation site.
- Identify staging areas and temporary access/haul roads.
- Implement TESC plan; install TESC measures for grading and demolition areas.
- Identify and flag sewer manholes and sewer easement.
- Install fencing (orange barrier) around areas to be protected (e.g., existing wetlands, outlet ditches, sewer manholes).
- Maintain security of the site through construction.
- Establish temporary access.
- Implement a spill control plan and identify fueling areas.
- Demolish buildings and other facilities. (Buildings may be demolished by the Port and then stabilized before construction of the mitigation project.)
- Establish staging and stockpile areas.

#### **9.1.3.3 Clearing, Excavation, and Grading**

- Clear and grub the site.
- Install LWD in the stream
- Remove weeds (e.g., grub out blackberry and reed canarygrass; apply herbicide if appropriate per specifications) and clear brush in buffer enhancement areas.
- Mass and fine grade the restoration area.

#### **9.1.3.4 Irrigation and Landscaping**

- Install and test irrigation system.
- Apply hydroseed to graded portion of the floodplain.
- Plant enhancement, restoration, and buffer zones.

#### **9.1.3.5 Closeout**

- Complete site cleanup by removing temporary haul/access roads, TESC items, and staging areas.
- Remove construction equipment and debris.
- Hydroseed and/or install plants in temporary staging areas or access roads within the mitigation site boundaries.

- Hydroseed erosion control mix in temporary staging areas/access roads outside the mitigation boundaries.

#### **9.1.3.6 Record Drawings, Monitoring, and Maintenance**

- Produce record drawings (including grading, LWD placement, and planting).
- Complete a baseline report, including record drawings and final monitoring plan (e.g., locations of monitoring plots, baseline conditions).
- Begin compliance monitoring during the first growing season after all grading and planting are complete; submit annual monitoring reports for 15-year monitoring period.
- Conduct maintenance (e.g., weed management, WHMP) and implement any necessary contingency measures to meet performance standards.

## 10. REFERENCES

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**ATTACHMENT A**

**WETLAND DELINEATION DATA SHEETS**

**AR 052492**



Data Plot #: 1W  
Wetland: N8

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louther, B. Kleindl State: WA

1987 Method  1989 Method Community ID: PEM  
Field Plot ID: 1W

Do Normal Circumstances exist on the site? Yes X No \_\_\_\_\_  
Is the site significantly disturbed (Atypical Situation)? Yes \_\_\_\_\_ No X  
Is the area a potential Problem Area? Yes \_\_\_\_\_ No X

Remarks (Explain sample location, disturbances, problem areas):  
*This data plot is located west of Miller Creek, in lawn east of the plant nursery.*

**VEGETATION** (✓ Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
1. <u>Festuca spp.</u>	<u>15</u>	<u>Herb</u>	<u>_____</u>
✓ 2. <u>Holcus lanatus</u>	<u>95</u>	<u>Herb</u>	<u>FAC</u>
3. <u>Scirpus spp.</u>	<u>Tr</u>	<u>Herb</u>	<u>_____</u>
4. <u>Rubus spectabilis</u>	<u>Tr</u>	<u>Shrub</u>	<u>FAC+</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. "T" indicates trace. 100

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*The vegetation meets the hydrophytic criteria for wetlands.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
\_\_\_\_\_ Stream, Lake, or Tide Gage  
\_\_\_\_\_ Aerial Photograph  
\_\_\_\_\_ Other  
X No Recorded Data Available

**Wetland Hydrology Indicators** (Describe in Remarks):

Primary Indicators:  
\_\_\_\_\_ Inundated  
\_\_\_\_\_ Saturated in Upper 12 inches  
\_\_\_\_\_ Saturated in Upper 18 inches  
\_\_\_\_\_ Water Marks  
\_\_\_\_\_ Drift Lines  
\_\_\_\_\_ Sediment Deposits  
X Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: >18 (in.)

Secondary Indicators (2 or more required):  
\_\_\_\_\_ Oxidized Root Channels in Upper 12 inches  
\_\_\_\_\_ Water-Stained Leaves  
\_\_\_\_\_ Local Soil Survey Data  
\_\_\_\_\_ Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*The presence of hydric soil and hydrophytic vegetation can be used to infer the presence of wetland hydrology.*

**DRAFT**

# Parametrix, Inc.



Data Plot #: 1W  
 Wetland: NS

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_

Field Observations Confirm Mapped Type?

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_ No X NA \_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-6		10 YR 2/1	none	none	Loam
6-18		5 Y 5/2	10 YR 5/6	common, coarse, predominant	silty clay

### Hydric Soil Indicators:

- |                                                                 |                                                               |
|-----------------------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> Histoal                                | <input type="checkbox"/> Listed on Local Hydric Soils List    |
| <input type="checkbox"/> Histic Epipedon                        | <input type="checkbox"/> Listed on State Hydric Soils List    |
| <input type="checkbox"/> Sulfidic Odor                          | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Probable Aquic Moisture Regime         | <input type="checkbox"/> Aquic Moisture Regime                |
| <input type="checkbox"/> Reducing Conditions                    | <input type="checkbox"/> Organic Streaking in Sandy Soils     |
| <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors | <input checked="" type="checkbox"/> Mottles                   |
| <input type="checkbox"/> High Organic Content in Surface Layer  | <input type="checkbox"/> Other (Explain in Remarks)           |

### Remarks (Describe soil disturbances, local variations, etc.):

*Hydric soil indicators are present within the rooting zone.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes <u>X</u> No ___	Is this Sampling Point Within a Wetland?
Hydric Soils Present?	Yes <u>X</u> No ___	Yes <u>X</u> No ___
Wetland Hydrology Present?	Yes <u>X</u> No ___	

### Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):

*Vegetation and hydrology of the area have been altered by ditching and plowing. Wetland hydrology is presumed by the presence of hydric soil and wetland vegetation. The three wetland parameters are present and the area is considered wetland.*

**DRAFT**

**AR 052494**





Data Plot #: 2U  
Wetland: N9

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louthar, B. Kleindl State: WA

1987 Method  1989 Method Community ID: Upland  
Field Plot ID: 2U

Do Normal Circumstances exist on the site? Yes X No       
Is the site significantly disturbed (Atypical Situation)? Yes      No X  
Is the area a potential Problem Area? Yes      No X

Remarks (Explain sample location, disturbances, problem areas):  
*The data plot is located south of Loop 2, on the east side of Miller Creek.*

**VEGETATION** (✓ Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
✓ 1. <u>Equisetum arvense</u>	<u>20</u>	<u>Herb</u>	<u>FAC</u>
2. <u>Hedera helix</u>	<u>10</u>	<u>Herb</u>	<u>NL</u>
3. <u>Polystichum munium</u>	<u>10</u>	<u>Herb</u>	<u>FACU</u>
✓ 4. <u>Rubus discolor</u>	<u>30</u>	<u>Shrub</u>	<u>FACU</u>
✓ 5. <u>Alnus rubra</u>	<u>95</u>	<u>Tree</u>	<u>FAC</u>
6. <u>Corylus cornuta</u>	<u>10</u>	<u>Tree</u>	<u>FACU</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. "T" indicates trace. 75

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*The wetland vegetation criterion is met.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
     Stream, Lake, or Tide Gage  
     Aerial Photograph  
     Other  
X No Recorded Data Available

Wetland Hydrology Indicators (Describe in Remarks):  
Primary Indicators:

- Inundated
- Saturated in Upper 12 inches
- Saturated in Upper 18 inches
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: >18 (in.)

