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MEMORANDUM

DATE: December 8, 2000

TO: Ralph Wessels, Port of Seattle

FROM: Reese P. Hastings and Michael J. Bailey, P.E., Hart Crowser, Inc.

RE: **Third Runway Project, Borrow Areas 1, 3, and 4
Projected Impacts to Wetlands (revised)**
J-4978-62

CC: Marti Louther and James C. Kelley, Ph. D., Parametrix, Inc.
J. Thomson, P.E., HNTB

Anchorage

Boston

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On-Site Borrow Activities

This memorandum quantifies the potential impacts to wetland resources resulting from development of Borrow Areas 1, 3, and 4, and an on-site haul route for use in the construction of the Third Runway embankment. Completion of the Third Runway embankment will require about 17 million cubic yards of compacted earth fill. Use of borrow sites owned by the Port of Seattle (Port) to provide this material will significantly reduce air quality and local traffic impacts associated with haulage from off-site sources.

Fairbanks

Jersey City

The Final Environmental Impact Statement (FEIS) (prepared for Sea-Tac International Airport's Proposed Master Plan update development actions) discussed development of construction fill material borrow areas from eight identified sources within property controlled by the Port. Based on several factors (wetlands impacts, material types, operational costs) the Final Supplemental Environmental Impact Statement (FSEIS) indicated that four of these eight on-site resource areas could likely be used to extract a maximum quantity of 15.45 million cubic yards of fill material. Further study by the Port has focused on the Borrow Areas designated 1, 3, and 4, which are proposed to provide a combined total of 6.7 million cubic yards. Figure 1 - Site Location Map shows the location of Borrow Areas 1, 3, and 4.

Juneau

Long Beach

Original resource estimates for two of these borrow areas have been revised in an effort to minimize the potential impacts on wetland resources delineated therein. The decrease in

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the potential impacts to wetland resources and the decline in the resource estimates are described below.

Borrow Area 1

Borrow Area 1 is located less than a mile south of the Airport's 34 R runway. It consists of approximately 121 acres situated northwest of South 216th Street and 24th Avenue South. The area is bounded by these streets to the south and east, respectively, and on the north and west sides by the Des Moines Creek Park and the proposed Washington State Department of Transportation (WSDOT) SR-509 extension right of way. Borrow Area 1 is located in the City of Des Moines and City of SeaTac.

Engineering estimates conducted in 1994 supporting the FEIS and FSEIS indicated that the borrow material resource consists of glacially deposited, slightly silty to silty sands and gravels. Volumetric estimates presented in the FSEIS indicated that 6.6 million bank cubic yards (BCY - volume unit of soil in place, prior to excavation) of material were available from Borrow Area 1. Changes in site development conditions and the adoption of wider buffers (perimeter, stream) have resulted in this figure being adjusted. Estimates were revised in 1998 and indicate that this area still has the potential to generate substantial quantities of fill, and if fully utilized, it would produce approximately 4.8 million BCY of borrow material. Figure 2 shows the conceptual end of mining topography for the area based on full utilization.

There are 1.83 acres of wetlands within Borrow Area 1, some of which can be avoided without significantly diminishing the available borrow resource (as discussed below). Examination of Figure 2 shows how the current full utilization development plan will avoid several perimeter wetlands, and how it will utilize a 200-foot setback to avoid the Des Moines Creek drainage system. Post-extraction topography would drain toward the creek through approved erosion, infiltration, and sediment control structures constructed along the western margins of the excavation.

Under the Port's currently proposed development alternative to avoid impacts to wetlands and enhance site infiltration and off-site drainage to Des Moines Creek within or adjacent to the western margins of Borrow Area 1, approximately 4.2 million BCY of borrow material would be available. The resource reduction from 4.8 million BCY to 4.2 million BCY was done specifically to avoid impacts to off-site wetlands. Figure 3 shows how this alternative would be contoured to infiltrate or drain precipitation naturally through existing wetlands, draws, or ravines into Des Moines Creek and adjacent wetlands.



Borrow Area 3

Borrow Area 3 is located south of the Airport's 34 L runway, in the City of SeaTac. It consists of approximately 60 acres, bounded on the north by South 200th Street, and to the east by 18th Avenue South and the WSDOT right of way. The resource consists of glacially deposited, slightly silty to silty sands and gravels. Borrow Area 3 contains 2.35 acres of wetlands. Full utilization of the available resource would produce approximately 1.5 million BCY of borrow material for use in the construction of the Third Runway embankment (see Figure 4). Under the Port's currently proposed development alternative to avoid impacts to all the wetlands in Area 3, approximately 1.0 million BCY of the borrow resource would be available (see Figure 5). The resource reduction from 1.5 million BCY to 1.0 million BCY was done specifically to avoid impacts to on-site wetlands. Material extraction would be conducted in a manner that would preserve local hydrologic seepage thought to support Borrow Area 3 wetlands (see Hart Crowser, 2000).

Borrow Area 4

Immediately north of Borrow Area 3 and approximately 1,100 feet south-southwest of the runway is Borrow Area 4 (see Figure 4). The site comprises an area of approximately 36 acres and is located west of the Tyee Golf Course. It is bounded to the south by South 200th Street, to the east by 18th Avenue South, and to the north by South 196th Street. The resource geology has been identified as being generally similar to that of Borrow Area 3. No wetlands exist in Borrow Area 4. Full utilization of the available resource will produce approximately 1.5 million BCY of borrow material for use as embankment fill.

Conceptual Truck and Conveyor Haul Routes

Transfer of borrow materials from the above-named sources will be accomplished by truck or conveyor haulage. Conceptual haul route alternatives have been laid out to avoid wetlands impacts and to avoid conflicts with future construction of the proposed regional detention facility (RDF) to be located within the existing Port-owned Tyee Golf Course.

Figure 6 shows conceptual haul routes across Port property consisting of the Tyee Golf Course and the southern airport roadway system, to transport materials from Borrow Areas 1, 3, and 4 as presented in the FSEIS.

