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January 22, 2013

Alice Kelly
Department of Ecology, Northwest Regional Office

Randel Perry
U.S. Army Corps of Engineers, Northwest Field Office

Tyler Schroeder
Whatcom County, Planning and Development Services

Sent via USPS to:

GPT/BNSF Custer Spur EIS Co-Lead Agencies
c/o CH2M HILL
1100 112th Avenue NE, Suite 400
Bellevue, WA 98004

Re: Scoping Comments on Pacific International Terminals' Proposal to Construct Deep Water Dry Bulk Export Terminal in Cherry Point Management Area

Dear Ms. Kelly, Mr. Perry, and Mr. Schroeder:

We represent Washington Environmental Council, League of Women Voters of Bellingham/Whatcom County, and North Cascades Audubon Society (collectively "Conservation Groups") in the matter of the proposal by Pacific International Terminals/SSA Marine ("PIT") to construct a deep water coal export terminal in the Cherry Point Management Area ("Gateway Pacific Terminal" or "GPT"). On behalf of the Conservation Groups, we submit this letter providing written comments on scoping for the environmental review of the GPT proposal.

As you are aware, the Conservation Groups have been involved in PIT's efforts to construct GPT for over fifteen years. In 1997, the Conservation Groups, along with the Washington Department of Ecology and Washington Department of Fish and Wildlife, appealed Whatcom County's 1997 issuance of the Shoreline Substantial Development Permit for GPT in actions that were consolidated before the Washington Shoreline Hearings Board ("SHB"), SHB Nos. 97-22 and 97-23. Those appeals were ultimately resolved a in 1999 settlement agreement ("1999 Agreement"), to which the Conservation Groups, State Agencies, Whatcom County, and

PIT are parties. The 1999 Agreement, along with appendices, is included as an attachment to this letter.

The 1999 Agreement was primarily designed to address the impacts that GPT (as then proposed) would have on the aquatic environment in Puget Sound. The Conservation Groups remain concerned with the impacts that GPT construction and operation will have on aquatic species, including the Cherry Point herring stock, which has documented spawning habitat in the area where the GPT project is proposed to be located.[1] In the past, the Cherry Point herring stock was the largest herring stock in Washington State; however, it has declined considerably over the last two decades. Pacific herring are highly sensitive to noise, light, and disturbance caused by human activities, and construction and operation of GPT will disrupt herring nearshore movement, schooling, and spawning, impacting the already diminished herring spawning and recruitment success.

The 1999 Agreement contains significant mitigation measures designed to mitigate the potential impacts that GPT construction and operation was expected to have on Cherry Point herring stock and other impacts to the marine ecosystem in Puget Sound. To the best of our knowledge, none of these mitigation measures have been implemented to date. The mitigation measures required by the 1999 Agreement include, but are not limited to, the following:

- GPT must be designed in compliance with the PIT Wetland and Habitat Mitigation Plan set forth in Appendix A of the 1999 Settlement Agreement. 1999 Settlement Agreement, ¶ 2.1.

- GPT must be designed in compliance with requirements to minimize the impacts of the facility on the local macroalgae community. 1999 Settlement Agreement, ¶¶ 2.2.b.1-2.2.b.2. This includes the requirement that PIT construct a macroalgae mitigation site prior to commencement of pier construction, and that pier construction not be initiated for a minimum of one macroalgae colonization cycle following the construction of the mitigation site. 1999 Settlement Agreement, ¶ 2.2.b.1.

- PIT is prohibited from engaging in any in-water pier construction during restricted times for protection of herring spawn and juvenile salmonids. 1999 Settlement Agreement, ¶ 2.2.b.1.

- PIT is required to comply with the Herring Monitoring Program attached to the 1999 Settlement Agreement as Appendix C. 1999 Settlement Agreement, ¶ 2.3.a. This includes both pre- and post-construction monitoring, and implementation of all applicable contingency measures that may be triggered by monitoring results. *Id.* ¶¶ 2.3.b-2.3.d. Such contingencies, if triggered by monitoring, would require PIT to: (1) avoid berthing activities from April 10 through May 20 of each year, which is the herring spawning period; (2) avoid berthing activity from one hour after the beginning of flood tide to one hour after the beginning of the ebb tide during the herring spawning period; (3) conduct additional monitoring and sampling to determine the impacts of GPT operations on herring; (4) implement a specified vessel