- Secondary Indicators (2 or more required):
- Oxidized Root Channels in Upper 12 inches
  - Water-Stained Leaves
  - Local Soil Survey Data
  - Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*There is no evidence of wetland hydrology. The area appears to have been filled.*

**DRAFT**

AR 052495

# Parametrix, Inc.



Date Plot #: 2U  
Wetland: N9

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_  
Field Observations Confirm Mapped Type?

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_ No X NA \_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-12	A'	10 YR 4/2	none	none	gravelly loam
12-18	fill	10 YR 5/1	none	none	gravelly loam

### Hydric Soil Indicators:

- |                                                                 |                                                                |
|-----------------------------------------------------------------|----------------------------------------------------------------|
| <input type="checkbox"/> Histosol                               | <input type="checkbox"/> Listed on Local Hydric Soils List     |
| <input type="checkbox"/> Histic Epipedon                        | <input type="checkbox"/> Listed on State Hydric Soils List     |
| <input type="checkbox"/> Sulfidic Odor                          | <input type="checkbox"/> Listed on National Hydric Soils List  |
| <input type="checkbox"/> Probable Aquic Moisture Regime         | <input type="checkbox"/> Aquic Moisture Regime                 |
| <input type="checkbox"/> Reducing Conditions                    | <input type="checkbox"/> Organic Streaking in Sandy Soils      |
| <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors | <input type="checkbox"/> Mottles                               |
| <input type="checkbox"/> High Organic Content in Surface Layer  | <input checked="" type="checkbox"/> Other (Explain in Remarks) |

Remarks (Describe soil disturbances, local variations, etc.):

*The soil is fill material with hydric soil inclusions; however the area does not meet hydric soil criteria.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes <u>X</u> No ___	Is this Sampling Point Within a Wetland?	
Hydric Soils Present?	Yes ___ No <u>X</u>		Yes ___ No <u>X</u>
Wetland Hydrology Present?	Yes ___ No <u>X</u>		

Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):

*Only one out of the three parameters satisfy the criterion, therefore this area is not considered to be wetland.*

**DRAFT**

AR 052496



Date Plot #: 2W  
Wetland: N9

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louthar, B. Kleindl State: WA

1987 Method  1989 Method Community ID: PFO  
Do Normal Circumstances exist on the site? Yes X No      Field Plot ID: 2W  
Is the site significantly disturbed (Atypical Situation)? Yes      No X  
Is the area a potential Problem Area? Yes      No X

Remarks (Explain sample location, disturbances, problem areas):  
*This Data Plot is located on the east side of the Miller Creek channel in Loop 2.*

**VEGETATION** (✓ Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
✓ 1. <u>Athyrium filix-femina</u>	<u>20</u>	<u>Herb</u>	<u>FACW</u>
✓ 2. <u>Equisetum arvense</u>	<u>20</u>	<u>Herb</u>	<u>FAC</u>
3. <u>Solanum dulcamara</u>	<u>Tr</u>	<u>Herb</u>	<u>FAC+</u>
✓ 4. <u>Rubus discolor</u>	<u>50</u>	<u>Shrub</u>	<u>FACU</u>
5. <u>Rubus spectabilis</u>	<u>5</u>	<u>Shrub</u>	<u>FAC+</u>
✓ 6. <u>Alnus rubra</u>	<u>95</u>	<u>Tree</u>	<u>FAC</u>
7. <u>Salix sitchensis</u>	<u>10</u>	<u>Tree</u>	<u>FACW</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. "T" indicates trace. 75

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*Greater than 50% of the dominant species are FAC or wetter; therefore the wetland vegetation criterion is met.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
     Stream, Lake, or Tide Gage  
     Aerial Photograph  
     Other  
X No Recorded Data Available

Wetland Hydrology Indicators (Describe in Remarks):

Primary Indicators:  
     Inundated  
     Saturated in Upper 12 inches  
X Saturated in Upper 18 inches  
     Water Marks  
     Drift Lines  
     Sediment Deposits  
X Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: 15 (in.)

Secondary Indicators (2 or more required):  
     Oxidized Root Channels in Upper 12 inches  
     Water-Stained Leaves  
     Local Soil Survey Data  
X Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*There is no standing water in hole; however the soil is saturated at 15" in depth.*

**DRAFT**

AR 052497

# Parametrix, Inc.



Date Plot #: 2W  
Wetland: N9

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_

Field Observations Confirm Mapped Type?

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_ No X NA \_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-15		10 YR 2/1	none	none	Sandy Loam
15-18+		10 YR 2/2	10 YR 2/1	coarse common faint	soils have high organic content with fibric matter

### Hydric Soil Indicators:

- |                                                                 |                                                               |
|-----------------------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> Histosol                               | <input type="checkbox"/> Listed on Local Hydric Soils List    |
| <input type="checkbox"/> Hiatic Epipedon                        | <input type="checkbox"/> Listed on State Hydric Soils List    |
| <input checked="" type="checkbox"/> Sulfidic Odor               | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Probable Aquic Moisture Regime         | <input type="checkbox"/> Aquic Moisture Regime                |
| <input type="checkbox"/> Reducing Conditions                    | <input type="checkbox"/> Organic Streaking in Sandy Soils     |
| <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors | <input checked="" type="checkbox"/> Mottles                   |
| <input type="checkbox"/> High Organic Content in Surface Layer  | <input type="checkbox"/> Other (Explain in Remarks)           |

Remarks (Describe soil disturbances, local variations, etc.):

*Sulfidic odor in this soil test pit is very strong.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes <u>X</u> No ___	Is this Sampling Point Within a Wetland?	
Hydric Soils Present?	Yes <u>X</u> No ___		Yes <u>X</u> No ___
Wetland Hydrology Present?	Yes <u>X</u> No ___		

Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):

*All three wetland criteria have been satisfied, therefore this area is considered to be a wetland.*

**DRAFT**

AR 052498



Data Plot #: 3U-1  
Wetland: N10

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louthier, B. Kleindl State: WA

1987 Method  1989 Method Community ID: Upland  
Do Normal Circumstances exist on the site? Yes  No  Field Plot ID: L3 U-1

Is the site significantly disturbed (Atypical Situation)? Yes  No   
Is the area a potential Problem Area? Yes  No

Remarks (Explain sample location, disturbances, problem areas):  
*The plot is located in lawn area on the east side of the creek, near the foot bridge.*

**VEGETATION** (✓ Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
1. <u>Holcus lanatus</u>	<u>10</u>	<u>Herb</u>	<u>FAC</u>
✓ 2. <u>Phalaris arundinacea</u>	<u>30</u>	<u>Herb</u>	<u>FACW</u>
3. <u>Taraxacum officinale</u>	<u>Tr</u>	<u>Herb</u>	<u>FACU</u>
4. <u>Cytisus scoparius</u>	<u>10</u>	<u>Shrub</u>	<u>NL</u>
✓ 5. <u>Rubus discolor</u>	<u>20</u>	<u>Shrub</u>	<u>FACU</u>
6. <u>Rubus laciniatus</u>	<u>5</u>	<u>Shrub</u>	<u>FACU+</u>
7. <u>Ainus rubra</u>	<u>5</u>	<u>Tree</u>	<u>FAC</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. "T" indicates trace. 50

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*Less than 50% of the dominant plant species are rated FAC or wetter, therefore the wetland vegetation criterion is not satisfied.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
 Stream, Lake, or Tide Gage  
 Aerial Photograph  
 Other  
 No Recorded Data Available

Wetland Hydrology Indicators (Describe in Remarks):  
Primary Indicators:

- Inundated
- Saturated in Upper 12 inches
- Saturated in Upper 18 inches
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: > 18 (in.)