Three conceptual haulage mechanisms were evaluated: conventional or heavy mining truck haulage using a dedicated haul road on Port property; and a material conveyor system aligned along a similar route with a dedicated service road. The truck and conveyor routes



are aligned primarily to avoid wetlands and accommodate industry-standard turning radii and roadbed grades (trucks set at <8%, conveyor set at <15°) suitable for the selected haul method (see Figure 6).

Haul routes would cross existing City of SeaTac streets (18th Avenue South and South 200th Street) at grade or via grade-separated crossings depending on selection of a preferred haul method and outcome of future studies. Haulage within the City of Des Moines would utilize existing streets or dedicated routes again depending on selection of a preferred haul method. Haulage across South 188th Street is anticipated to utilize a grade separation (special purpose bridge) regardless of which haulage method is selected.

The conceptual haul routes utilize similar terrain traversing along the eastern edge of Borrow Area 3 north toward South 200th Street, crossing onto the southeastern corner of Borrow Area 4 before heading northeast across the Tye Golf Course toward the airport. Conceptual haul route alignments across the Golf Course have been laid out to avoid wetland impacts. Once the routes reach the central portion of the golf course, they extend along the southeastern berm of the proposed Des Moines Creek RDF, cross Des Moines Creek, and then turn north in a parallel course next to the runway approach light towers. At the southern toe of the runway embankment, the routes ascend the grade to connect into the existing airport roadway system situated on the west flank of the 34 R runway embankments. The routes then follow the southern edge of South 188th Street westward to a point where a proposed new bridge crossing structure will connect the haul route to the existing airport roadway system on the north side of the street. The haul route will then follow existing roadways along the western edge of the airport to the embankment construction site.

Borrow Development - Potential Impacts to Wetland

Wetland delineation efforts conducted throughout 1998 and 1999 identified the wetland resources indicated on Figures 2 and 4 within Borrow Areas 1 and 3. Delineation efforts have not identified any wetland resources within Borrow Area 4. Of the wetlands delineated within the Tye Golf Course, only those adjacent to the conceptual haul route are shown on Figure 6. The areal extent of wetlands in each borrow area and the golf course that could be potentially impacted by borrow material development and hauling activities are summarized in Table 1.

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Borrow Area 1

Full development of construction materials from Borrow Area 1 would likely impact approximately 1.40 acres of the 1.83 acres of wetland delineated for this site. However, the proposed approach to developing Area 1 as depicted on Figure 3 would minimize these impacts to 1.03 acres or less, and facilitate on-site infiltration and free drainage of direct precipitation and surface runoff into Des Moines Creek and the adjoining wetlands located on the parcel adjacent to and west of Wetlands 15a and 48. Excavation in these five wetlands (B-1, B-4, B-15a/b, 32, and 48) will be avoided by configuring the borrow site boundary and mined slopes a minimum of 50 feet away from wetland edges.

Potential impacts to Wetland B-15a/b and 48 would be completely avoided by not having any material extraction activities from the area west of 20th Avenue South. The portion of land west of 20th Avenue South would be managed to preserve the overland flow, which contributes, in a limited manner, to the perched wetland hydrology supporting these two flat-lying wetlands. Potential impacts to Wetlands B-1, B-4, B-15a/b, 32, and 48 will also be avoided through the use of 50-foot buffers. No borrow material extraction would occur within the wetland buffer.

It will not be practicable to avoid the remaining wetlands in Borrow Area 1 because:

- ▶ The preservation of the wetlands would render the resource impracticable to mine; or
- ▶ Mining the resource would completely remove the upgradient source of water sustaining the wetland.

Borrow Area 3

Full development of Borrow Area 3 would impact the wetlands delineated within the area boundary. However, the proposed approach to developing Borrow Area 3 as depicted on Figure 5 would avoid these impacts. As explained Hart Crowser October 20, 2000, memo, hydrogeologic studies indicate the source of water feeding the Borrow Area 3 wetlands will remain intact given that surface drainage and perched seepage systems immediately upgradient will remain undisturbed and seepage adjacent to Wetland 29 will remain unimpaired. As noted above, avoiding the wetlands would still allow development of a substantial volume of construction material from Borrow Area 3. Where mining intercepts surface seepage in areas immediately to the north of these wetlands, a collection and conveyance system in the form of a drainage swale will help ensure that an adequate



amount of water from these areas will supply of water to nearby wetlands Figure 5 (Hart Crowser, 2000).

The haul route has been aligned through Borrow Areas 3 and 4, and the Tye Golf Course with the goal of avoiding or minimizing the potential for impacts to wetlands:

- ▶ Wetlands delineated in Borrow Area 3 would not be impacted by the construction and operation of the conceptual means of haulage; and
- ▶ Wetlands delineated within the confines of the Tye Golf Course have been avoided.

Mitigation

In addition to avoidance of wetland fill or excavation, other mitigation activities that will minimize indirect wetland impacts arising from borrow development or haulage will include:

- ▶ Conduct material extraction during the summer season and maintain site drainage through use of TESC measures throughout the winter rainy season;
- ▶ Use of 50-foot-wide undisturbed buffers around delineated wetlands;
- ▶ Preservation of water recharge source areas upgradient of wetlands;
- ▶ Construction of a drainage swale to maintain seepage flows to wetlands in Borrow Area 3;
- ▶ Use of berms or other erosion protection to prevent overland flow away from wetlands into excavated areas;
- ▶ Implementation of TESC measures (berms, silt, fencing, hay bales, drainage control swales, ponds, recontouring, etc.) within the borrow and haul areas to protect wetlands from storm water impacts; and
- ▶ Modification of mining methods (borrow area bench layout, slope stability, recontouring), and re-alignment of preferred construction material haul routes (side-cast materials, road maintenance).



Borrow Area 1

Mitigation of potential impacts in Area 1 will include modification to the conceptual post-mining contours along portions of the southern, western, and eastern perimeter. Use of a 50-foot-wide undisturbed buffer around five wetlands (B-1, B-4, B-15a/b, 32, and 48) would insulate the wetlands from activity related to borrow material development, (see Figure 3). Borrow Area 1 operations can be completed without disrupting the upgradient source of water needed to sustain these wetlands, for example, near Wetlands B-15a/b and 48, borrow material extraction activities have been shifted over 200 feet to the east.