[1] The Conservation Groups are concerned with other aspects of the GPT proposal besides its impacts on the aquatic environment, and will be submitting separate comments addressing these other concerns.

movement-herring interaction protocol; (5) modify trestle and/or wharf lighting as necessary to minimize the light case onto the water surface during the herring spawning period; (6) minimize loading activities during the herring spawning period; (7) restrict loading operations to eight-hour periods during the herring spawning period; (8) ensure that all non-critical mechanical equipment on vessels moored at GPT is turned off during the herring spawning period; and (9) conduct post-construction hydroacoustic monitoring to determine which aspects of GPT operations are affecting herring spawn deposition. 1999 Settlement Agreement, Appendix C, at 18-20.

- PIT is required to implement the ballast water monitoring and contingency plan found in Appendix D to the 1999 Settlement Agreement. This would require that vessels intending to call at GPT perform open ocean ballast water transfers in order to greatly reduce the incidence of introduction of non-native organisms to local waters. 1999 Settlement Agreement, ¶ 2.4.

- PIT is required to design, fund, and implement background and annual programs for monitoring sediment, tissue, and water quality in the vicinity of the project site and implement mitigation measures to prevent and address any exceedance of prescribed standards. 1999 Settlement Agreement, ¶ 2.5. The Department of Ecology first approved the required sampling and analysis plan in 2004; however, to the best of our knowledge, PIT has never implemented the approved plan.

- GPT is designed so as to reduce the shading of aquatic vegetation and minimize the potential impacts on migrating juvenile salmonids and herring. 1999 Settlement Agreement, ¶ 2.6. This includes: (1) alignment of the main ship pier trestle in a manner that avoids potential shading of eelgrass and macroalgae, and avoids potential impacts to herring dispersion into the embayment; (2) design of the GPT pier height and piling locations to enhance light refraction and diffusion, particularly in the critical zone from the ordinary high water line out to the -25 tide elevation; (3) incorporation of grating or other light transmission structures along sections of the pier trestle roadway service from the ordinary high water line to the -25 tide elevation; (4) design of a conveyor system that is totally enclosed within a gallery and equipped with automatic shutoff systems to maximize safety of the system and minimize noise and dust; and (6) use of a commercially available light reflective coating on the underside of the pier and trestle over the macroalgae growing zone. *Id.* ¶¶ 2.6.a-2.6.f.

- PIT is required to minimize wave dampening and impacts to littoral drift by appropriate placement and operation of the pier and trestle and maintenance of a log detailing each vessel that utilizes the pier. 1999 Settlement Agreement, ¶¶ 2.7.b-2.7.c.

- PIT is required to use best management practices to avoid and minimize the environmental impacts of GPT construction and operation, including proper stormwater management, scheduling of construction activities to avoid impacts on

salmonid migration and herring spawning, and limits on the number of pilings and the materials used for such pilings. 1999 Settlement Agreement, ¶¶ 2.8.b-2.8.e.

- GPT must be operated in a manner that reduces risks of accidental spills through: (1) preparation an incident response plan prior to construction consistent with applicable federal and state requirements; (2) prohibiting bunkering by vehicle or other fuel transfers of over 1,000 gallons to vehicles using GPT except in emergency situations; (3) acquiring and maintaining rapid deployment heavy spill containment boom sufficient to circle the largest anticipated vessels plus 50%; (4) operating any conveyor systems, including ship loading and unloading systems, to maximize safety of the system and minimize noise and dust; and (5) putting into place operating and safety protocols for each product exported from GPT. 1999 Settlement Agreement, ¶¶ 2.9.a-2.9.d.

- PIT is required to take steps to minimize vessel traffic impacts, including: (1) funding a Department of Ecology study that, prior to commencement of GPT construction, analyzes the impacts to vessel traffic safety resulting from GPT operations and recommends operating protocols to reduce the risk of vessel collisions, groundings, allisions, spills, routine discharges, and other incidents resulting from the operation of GPT; (2) funding an ad hoc advisory marine safety committee that recommends vessel operating protocols and other mitigation measures to reduce risks resulting from increased vessel traffic, which PIT is required to implement prior to commencement of GPT operations; and (3) preparing a tidal current study to be used in the vessel traffic analysis. 1999 Settlement Agreement, ¶¶ 2.10.b-2.10.e. This vessel traffic analysis should include assessment of cumulative impacts, including increased vessel traffic in Puget Sound, the coast of British Columbia, and the Alaska panhandle through Unimak Pass.