- Secondary Indicators (2 or more required):
- Oxidized Root Channels in Upper 12 inches
  - Water-Stained Leaves
  - Local Soil Survey Data
  - Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*No indicators of wetland hydrology are present in this area.*

**DRAFT**

# Parametrix, Inc.



Data Plot #: 3U-1  
 Wetland: N10

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_

Field Observations Confirm Mapped Type?

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_\_\_ No X NA \_\_\_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-18		2.5 Y 4/3	none	none	Sandy loam w/crushed rock

### Hydric Soil Indicators:

- |                                                                |                                                               |
|----------------------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> Histosol                              | <input type="checkbox"/> Listed on Local Hydric Soils List    |
| <input type="checkbox"/> Histic Epipedon                       | <input type="checkbox"/> Listed on State Hydric Soils List    |
| <input type="checkbox"/> Sulfidic Odor                         | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Probable Aquic Moisture Regime        | <input type="checkbox"/> Aquic Moisture Regime                |
| <input type="checkbox"/> Reducing Conditions                   | <input type="checkbox"/> Organic Streaking in Sandy Soils     |
| <input type="checkbox"/> Gleyed or Low-Chroma Colors           | <input type="checkbox"/> Mottles                              |
| <input type="checkbox"/> High Organic Content in Surface Layer | <input type="checkbox"/> Other (Explain in Remarks)           |

Remarks (Describe soil disturbances, local variations, etc.):  
*No evidence of hydric soil indicators are present.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes _____ No <u>X</u>	Is this Sampling Point Within a Wetland?
Hydric Soils Present?	Yes _____ No <u>X</u>	Yes _____ No <u>X</u>
Wetland Hydrology Present?	Yes _____ No <u>X</u>	

Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):  
*None of the wetland indicators are present.*

**DRAFT**

AR 052500



Data Plot #: 3U-2  
Wetland: N10

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louthar, B. Kleindl State: WA

1987 Method  1989 Method Community ID: Upland  
Do Normal Circumstances exist on the site? Yes      No X Field Plot ID: L3 U2  
Is the site significantly disturbed (Atypical Situation)? Yes      No X  
Is the area a potential Problem Area? Yes      No X

Remarks (Explain sample location, disturbances, problem areas):  
*The data plot is located in lawn on the west side of Miller Creek.*

**VEGETATION** ( Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
✓ 1. <u>Agrostis spp.</u>	<u>50</u>	<u>Herb</u>	<u>IAC</u>
2. <u>Holcus lanatus</u>	<u>5</u>	<u>Herb</u>	<u>FAC</u>
3. <u>Hypochaeris radicata</u>	<u>Tr</u>	<u>Herb</u>	<u>FACU</u>
4. <u>Taraxacum officinale</u>	<u>Tr</u>	<u>Herb</u>	<u>FACU</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. "T" indicates trace. 50

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*Less than 50% of the dominant plant species are rated FAC or wetter, therefore the wetland vegetation criterion is not satisfied.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
     Stream, Lake, or Tide Gage  
     Aerial Photograph  
     Other  
X No Recorded Data Available

Wetland Hydrology Indicators (Describe in Remarks):  
Primary Indicators:

- Inundated
- Saturated in Upper 12 inches
- Saturated in Upper 18 inches
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: 0 (in.)

Secondary Indicators (2 or more required):  
     Oxidized Root Channels in Upper 12 inches  
     Water-Stained Leaves  
     Local Soil Survey Data  
     Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*No indicators of wetland hydrology are present in this area.*

**DRAFT**

AR 052501

# Parametrix, Inc.



Data Plot #: 3U-2  
Wetland: N10

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_  
Field Observations Confirm Mapped Type? \_\_\_\_\_

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_ No X NA \_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-12		10 YR 2/2	none	none	Loam
12-18		10 YR 3/3	none	none	Silt loam

### Hydric Soil Indicators:

<input type="checkbox"/> Histoal	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> Listed on State Hydric Soils List
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Probable Aquic Moisture Regime	<input type="checkbox"/> Aquic Moisture Regime
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Mottles
<input type="checkbox"/> High Organic Content in Surface Layer	<input type="checkbox"/> Other (Explain in Remarks)

Remarks (Describe soil disturbances, local variations, etc.):

*No hydric soil indicators are present, therefore soils do not meet hydric soil criteria.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes ___ No <u>X</u>	Is this Sampling Point Within a Wetland?
Hydric Soils Present?	Yes ___ No <u>X</u>	Yes ___ No <u>X</u>
Wetland Hydrology Present?	Yes ___ No <u>X</u>	

Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):

*None of the wetland indicators are present.*

DRAFT

AR 052502





Data Plot #: 3W  
Wetland: N10

**WETLAND DETERMINATION**

(Modified from: 1987 COE Wetlands Delineation Manual)

Project/Site: Des Moines Way Nursery Date: 10/10/01  
Applicant/Owner: Port of Seattle County: King  
Investigator: M. Louthier, B. Kleindl State: WA

1987 Method  1989 Method Community ID: PEM  
Do Normal Circumstances exist on the site? Yes  No  Field Plot ID: L-3W

Is the site significantly disturbed (Atypical Situation)? Yes  No   
Is the area a potential Problem Area? Yes  No

Remarks (Explain sample location, disturbances, problem areas):  
*The data plot is located on the east side of Miller Creek, in wetland Loop #3. A portion of the wetland is mowed.*

**VEGETATION** (✓ Dominant species are checked)

Plant Species	% Cover	Stratum	Indicator
1. <u>Equisetum arvense</u>	<u>1</u>	<u>Herb</u>	<u>FAC</u>
✓ 2. <u>Phalaris arundinacea</u>	<u>95</u>	<u>Herb</u>	<u>FACW</u>
3. <u>Rubus discolor</u>	<u>1</u>	<u>Shrub</u>	<u>FACU</u>

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (\*) as showing morphological adaptations to wetlands. \*T\* indicates trace. 100

Remarks (Describe disturbances, relevant local variations, seasonal effects, etc.):  
*Greater than 50% of the dominant species are FAC or wetter; therefore the wetland vegetation criterion is met.*

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
 Stream, Lake, or Tide Gage  
 Aerial Photograph  
 Other  
 No Recorded Data Available

Wetland Hydrology Indicators (Describe in Remarks):  
Primary Indicators:

- Inundated
- Saturated in Upper 12 inches
- Saturated in Upper 18 inches
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Field Observations:  
Depth of Surface Water: 0 (in.)  
Depth to Free Water in Pit: 0 (in.)  
Depth to Saturated Soil: > 18 (in.)

Secondary Indicators (2 or more required):  
 Oxidized Root Channels in Upper 12 inches  
 Water-Stained Leaves  
 Local Soil Survey Data  
 Other (Explain in Remarks)

Remarks (As relevant, describe recent precipitation, hydrologic modifications, local variations, etc.):  
*Wetland hydrology is assumed due to the presence of hydric soil conditions, oxidized rhizopheres, and the presence of hydrophytic vegetation.*

**DRAFT**

# Parametrix, Inc.



Data Plot #: 3W  
 Wetland: N10

Project/Site: Des Moines Way Nursery Date: 10/10/01

## SOILS

### Soil Survey Data:

Map Unit Name: Everett gravelly sandy loam (1952) Drainage Class: \_\_\_\_\_  
 Field Observations Confirm Mapped Type?