Mitigation will also include the use of a stream setback averaging 200 feet to protect Des Moines Creek from the potential impacts of borrow development activities. Excavation along the stream buffer areas would allow borrow area bench layout and recontouring measures to provide for adequate positive drainage or infiltration from the extraction areas to the east. This combined approach to on-site infiltration and off-site drainage is required to prevent water from accumulating in the borrow area for significant periods of time.

Borrow Area 3

Mitigation of potential impacts to wetlands in Borrow Area 3 will rely upon the combined effect of avoidance and mitigation incorporated into the alternate development scenario portrayed on Figure 5.

The preferred plan for excavating borrow materials from Borrow Area 3 (identified as Alternative 2) would preserve the wetlands by maintaining 50-foot-wide undisturbed buffer zones around the wetlands, and by not mining in any areas that directly contribute surface water or groundwater flow to the wetlands. Borrow development would include construction of a drainage swale to convey seepage and precipitation into Wetland 29 that might reach this wetland by lateral flow mechanisms from the perched seepage zone to the north. Proposed mining would not impact up gradient flows into this wetland. The water conveyed by this drainage swale into Wetland 29 would mitigate potential indirect effects of mining north of this wetland (Hart Crowser, 2000). Mining would not affect seepage draining from Wetlands B-10 and 29 south and east through Wetlands B-5, B-6, B-7, and B-9 and Wetland 30, by virtue of their locations on the slopes above the mined areas.

Mining will occur to elevations that are no more than 1 to 2 feet below the base elevations of the nearest adjacent wetlands as shown by the proposed end of mining topography on Figure 5. Given that these wetland experience significant losses by percolation through permeable soils beneath the wetlands, and that seepage from upgradient sources will remain uninterrupted, mining will not materially affect the hydrology of the wetlands. Mining will be confined to a zone north and east of the wetlands, leaving the primary wetland water source areas in the southwestern portion of the site generally undisturbed.



Haul Routes

The haul route alignment was developed to avoid wetland impacts, to the maximum extent practical. Mitigation of potential impacts arising from hauling activities would consist of TESC measures near wetlands or buffers. The routes laid out for both the truck or conveyor options will have some minor temporary impact on riparian Wetland E, where the haul route must cross Des Moines Creek (see Table 1 and Figures 6 and 7). The proposed conceptual haul route alignments go around Wetlands G-1, G-2, and G-3, entirely avoiding any impacts by utilizing existing roads. Aside from the stream crossing, the routes maintain a minimum buffer distance of 50 feet, except in the vicinity of Wetland G-3 (on the west side of the 34 R runway embankment), the routes maintain a minimum buffer distance of 50 feet, see Figure 8.

In that single location, the haul route would come within 20 to 30 feet of the northeastern tip of this wetland (see Figure 8). The potential for sedimentation or water quality impacts to this wetland from hauling activity in this area would be avoided by the installation of silt fencing, berm and a drainage ditch along the outside shoulder of the road, and other appropriate TESC measures (storm water management ponds, etc.).

Attachments:

- Table 1 - Summary of Potential Wetland Impacts for Borrow Areas 1, 3, and 4 and Conceptual Haul Routes
- Figure 1 - Site Location Map
- Figure 2 - Conceptual End of Mining Topographic Map for Borrow Area 1
Alternative 1 - Full Utilization
- Figure 3 - Conceptual End of Mining Topographic Map for Borrow Area 1
Alternative 2 - Avoidance of Wetland Impacts
- Figure 4 - Conceptual End of Mining Topographic Map for Borrow Areas 3 and 4
Alternative 1 - Full Utilization of Borrow Area 3
- Figure 5 - Conceptual End of Mining Topographic Map for Borrow Areas 3 and 4
Alternative 2 - Avoidance of Wetland Impacts (Revised, June 22, 2001)
- Figure 6 - Proposed Haulage Routes Map
- Figure 7 - Representative Conceptual Des Moines Creek - Borrow Area Haul Road Crossing Map and Cross Sections
- Figure 8 - Borrow Area Haul Route Representative Cross Section
At Closest Encroachment Wetland (Sta H+59.5)

References:

- Hart Crowser, 2000. Memo, Sea-Tac Third Runaway - Borrow Area 3, Preservation of Wetlands.
J-4978-06, October 20, 2000.

Table 1 - Summary of Potential Wetland Impacts for Borrow Areas 1, 3, and 4 and Conceptual Haul Routes

BORROW AREA 1

| Wetland | Area in Acres | Impacted Area in Acres | Comments |
|---------|---------------|------------------------|---|
| B-1 | 0.27 | 0 | Impacts avoided |
| B-4 | 0.07 | 0 | |
| 32 | 0.09 | 0 | |
| B-15a | 0.19 | 0.19 | Mining will temporarily alter buffers, wetland, and surface water sources |
| 48 | 0.14 | 0.14 | |
| B-11 | 0.18 | 0.18 | Impacts unavoidable, mining will eliminate upgradient sources of water |
| B-12 | 0.07 | 0 | |
| B-14 | 0.78 | 0.78 | |
| B-15b | 0.02 | 0.02 | |