Taxonomy (Subgroup): not developed in 1952 Yes \_\_\_ No X NA \_\_\_

### Profile Description:

Depth (Inches)	Horizon Designation	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-10		10 YR 4/1	none	none	loam
10-18		10 YR 6/1	none	none	silt with discontinuous earth inclusions

### Hydric Soil Indicators:

- |                                                                 |                                                               |
|-----------------------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> Histoel                                | <input type="checkbox"/> Listed on Local Hydric Soils List    |
| <input type="checkbox"/> Histic Epipedon                        | <input type="checkbox"/> Listed on State Hydric Soils List    |
| <input type="checkbox"/> Sulfidic Odor                          | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Probable Aquic Moisture Regime         | <input type="checkbox"/> Aquic Moisture Regime                |
| <input type="checkbox"/> Reducing Conditions                    | <input type="checkbox"/> Organic Streaking in Sandy Soils     |
| <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors | <input type="checkbox"/> Mottles                              |
| <input type="checkbox"/> High Organic Content in Surface Layer  | <input type="checkbox"/> Other (Explain in Remarks)           |

Remarks (Describe soil disturbances, local variations, etc.):  
*Hydric soil indicators are present.*

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes <u>X</u> No ___	Is this Sampling Point Within a Wetland?
Hydric Soils Present?	Yes <u>X</u> No ___	Yes <u>X</u> No ___
Wetland Hydrology Present?	Yes <u>X</u> No ___	

Remarks (If applicable, explain any differences between 1987 and 1989 delineation results):  
*All three wetland criterion are met.*

**DRAFT**

**AR 052504**

**ATTACHMENT B**

**WETLAND RATING FORMS FOR WETLANDS N8, N9, AND N10 ON THE  
DES MOINES WAY NURSERY SITE**

**AR 052505**

# Wetlands Rating Field Data Form

## Background Information:

Name of Rater: Marti Louther Affiliation: Parametrix Date: Oct 13, 2001

Name of wetland (if known): Wetland N9

Government Jurisdiction of wetland: City of Seattle

Location: 1/4 Section: \_\_\_\_\_ of 1/4 S: \_\_\_\_\_ Section: 20 Township: 23N Range: 4E

## Sources of information: (Check all sources that apply)

Site visit:  USGS Topo Map:  NWI map:  Aerial Photo:  Soils survey:

Other:  Describe: \_\_\_\_\_

When The Field Data form is complete enter Category here:

3

## Q.1. High Quality Natural Wetland

Answer this question if you have adequate information or experience to do so. If not find someone with the expertise to answer the questions. Then, if the answer to questions 1a, 1b and 1c are all NO, contact the Natural Heritage program of DNR.

### 1a. Human caused disturbances.

Is there significant evidence of human-caused changes to topography or hydrology of the wetland as indicated by any of the following conditions? Consider only changes that may have taken place in the last 5 decades. The impacts of changes done earlier have probably been stabilized and the wetland ecosystem will be close to reaching some new equilibrium that may represent a high quality wetland.

- 1a1. Upstream watershed > 12% impervious.
  - 1a2. Wetland is ditched and water flow is not obstructed.
  - 1a3. Wetland has been graded, filled, logged.
  - 1a4. Water in wetland is controlled by dikes, weirs, etc.
  - 1a5. Wetland is grazed.
  - 1a6. Other indicators of disturbance (list below)
- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Circle Answers

- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- No: go to 1b.

<p>1b Are there populations of non-native plants which are currently present, cover more than 10% of the wetland, and appear to be invading native populations? Briefly describe any non-native plant populations and Information source(s): _____</p> <hr/> <p>1c. Is there evidence of human-caused disturbances which have visibly degraded water quality. Evidence of the degradation of water quality include: direct (untreated) runoff from roads or parking lots; presence, or historic evidence, of waste dumps; oily sheens; the smell of organic chemicals; or livestock use. Briefly describe:</p> <hr/> <hr/>	<p>YES: go to Q.2 No: go to 1c.</p> <p>YES: go to Q.2 NO: Possible Cat. I contact DNR</p>
<p><b>Q.2. Irreplaceable Ecological Functions:</b> Does the wetland:</p> <ul style="list-style-type: none"> <li>⊕ have at least 1/4 acre of organic soils deeper than 16 inches and the wetland is relatively undisturbed; OR [If the answer is NO because the wetland is disturbed briefly describe: Indicators of disturbance may include: <ul style="list-style-type: none"> <li>- Wetland has been graded, filled, logged;</li> <li>- Organic soils on the surface are dried-out for more than half of the year;</li> <li>- Wetland receives direct stormwater runoff from urban or agricultural areas.];</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have a forested class greater than 1 acre;</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have characteristics of an estuarine system;</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have eel grass, floating or non-floating kelp beds?</li> </ul>	<p>(NO to all: go to Q.3) YES go to 2a</p> <p>YES: Go to 2b</p> <p>YES: Go to 2c</p> <p>YES: Go to 2d</p>
<p><b>2a. Bogs and Fens</b> Are any of the three following conditions met for the area of organic soil?</p> <p>2a.1. Are Sphagnum mosses a common ground cover (&gt;30%) and the cover of invasive species (see Table 3) is less than 10%?</p> <p>Is the area of sphagnum mosses and deep organic soils &gt; 1/2 acre? Is the area of sphagnum mosses and deep organic soils 1/4-1/2 acre?</p> <p>2a.2. Is there an area of organic soil which has an emergent class with at least one species from Table 2, and cover of invasive species is &lt; 10% (see Table 3)?</p> <p>Is the area of herbaceous plants and deep organic soils &gt; 1/2 acre? Is the area of herbaceous plants and deep organic soils 1/4-1/2 acre?</p>	<p>YES: Category I YES: Category II</p> <p>NO: Go to 2a.3</p> <p>YES: Category I YES: Category II</p> <p>NO: Go to 2a.3</p>

<p><b>2a.3. Is the vegetation a mixture of only herbaceous plants and Sphagnum mosses with no scrub/shrub or forested classes?</b></p> <p>Is the area of herbaceous plants, Sphagnum, and deep organic soils &gt; 1/2 acre?  Is the area of herbaceous plants, Sphagnum, and deep organic soils 1/4-1/2 acre?</p>	<p>YES: Category I  YES: Category II  NO: Go to Q.3.</p>
<p><b>Q.2b. Mature forested wetland.</b></p> <p><b>2b.1. Does 50% of the cover of upper forest canopy consist of evergreen trees older than 80 years or deciduous trees older than 50 years?</b>  <i>Note: The size of trees is often not a measure of age, and size cannot be used as a surrogate for age (see guidance).</i></p> <p><b>2b.2. Does 50% of the cover of forest canopy consist of evergreen trees older than 50 years, AND is the structural diversity of the forest high as characterized by an additional layer of trees 20'-49' tall, shrubs 6' - 20' tall, and a herbaceous groundcover?</b></p> <p><b>2b.3. Does &lt; 25% of the areal cover in the herbaceous/groundcover or the shrub layer consist of invasive/exotic plant species from the list on p. 19?</b></p>	<p>YES: Category I  NO: Go to 2b.2</p> <p>YES: Go to 2b.3  NO: Go to Q.3</p> <p>YES: Category I  NO: Go to Q.3</p>
<p><b>Q.2c. Estuarine wetlands.</b></p> <p><b>2c1. Is the wetland listed as National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park, or Educational, Environmental or Scientific Reserves designated under WAC 332-30-151? . . . . .</b></p> <p><b>2c.2. Is the wetland &gt; 5 acres; . . . . .</b>  <i>Note: If an area contains patches of salt tolerant vegetation that are</i>  1) less than 600 feet apart and that are separated by mudflats that go dry on a Mean Low Tide, or  2) separated by tidal channels that are less than 100 feet wide;  all the vegetated areas are to be considered together in calculating the wetland area.</p> <p>or is the wetland 1-5 acres; . . . . .</p> <p>or is the wetland &lt; 1 acre? . . . . .</p>	<p>YES: Category I  NO: Go to 2c.2</p> <p>YES: Category I</p> <p>YES: Go to 2c.3</p> <p>YES: Go to 2c.4</p>