TOTAL **1.81** **1.31**

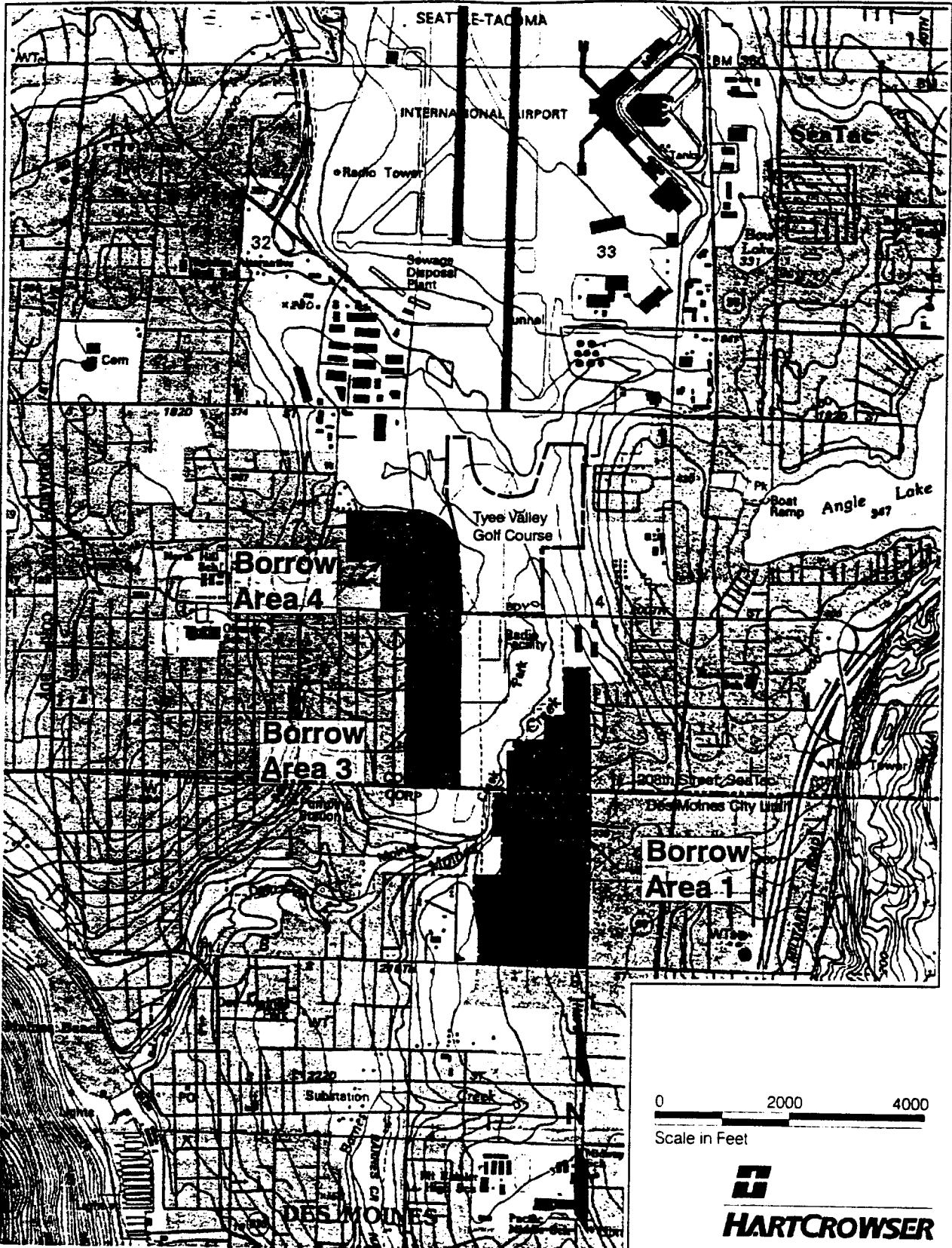
BORROW AREA 3

| Wetland | Area in Acres | Impacted Area in Acres | Comments |
|--------------|---------------|------------------------|--|
| B-1 | 0.02 | 0 | Impacts completely avoided with Mining Alternative 2 |
| B-5 | 0.08 | 0 | |
| B-6 | 0.55 | 0 | |
| B-7 | 0.03 | 0 | |
| B-9 | 0.05 | 0 | |
| 29 | 0.74 | 0 | |
| 30 | 0.88 | 0 | |
| TOTAL | 2.35 | 0 | |

CONCEPTUAL HAUL ROUTES (DES MOINES CREEK CROSSING)

| Wetland | Area in Acres | Impacted Area in Acres | Comments |
|--------------|---------------|------------------------|---|
| | | Truck/Conveyor | |
| E | 0.07 | 0.03/0.01 | Impact depends on selected haulage method |
| TOTAL | 0.07 | 0.03/0.01 | |

Site Location Map



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Note: Base map prepared from USGS 7.5 minute quadrangle maps of Seattle South, Washington, revised 1995

0 2000 4000

Scale in Feet



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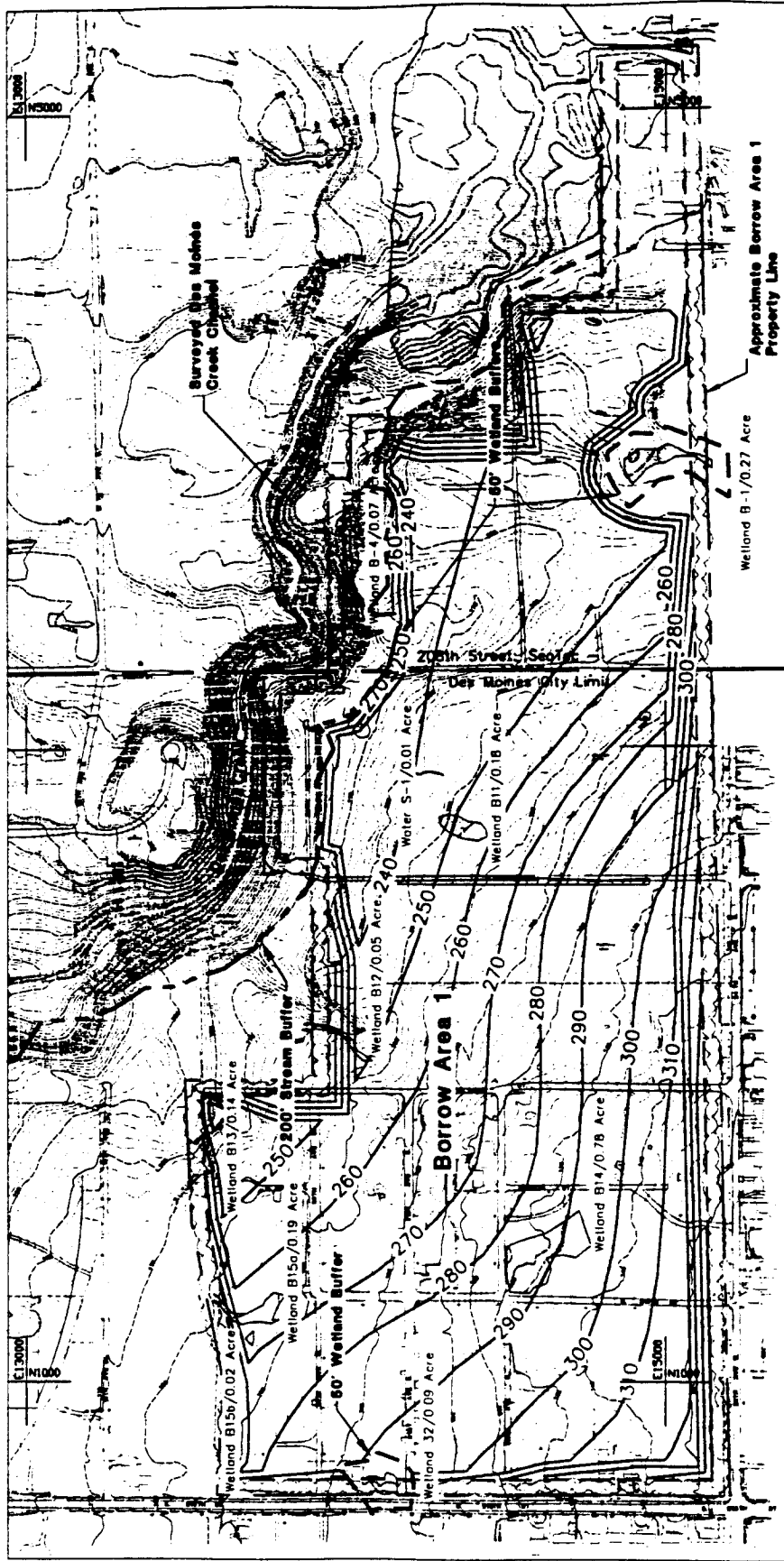
Figure 1

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Conceptual End of Mining Topographic Map for Borrow Area 1

Alternative 1 - Full Utilization



Notes: Base map prepared from drawing provided by HNTB entitled "Base03", dated October 6, 1998. Wetland and stream channel survey data provided by Parametrix drawing entitled "w052899", dated May 28, 1999.

- 300 --- Conceptual End of Mining Elevation Contour in Feet
- Existing Elevation Contour in Feet
- Reclamation Setback
- Wetlands Delineated by Parametrix (11/00)
- 50-foot Wetland Buffer
- 200-foot Stream Buffer

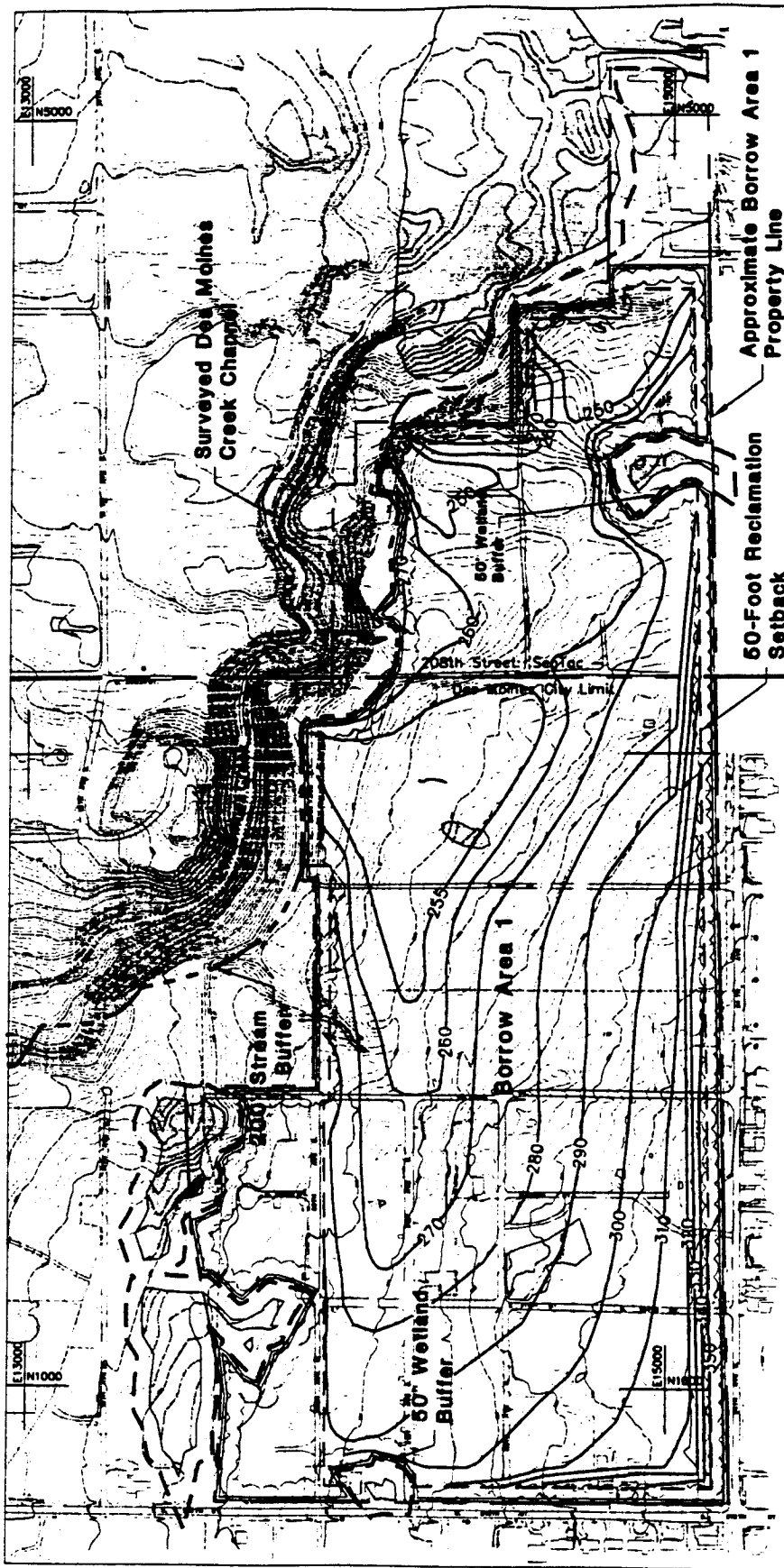


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 Figure 2

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Conceptual End of Mining Topographic Map - Borrow Area 1

Alternative 2 - Avoidance of Wetland Impacts



Note: Base map prepared from drawing provided by HNTB entitled "Base03", dated October 6, 1998. Wetland and stream channel survey data provided by Parametrix drawing entitled "W_110800," dated November 8, 2000.