<p>2c.3. Does the wetland meet at least 3 of the following 4 criteria: . . . . .</p> <ul style="list-style-type: none"> <li>- minimum existing evidence of human related disturbance such as diking, ditching, filling, cultivation, grazing or the presence of non-native plant species (see guidance for definition);</li> <li>- surface water connection with tidal saltwater or tidal freshwater;</li> <li>- at least 75% of the wetland has a 100' buffer of ungrazed pasture, open water, shrub or forest;</li> <li>- has at least 3 of the following features: low marsh; high marsh; tidal channels; lagoon(s); woody debris; or contiguous freshwater wetland.</li> </ul> <p>2c.4. Does the wetland meet all of the four criteria under 2c3. (above)? . .</p>	<p>YES: Category I NO: Category II</p> <p>YES: Category II NO: Category III</p>
<p><b>Q.2d. Eel Grass and Kelp Beds.</b> 2d.1. Are eel grass beds present? . . . . .</p> <p>2d.2. Are there floating or non-floating kelp bed(s) present with greater than 50% macro algal cover in the month of August or September? . . . . .</p>	<p>YES: Category I NO: go to 2d.2</p> <p>YES: Category I NO: Category II</p>
<p><b>Q.3. Category IV wetlands.</b> 3a. Is the wetland: less than 1 acre and, hydrologically isolated and, comprised of one vegetated class that is dominated (&gt; 80% areal cover) by one species from Table 3 (page 19) or Table 4 (page 20 )</p> <p>3b. Is the wetland: less than two acres and, hydrologically isolated, with one vegetated class, and &gt; 90% of areal cover is any combination of species from Table 3 (page 19)</p> <p>3c. Is the wetland excavated from upland and a pond smaller than 1 acre without a surface water connection to streams, lakes, rivers, or other wetland, and has &lt; 0.1 acre of vegetation.</p>	<p>YES: Category IV NO: go to 3b</p> <p>YES: Category IV NO: go to 3c</p> <p>YES: Category IV NO: go to Q.4</p>

**Q.4. Significant habitat value.**

Answer all questions and enter data requested.

**4a. Total wetland area**

Estimate area, select from choices in the near-right column, and score in the far column:

Enter acreage of wetland here: 0.08 acres, and source: Survey

Circle scores that qualify

acres	points
> 200	6
40- 200	5
10 - 40	4
5 - 10	3
1 - 5	2
0.1 - 1	1
<u>&lt; 0.1</u>	<u>0</u>

**4b. Wetland classes: Circle the wetland classes below that qualify:**

Open Water: if the area of open water is > 1/4 acre

Aquatic Beds: if the area of aquatic beds > 1/4 acre.

Emergent: if the area of emergent class is > 1/4 acre,

Scrub-Shrub: if the area of scrub-shrub class is > 1/4 acre.

Forested: if area of forested class is > 1/4 acre,

Add the number of wetland classes, above, that qualify, and then score according to the columns at right.

e.g. If there are 4 classes (aquatic beds, open water, emergent & scrub- shrub), you would circle 8 points in the far right column.

# of classes Points

<u>1</u> .....	<u>0</u>
2.....	3
3.....	6
4.....	8
5.....	10

**4c. Plant species diversity.**

For each wetland class (at right) that qualifies in 4b above, count the number of different plant species you can find that cover more than 5% of the ground. You do not have to name them.

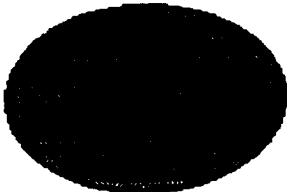
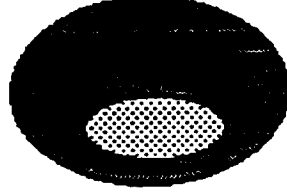
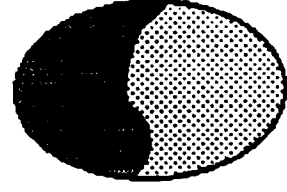
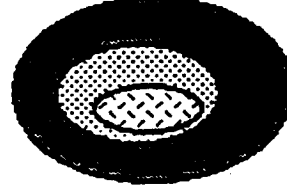
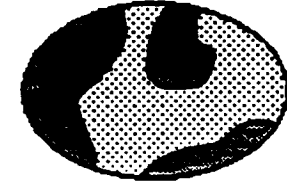
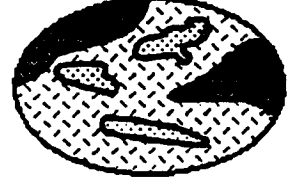
Score in column at far right:

e.g. If a wetland has an aquatic bed class with 3 species, an emergent class with 4 species and a scrub-shrub class with 2 species you would circle 2, 2, and 1 in the far column.

*Note:* Any plant species with a cover of > 5% qualifies for points within a class, even those that are not of that class.

Class	# species in class	Points
Aquatic Bed	1	0
	2	1
	3	2
	> 3	3
Emergent	1	0
	2-3	1
	4-5	2
	> 5	3
Scrub-Shrub	1	0
	2	1
	3-4	2
	> 4	3
Forested	1	0
	2	1
	3-4	2
	<u>&gt; 4</u>	<u>3</u>



<p><b>4d. Structural diversity.</b>          If the wetland has a forested class, add 1 point if each of the following classes is present within the forested class and is <u>larger than 1/4 acre</u>:</p> <ul style="list-style-type: none"> <li>-trees &gt; 50' tall .....</li> <li>-trees 20'- 49' tall .....</li> <li>-shrubs .....</li> <li>-herbaceous ground cover .....</li> </ul> <p>Also add 1 point if there is any "open water" or "aquatic bed" class immediately next to the forested area (ie. there is no scrub/shrub or emergent vegetation between them).</p>	<p>YES - 1          YES - 1          YES - 1          YES - 1</p> <p>YES - 1</p>
<p><b>4e. Decide from the diagrams below whether interspersions between wetland classes is high, moderate, low or none? If you think the amount of interspersions falls in between the diagrams score accordingly (i.e. a moderately high amount of interspersions would score a 4, while a moderately low amount would score a 2)</b></p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center;">  <p>none</p> </div> <div style="text-align: center;">  <p>low</p> </div> <div style="text-align: center;">  <p>low</p> </div> <div style="text-align: center;">  <p>moderate</p> </div> <div style="text-align: center;">  <p>moderate</p> </div> <div style="text-align: center;">  <p>high</p> </div> </div>	<p>High - 5          Moderate - 3          Low - 1  <u>None - 0</u></p>
<p><b>4f. Habitat features.</b>          Answer questions below, circle features that apply, and score to right:</p> <ul style="list-style-type: none"> <li>Is there evidence that the open or standing water was caused by beavers</li> <li>Is a heron rookery located within 300'?</li> <li>Are raptor nest/s located within 300'?</li> <li>Are there at least 3 standing dead trees (snags) per acre greater than 10" in diameter at "breast height" (DBH)?</li> <li>Are there at least 3 downed logs per acre with a diameter &gt; 6" for at least 10' in length?</li> <li>Are there areas (vegetated or unvegetated) within the wetland that are ponded for at least 4 months out of the year, and the wetland has not qualified as having an open water class in Question 4b. ?</li> </ul>	<p>YES = 2          YES = 1          YES = 1          YES = 1          YES = 1          YES = 2</p>