- 300 Conceptual End of Mining Elevation Contour in Feet
- Existing Elevation Contour in Feet
- Reclamation Setback
- Borrow Area Development Boundary
- Wetlands Delineated by Parametrix (11/00)
- 50-Foot Wetland Buffer
- 200-Foot Stream Buffer

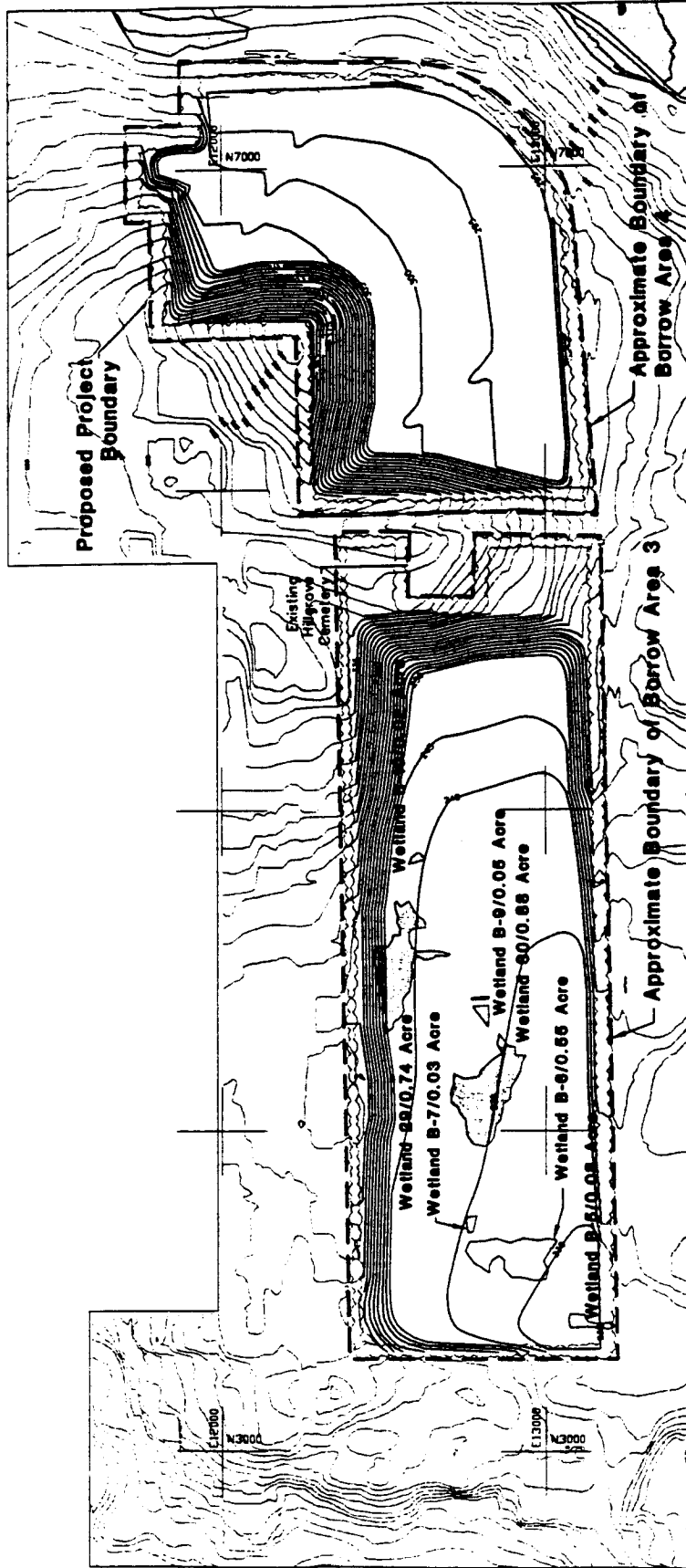


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Figure 3

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Conceptual End of Mining Topographic Map for Borrow Areas 3 and 4 Alternative 1 - Full Utilization of Borrow Area 3



Note: Base map prepared from drawing provided by HNTB entitled "Borrow Site Areas 3 & 4 Grading Plan," dated April 13, 1998.

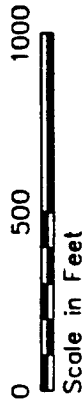


---360--- Proposed End of Mining Elevation Contour in Feet

--- Existing Elevation Contour in Feet

○ Wetlands Delineated by Parametrix (8/98)

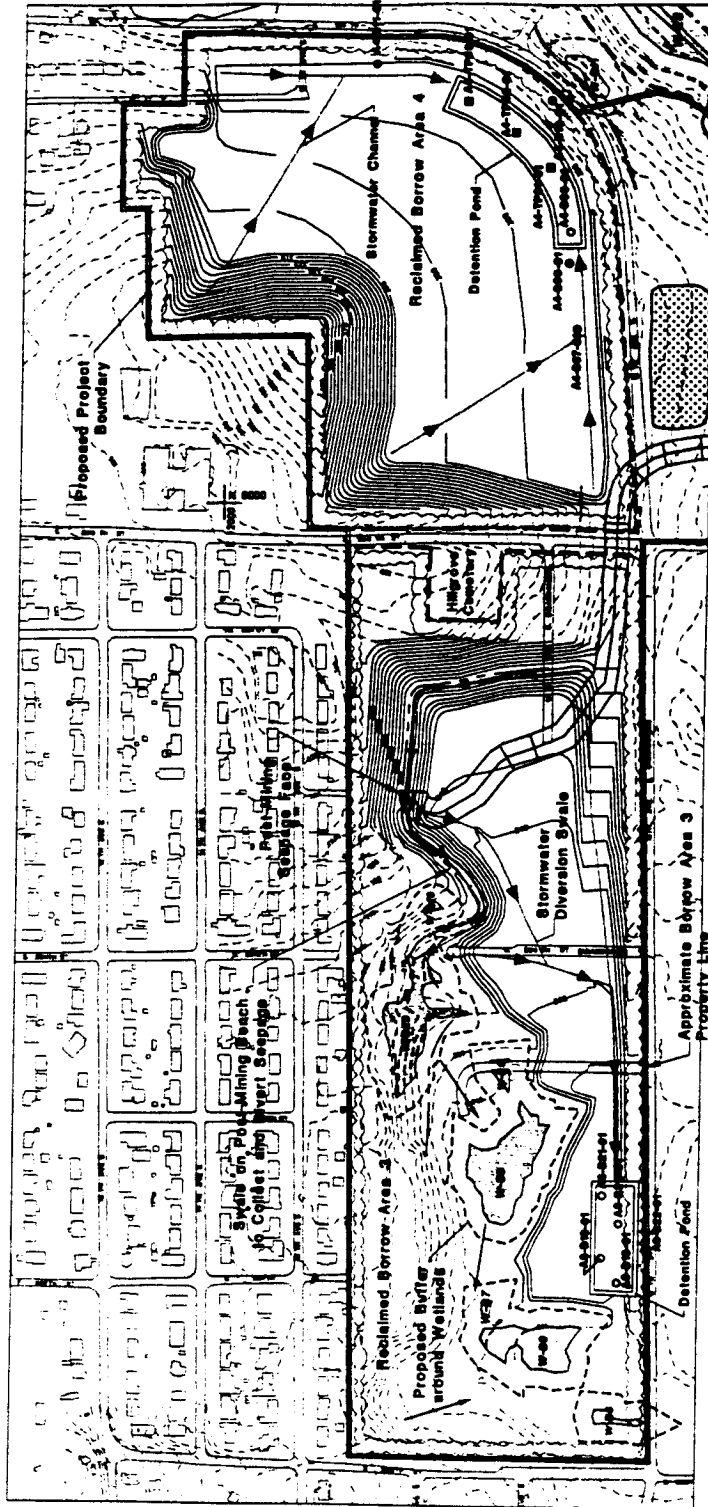
--- Proposed Borrow Development Project Boundary



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 Figure 4


Conceptual End of Mining Topographic Map for Borrow Areas 3 and 4

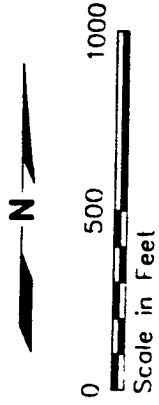
Alternative 2 - Avoidance of Wetlands Impacts & Drainage Swale



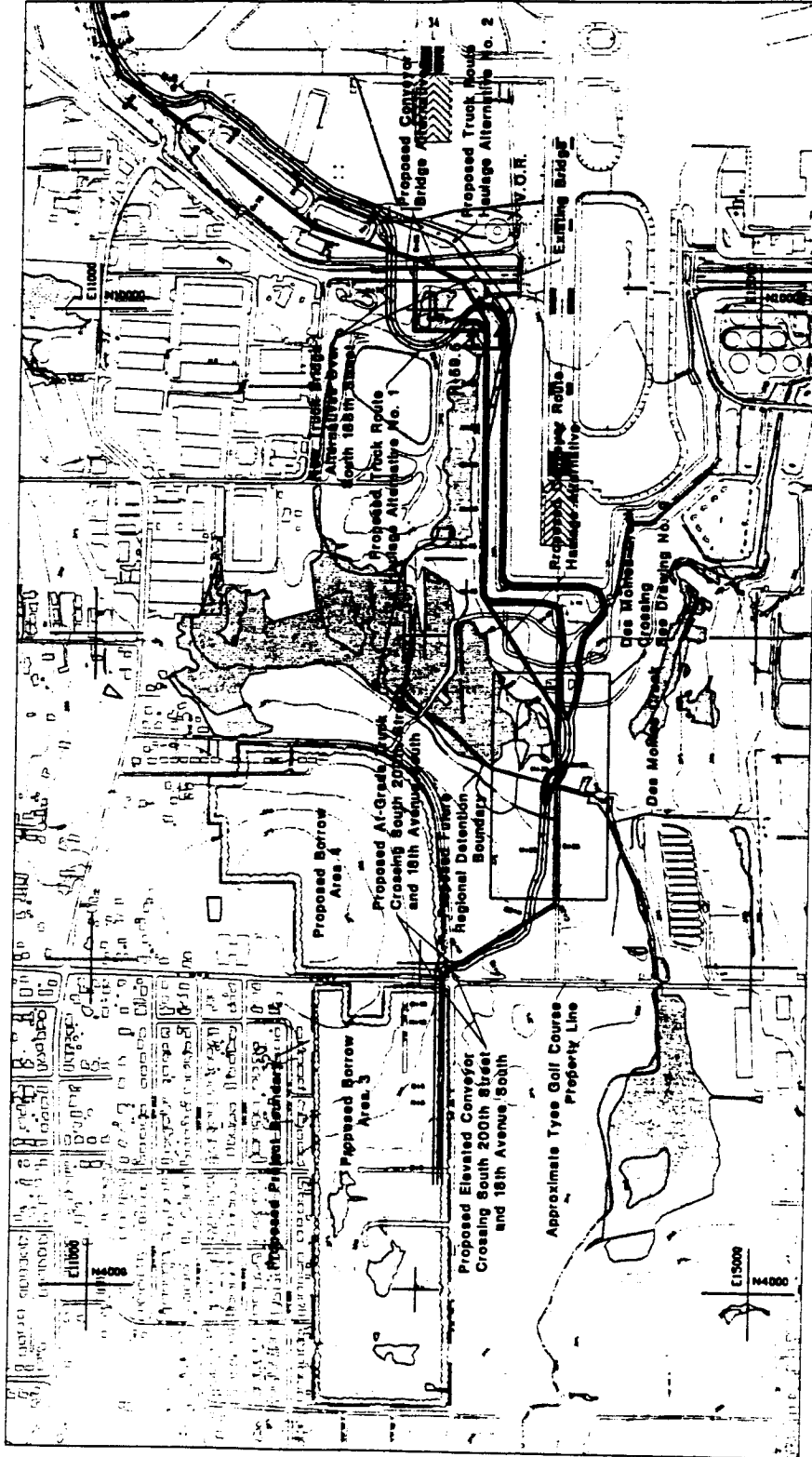
Notes: 1) Base map prepared from drawing provided by HNTB entitled "Borrow Site Areas 3 & 4 Grading Plan", dated April 13, 1998.
2) Drainage swale and property boundaries revised June 22, 2001.