<p><b>4g. Connection to streams. (Score one answer only.)</b></p> <p>4g.1. Does the wetland provide habitat for fish at any time of the year AND does it have a perennial surface water connection to a fish bearing stream.</p> <p>4g.2 Does the wetland provide fish habitat seasonally AND does it have a seasonal surface water connection to a fish bearing stream.</p> <p>4g.3 Does the wetland function to export organic matter through a surface water connection at all times of the year to a perennial stream.</p> <p>4g.4 Does the wetland function to export organic matter through a surface water connection to a stream on a seasonal basis?</p>	<p>YES = 6</p> <p>YES = 4</p> <p>YES = 4</p> <p>YES = 2</p>
<p><b>4h. Buffers.</b></p> <p>Score the existing buffers on a scale of 1-5 based on the following four descriptions. If the condition of the buffers do not exactly match the description, score either a point higher or lower depending on whether the buffers are less or more degraded.</p> <p>Forest, scrub, native grassland or open water buffers are present for more than 100' around 95% of the circumference.</p> <p>Forest, scrub, native grassland, or open water buffers wider than 100' for more than 1/2 of the wetland circumference, or a forest, scrub, grasslands, or open water buffers for more than 50' around 95% of the circumference.</p> <p>Forest, scrub, native grassland, or open water buffers wider than 100' for more than 1/4 of the wetland circumference, or a forest, scrub, native grassland, or open water buffers wider than 50' for more than 1/2 of the wetland circumference.</p> <p>No roads, buildings or paved areas within 100' of the wetland for more than 95% of the wetland circumference.</p> <p>No roads, buildings or paved areas within 25' of the wetland for more than 95% of the circumference, or No roads buildings or paved areas within 50' of the wetland for more than 1/2 of the wetland circumference.</p> <p>Paved areas, industrial areas or residential construction (with less than 50' between houses) are less than 25 feet from the wetland for more than 95% of the circumference of the wetland.</p>	<p>Score = 5</p> <p>Score = 3</p> <p>Score = 2</p> <p>Score = 2</p> <p>Score = 1</p> <p>Score = 0</p>

<p><b>4i. Connection to other habitat areas:</b>  Select the description which best matches the site being evaluated.</p> <p>-Is the wetland connected to, or part of, a riparian corridor at least 100' wide connecting two or more wetlands; or, is there an upland connection present &gt;100' wide with good forest or shrub cover (&gt;25% cover) connecting it with a Significant Habitat Area?</p> <p>- Is the wetland connected to any other Habitat Area with either 1) a forested/shrub corridor &lt; 100' wide, or 2) a a corridor that is &gt; 100' wide, but has a low vegetative cover less than 6 feet in height?</p> <p>-Is the wetland connected to, or a part of, a riparian corridor between 50) - 100' wide with scrub/shrub or forest cover connection to other wetlands?</p> <p>- Is the wetland connected to any other Habitat Area with narrow corridor (&lt;100') of low vegetation (&lt; 6' in height)?</p> <p>- Is the wetland and its buffer (if the buffer is less than 50' wide) completely isolated by development (urban, residential with a density greater than 2/acre, or industrial)?</p>	<p>YES = 5</p> <p><b>YES = 3</b></p> <p>YES = 3</p> <p>YES = 1</p> <p>YES = 0</p>
<p><b>Now add the scores circled (for Q.5a - Q.5i above) to get a total.</b>  Is the Total greater than or equal to 22 points? <b>(11 pts.)</b></p> <p><b>YES = Category II</b>  <b>NO = Category III</b></p>	

# Wetlands Rating Field Data Form

## Background Information:

Name of Rater: Mart. Louther Affiliation: Parametrix, Inc. Date: OCT 13, 2001

Name of wetland (if known): Wetlands NB & NID

Government Jurisdiction of wetland: City of Seatac, WA

Location: 1/4 Section: \_\_\_\_\_ of 1/4 S: \_\_\_\_\_ Section: 20 Township: 23N Range: 4E

## Sources of Information: (Check all sources that apply)

Site visit:  USGS Topo Map:  NWI map:  Aerial Photo:  Soils survey:

Other:  Describe: \_\_\_\_\_

When The Field Data form is complete enter Category here:

3

### Q.1. High Quality Natural Wetland

Answer this question if you have adequate information or experience to do so. If not find someone with the expertise to answer the questions. Then, if the answer to questions 1a, 1b and 1c are all NO, contact the Natural Heritage program of DNR.

#### 1a. Human caused disturbances.

Is there significant evidence of human-caused changes to topography or hydrology of the wetland as indicated by any of the following conditions? Consider only changes that may have taken place in the last 5 decades. The impacts of changes done earlier have probably been stabilized and the wetland ecosystem will be close to reaching some new equilibrium that may represent a high quality wetland.

- 1a1. Upstream watershed > 12% impervious.
- 1a2. Wetland is ditched and water flow is not obstructed.
- 1a3. Wetland has been graded, filled, logged.
- 1a4. Water in wetland is controlled by dikes, weirs, etc.
- 1a5. Wetland is grazed.
- 1a6. Other indicators of disturbance (list below)

Wetland is mowed with kitchen gardens located  
in a portion of it.

### Circle Answers

- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- Yes: go to Q.2
- No: go to 1b.