- Proposed End of Mining Contour
- Existing Contour
- Wetlands Delineated by Parametrix (8/98)
- Wetland and Stream Buffer
- Inferred Seepage Face above Perching Layer
- Direction of Surface/Shallow Subsurface Drainage



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Figure 5





Proposed Haulage Routes Map





Note:
 1) 25-foot elevation contours generated from drawing provided by HNTB entitled "Borrow Areas 3 & 4 Grading Plan", dated April 13, 1998.
 2) Wetland delineation prepared from drawing provided by Parametrix entitled, "W_062700.dwg", dated June 27, 2000.


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 Figure 6

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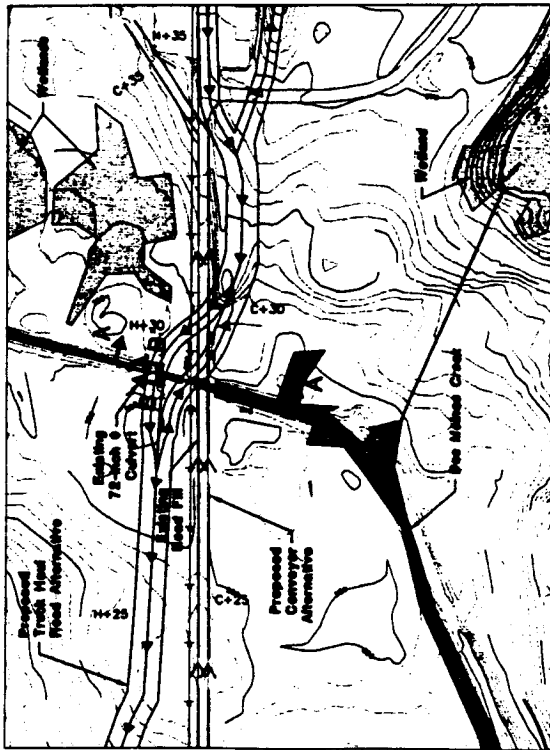
 Wetland Delineated by Parametrix and King County

 RDF Boundary (Flooding extends beyond boundary shown)

 Cross Section Location (See Figure 7)

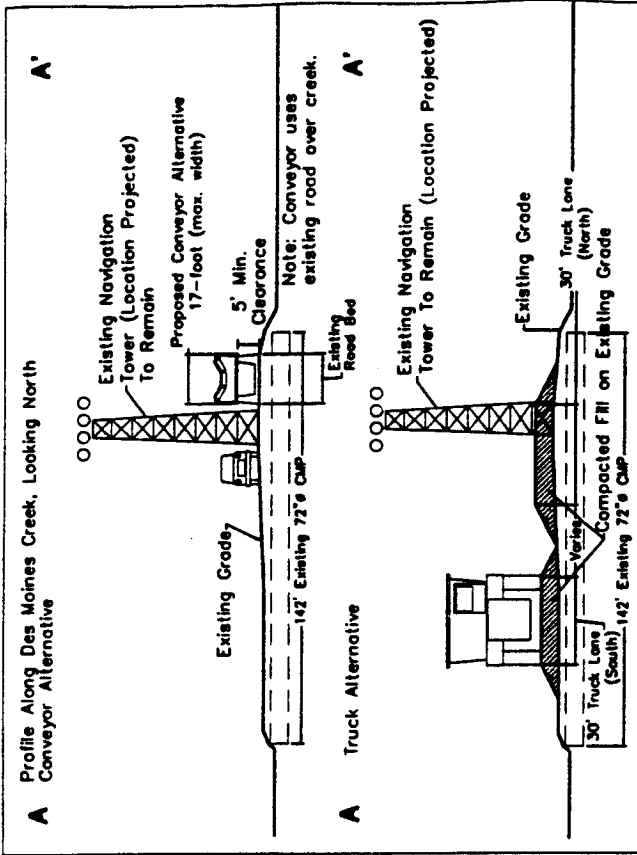
Scale in Feet
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Representative Conceptual Des Moines Creek - Borrow Area Haul Road Crossing Map and Cross Sections

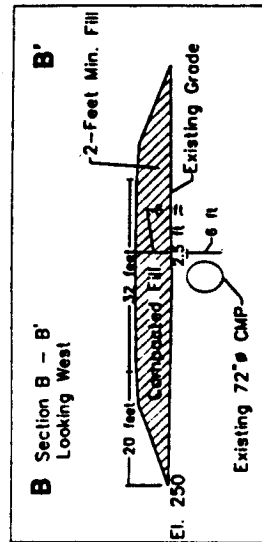


Conceptual Des Moines Creek - Haul Road Crossing Map

Note: Base map prepared from drawing provided by HNTB entitled "Topo_Full.dwg", dated October 4, 1999. Wetland delineation prepared from drawing provided by Parametrix entitled, "W_062700.dwg", dated June 27, 2000.



Conceptual Haul Road Crossing of Des Moines Creek



Conceptual Fill Section at Haul Road Crossing Des Moines Creek

Note: Culvert will be replaced in accordance with "Fish Passage Design at Road Culverts," published March 3, 1999, by Washington Department of Fish and Wildlife.

Borrow Area Haul Route Representative Cross Section At Closest Encroachment to Wetland (Sta H+59.5)