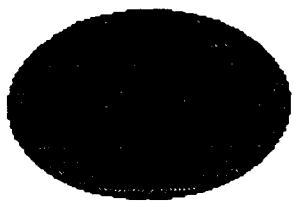
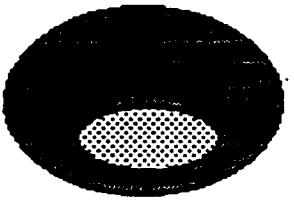
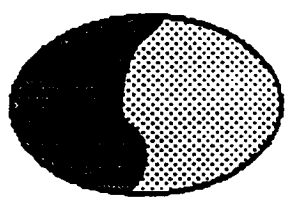
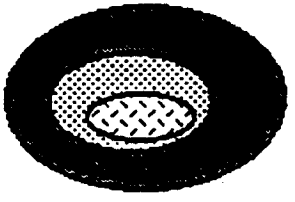
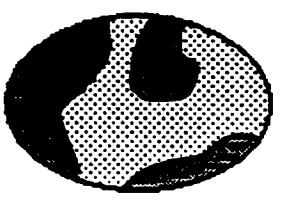
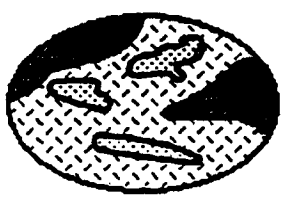
<p>1b Are there populations of non-native plants which are currently present, cover more than 10% of the wetland, and appear to be invading native populations? Briefly describe any non-native plant populations and Information source(s): _____</p>	<p>YES: go to Q.2 No: go to 1c.</p>
<p>1c. Is there evidence of human-caused disturbances which have visibly degraded water quality. Evidence of the degradation of water quality include: direct (untreated) runoff from roads or parking lots; presence, or historic evidence, of waste dumps; oily sheens; the smell of organic chemicals; or livestock use. Briefly describe: _____</p>	<p>YES: go to Q.2 NO: Possible Cat. I contact DNR</p>
<p><b>Q.2. Irreplaceable Ecological Functions:</b> Does the wetland:</p> <ul style="list-style-type: none"> <li>⊕ have at least 1/4 acre of organic soils deeper than 16 inches and the wetland is relatively undisturbed; OR [If the answer is NO because the wetland is disturbed briefly describe: Indicators of disturbance may include: <ul style="list-style-type: none"> <li>- Wetland has been graded, filled, logged;</li> <li>- Organic soils on the surface are dried-out for more than half of the year;</li> <li>- Wetland receives direct stormwater runoff from urban or agricultural areas.];</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have a forested class greater than 1 acre;</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have characteristics of an estuarine system;</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>⊕ have eel grass, floating or non-floating kelp beds?</li> </ul>	<p>(NO to all: go to Q.3) YES go to 2a</p> <p>YES: Go to 2b</p> <p>YES: Go to 2c</p> <p>YES: Go to 2d</p>
<p><b>2a. Bogs and Fens</b> Are any of the three following conditions met for the area of organic soil?</p> <p>2a.1. Are Sphagnum mosses a common ground cover (&gt;30%) and the cover of invasive species (see Table 3) is less than 10%?</p> <p>Is the area of sphagnum mosses and deep organic soils &gt; 1/2 acre? Is the area of sphagnum mosses and deep organic soils 1/4-1/2 acre?</p> <p>2a.2. Is there an area of organic soil which has an emergent class with at least one species from Table 2, and cover of invasive species is &lt; 10% (see Table 3)?</p> <p>Is the area of herbaceous plants and deep organic soils &gt; 1/2 acre? Is the area of herbaceous plants and deep organic soils 1/4-1/2 acre?</p>	<p>YES: Category I YES: Category II</p> <p>NO: Go to 2a.3</p> <p>YES: Category I YES: Category II</p> <p>NO: Go to 2a.3</p>

<p><b>2a.3. Is the vegetation a mixture of only herbaceous plants and Sphagnum mosses with no scrub/shrub or forested classes?</b></p> <p>Is the area of herbaceous plants, Sphagnum, and deep organic soils &gt; 1/2 acre?  Is the area of herbaceous plants, Sphagnum, and deep organic soils 1/4-1/2 acre?</p>	<p>YES: Category I  YES: Category II  NO: Go to Q.3.</p>
<p><b>Q.2b. Mature forested wetland.</b></p> <p><b>2b.1. Does 50% of the cover of upper forest canopy consist of evergreen trees older than 80 years or deciduous trees older than 50 years?</b>  <i>Note: The size of trees is often not a measure of age, and size cannot be used as a surrogate for age (see guidance).</i></p> <p><b>2b.2. Does 50% of the cover of forest canopy consist of evergreen trees older than 50 years, AND is the structural diversity of the forest high as characterized by an additional layer of trees 20'-49' tall, shrubs 6' - 20' tall, and a herbaceous groundcover?</b></p> <p><b>2b.3. Does &lt; 25% of the areal cover in the herbaceous/groundcover or the shrub layer consist of invasive/exotic plant species from the list on p. 19?</b></p>	<p>YES: Category I  NO: Go to 2b.2</p> <p>YES: Go to 2b.3  NO: Go to Q.3</p> <p>YES: Category I  NO: Go to Q.3</p>
<p><b>Q.2c. Estuarine wetlands.</b></p> <p><b>2c1. Is the wetland listed as National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park, or Educational, Environmental or Scientific Reserves designated under WAC 332-30-151? . . . . .</b></p> <p><b>2c.2. Is the wetland &gt; 5 acres; . . . . .</b>  <i>Note: If an area contains patches of salt tolerant vegetation that are</i>  1) less than 600 feet apart and that are separated by mudflats that go dry on a Mean Low Tide, or  2) separated by tidal channels that are less than 100 feet wide;  all the vegetated areas are to be considered together in calculating the wetland area.</p> <p>or is the wetland 1-5 acres; . . . . .</p> <p>or is the wetland &lt; 1 acre? . . . . .</p>	<p>YES: Category I  NO: Go to 2c.2</p> <p>YES: Category I</p> <p>YES: Go to 2c.3</p> <p>YES: Go to 2c.4</p>



<p><b>Q.4. Significant habitat value.</b>          Answer all questions and enter data requested.</p> <p><b>4a. Total wetland area</b>          Estimate area, select from choices in the near-right column, and score in the far column:</p> <p>Enter acreage of wetland here: <u>0.06</u> acres, and source: <u>Survey (N8)</u>  <u>0.13</u> ac " " <u>Survey (N10)</u></p>	<p style="text-align: center;"><b>Circle scores that qualify</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">acres</th> <th style="text-align: left;">points</th> </tr> </thead> <tbody> <tr><td>&gt; 200</td><td>6</td></tr> <tr><td>40- 200</td><td>5</td></tr> <tr><td>10 - 40</td><td>4</td></tr> <tr><td>5 - 10</td><td>3</td></tr> <tr><td>1 - 5</td><td>2</td></tr> <tr><td>0.1 - 1</td><td style="border: 1px solid black;">1</td></tr> <tr><td>&lt; 0.1</td><td>0</td></tr> </tbody> </table>	acres	points	> 200	6	40- 200	5	10 - 40	4	5 - 10	3	1 - 5	2	0.1 - 1	1	< 0.1	0																							
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<p><b>4b. Wetland classes:</b> Circle the wetland classes below that qualify:</p> <p>Open Water: if the area of open water is &gt; 1/4 acre          Aquatic Beds: if the area of aquatic beds &gt; 1/4 acre.</p> <p>Emergent: if the area of emergent class is &gt; 1/4 acre,          Scrub-Shrub: if the area of scrub-shrub class is &gt; 1/4 acre,          Forested: if area of forested class is &gt; 1/4 acre,</p> <p>Add the number of wetland classes, above, that qualify, and then score according to the columns at right.          e.g. If there are 4 classes (aquatic beds, open water, emergent &amp; scrub- shrub), you would circle 8 points in the far right column.</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"># of classes</th> <th style="text-align: left;">Points</th> </tr> </thead> <tbody> <tr><td style="border: 1px solid black;">1.....</td><td>0</td></tr> <tr><td>2.....</td><td>3</td></tr> <tr><td>3.....</td><td>6</td></tr> <tr><td>4.....</td><td>8</td></tr> <tr><td>5.....</td><td>10</td></tr> </tbody> </table>	# of classes	Points	1.....	0	2.....	3	3.....	6	4.....	8	5.....	10																											
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<p><b>4e. Decide from the diagrams below whether interspersions between wetland classes is high, moderate, low or none? If you think the amount of interspersions falls in between the diagrams score accordingly (i.e. a moderately high amount of interspersions would score a 4, while a moderately low amount would score a 2)</b></p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center;">  <p>none</p> </div> <div style="text-align: center;">  <p>low</p> </div> <div style="text-align: center;">  <p>low</p> </div> <div style="text-align: center;">  <p>moderate</p> </div> <div style="text-align: center;">  <p>moderate</p> </div> <div style="text-align: center;">  <p>high</p> </div> </div>	<p>High - 5          Moderate - 3          Low - 1  <u>None - 0</u></p>
<p><b>4f. Habitat features.</b>          Answer questions below, circle features that apply, and score to right:</p> <p>Is there evidence that the open or standing water was caused by beavers?          Is a heron rookery located within 300'?          Are raptor nest/s located within 300'?          Are there at least 3 standing dead trees (snags) per acre greater than 10" in diameter at "breast height" (DBH)?          Are there at least 3 downed logs per acre with a diameter &gt; 6" for at least 10' in length?          Are there areas (vegetated or unvegetated) within the wetland that are ponded for at least 4 months out of the year, and the wetland has not qualified as having an open water class in Question 4b. ?</p>	<p>YES = 2          YES = 1          YES = 1            YES = 1            YES = 1            YES = 2</p>

<p><b>4g. Connection to streams. (Score one answer only.)</b></p> <p>4g.1. Does the wetland provide habitat for fish at any time of the year AND does it have a perennial surface water connection to a fish bearing stream.</p> <p>4g.2 Does the wetland provide fish habitat seasonally AND does it have a seasonal surface water connection to a fish bearing stream.</p> <p>4g.3 Does the wetland function to export organic matter through a surface water connection at all times of the year to a perennial stream.</p> <p>4g.4 Does the wetland function to export organic matter through a surface water connection to a stream on a seasonal basis?</p>	<p>YES = 6</p> <p>YES = 4</p> <p>YES = 4</p> <p>YES = 2</p>
<p><b>4h. Buffers.</b></p> <p>Score the existing buffers on a scale of 1-5 based on the following four descriptions. If the condition of the buffers do not exactly match the description, score either a point higher or lower depending on whether the buffers are less or more degraded.</p> <p>Forest, scrub, native grassland or open water buffers are present for more than 100' around 95% of the circumference.</p> <p>Forest, scrub, native grassland, or open water buffers wider than 100' for more than 1/2 of the wetland circumference, or a forest, scrub, grasslands, or open water buffers for more than 50' around 95% of the circumference.</p> <p>Forest, scrub, native grassland, or open water buffers wider than 100' for more than 1/4 of the wetland circumference, or a forest, scrub, native grassland, or open water buffers wider than 50' for more than 1/2 of the wetland circumference.</p> <p>No roads, buildings or paved areas within 100' of the wetland for more than 95% of the wetland circumference.</p> <p>No roads, buildings or paved areas within 25' of the wetland for more than 95% of the circumference, or No roads buildings or paved areas within 50' of the wetland for more than 1/2 of the wetland circumference.</p> <p>Paved areas, industrial areas or residential construction (with less than 50' between houses) are less than 25 feet from the wetland for more than 95% of the circumference of the wetland.</p>	<p>Score = 5</p> <p>Score = 3</p> <p>Score = 2</p> <p>Score = 2</p> <p>Score = 1</p> <p>Score = 0</p>

<p><b>4i. Connection to other habitat areas:</b>  Select the description which best matches the site being evaluated.</p> <p>-Is the wetland connected to, or part of, a riparian corridor at least 100' wide connecting two or more wetlands; or, is there an upland connection present &gt;100' wide with good forest or shrub cover (&gt;25% cover) connecting it with a Significant Habitat Area?</p> <p>- Is the wetland connected to any other Habitat Area with either 1) a forested/shrub corridor &lt; 100' wide, or 2) a corridor that is &gt; 100' wide, but has a low vegetative cover less than 6 feet in height?</p> <p>-Is the wetland connected to, or a part of, a riparian corridor between 50' - 100' wide with scrub/shrub or forest cover connection to other wetlands?</p> <p>- Is the wetland connected to any other Habitat Area with narrow corridor (&lt;100') of low vegetation (&lt; 6' in height)?</p> <p>- Is the wetland and its buffer (if the buffer is less than 50' wide) completely isolated by development (urban, residential with a density greater than 2/acre, or industrial)?</p>	<p>YES = 5</p> <p>YES = 3</p> <p><b>YES = 3</b></p> <p>YES = 1</p> <p>YES = 0</p>
<p>Now add the scores circled (for Q.5a - Q.5i above) to get a total.  Is the Total greater than or equal to 22 points? (13 pts)</p> <p><b>YES = Category II</b>  <b>NO = Category III</b></p>	

**ATTACHMENT C**

**HYDRAULIC ANALYSIS OF MILLER CREEK AT THE DES MOINES  
CREEK NURSERY SITE**

**AR 052522**

# DES MOINES WAY NURSERY HEC-RAS HYDROLOGIC ANALYSIS SUMMARY

## INTRODUCTION

A HEC-RAS model was assembled in order to evaluate the hydraulics of Miller Creek through the Des Moines Way Nursery site. HEC-RAS calculates water surface profiles and channel hydraulics for one-dimensional, steady and unsteady flow, and the results are presented in this attachment. This analysis indicates that wetland hydrology on the nursery site is not typically maintained by Miller Creek

## METHODOLOGY

The cross-sectional data of the creek channel was based on survey data collected in the field during October 2001 using a level instrument and rod. The cross-sectional data was augmented with data in the overbank area from previous aerial mapping and additional field survey.

A frequency analysis was performed on simulated flow data from an existing HSPF hydrologic model of the Miller Creek basin in order to obtain peak flow rates for the nursery site reach (RCHRES 33). The HSPF model is based on 1994 land cover conditions. The HEC-RAS model was run in the steady state mode using the peak flows summarized below.

Table 1: Flow Frequency Analysis Summary

Return Frequency	Peak Flow (cfs)
Annual	13.0
2-year	32.1
10-year	60.0
25-year	77.2
100-year	107.2

The model was run with two different downstream boundary conditions: one with normal depth based on channel slope and the other with the Miller Creek Detention Facility (MCDF) in overflow (water surface elevation 274.5).

## RESULTS

The results show that the water surface elevation of the reach of Miller Creek through the Des Moines Way Nursery site is highly dependent on the tailwater condition in the MCDF. With normal downstream water surface elevation, the creek begins to overtop the banks between the 2-year and 10-year peak flow rate. The maximum extent of ponding is approximately 50 feet wide at the 100-year return frequency. With the MCDF at flood stage, the creek backwaters overtop the banks ponding in a zone approximately 80 feet wide for the 100-year peak flow rate.

**Table 2: Simulated Water Surface Elevation with Normal Tailwater**

River Station	Min. Channel Elevation (ft)	Left Overbank Elevation (ft)	Right Overbank Elevation (ft)	Water Surface Elevation		
				2-Year (ft)	25-Year (ft)	100-Year (ft)
750	269.05	271.38	271.38	270.40	271.05	271.36
1000	269.05	270.04	270.01	270.53	271.30	271.67
1240	271.40	274.37	273.73	272.54	273.21	273.55
1400	272.92	274.28	274.80	274.39	275.10	275.40
1550	274.41	275.77	276.29	275.56	276.13	276.59

**Table 3: Simulated Water Surface Elevation with Flood Stage Tailwater**

River Station	Min. Channel Elevation (ft)	Left Overbank Elevation (ft)	Right Overbank Elevation (ft)	Water Surface Elevation		
				2-Year (ft)	25-Year (ft)	100-Year (ft)
750	269.05	271.38	271.38	274.50	274.50	274.50
1000	269.05	270.04	270.01	274.50	274.50	274.50
1240	271.40	274.37	273.73	274.50	274.48	274.46
1400	272.92	274.28	274.80	274.50	274.59	275.10
1550	274.41	275.77	276.29	275.48	276.51	276.59