- PIT is required to develop safe vessel mooring standard for GPT designed to address specific sea and weather conditions experienced in the Cherry Point area. 1999 Settlement Agreement, ¶¶ 2.11.a-2.11.b.

In evaluating the new GPT proposal, the permitting agencies should include evaluation of an alternative in which PIT complies with all its existing obligations under the 1999 Agreement, including the mitigation measures described above, which PIT and all the other parties agreed were appropriate to protect the marine ecosystem in Puget Sound.

However, the measures imposed by the 1999 Agreement are insufficient to address the expanded GPT proposal because they were designed to address impacts from the much smaller GPT proposal from 1997. PIT now proposes a 54 million metric ton facility (the original proposal was for an 8.2 million ton facility), and also proposes to almost exclusively use GPT to export coal to Asia (coal was not a commodity anticipated by the parties to the 1999 Agreement and not covered by the company's existing permit). Additional mitigation is necessary to address the expanded proposal, including relocation of the GPT wharf by not less than 1,000 feet from the herring migration corridor and schooling area located adjacent to and under PIT's proposed location of the GPT wharf. PIT should also be required to adopt more stringent measures to reduce the impacts of increased coal dust on the aquatic environment.

Even with such additional mitigation, the Conservation Groups oppose the new GPT proposal based on the unacceptable impacts on the aquatic environment from the greatly expanded size of and inclusion of coal as an export product from the terminal. Nonetheless, for purposes of scoping, the Conservation Groups call on the permitting agencies to consider imposing robust mitigation requirements on PIT, including all mitigation required under the 1999 Agreement, as well as additional mitigation to address the expanded scope of the project and the inclusion of coal as the primary export commodity.

Sincerely,

ZIONTZ, CHESTNUT, VARNELL,
BERLEY & SLONIM

Brian C. Gruber
Joshua Osborne-Klein

Attorneys for Washington Environmental Council, League of Women Voters of Bellingham/Whatcom County, and North Cascades Audubon Society

CC: Jeannie Summerhays, Department of Ecology
Bob Everitt, Washington Department of Fish and Wildlife
Bill Lynn, Counsel for PIT

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SETTLEMENT AGREEMENT

This SETTLEMENT AGREEMENT ("Agreement") is made and entered into this _____ day of _____, 19_____, by and between PACIFIC INTERNATIONAL TERMINALS ("PIT"); WHATCOM COUNTY ("County"); the STATE OF WASHINGTON DEPARTMENTS OF ECOLOGY ("Ecology") and FISH AND WILDLIFE ("WDFW") (hereinafter collectively referred to as "the State Agencies"); and NORTH CASCADE AUDUBON SOCIETY, PEOPLE FOR PUGET SOUND, LEAGUE OF WOMEN VOTERS OF BELLINGHAM, OCEAN ADVOCATES, and WASHINGTON ENVIRONMENTAL COUNCIL (hereinafter collectively referred to as "WEC").

RECITALS

WHEREAS, PIT seeks to develop a multi-use ocean going terminal composed of a deep water pier and ocean going barge dock with upland industrial storage and manufacturing facilities to be known as Gateway Pacific Terminal in Whatcom County, in the state of Washington;

WHEREAS, the County granted approval of PIT's applications for a Major Development Permit, MDP No. 92-0003, for development of the upland area, and a Shoreline Substantial Development Permit, SHS 92-0020, for development of the shoreline area;

WHEREAS, WEC and the State Agencies, appealed the County's issuance of the Shoreline Substantial Development Permit in actions now consolidated before the Washington State Shorelines Hearings Board, SHB Nos. 97-22 and 97-23;

WHEREAS, PIT, WEC, the County, and the State Agencies now desire to fully settle and cooperatively resolve all matters concerning this appeal; and

WHEREAS, this Agreement is for the purpose of settling disputed facts and claims among the parties and does not constitute any admission by the parties, except as specifically provided in this Agreement;

AGREEMENT

NOW, THEREFORE, in consideration of the mutual covenants and other consideration contained herein, IT IS AGREED:

1. **Settlement of Pending Appeals.** It is the intent, stipulation, and agreement of the parties that this Agreement constitutes a full and complete disposition of the issues raised in the Pre-hearing Order to the Shoreline Substantial Development Permit appeal, SHB Nos. 97-22 and 97-23. The parties understand, however, that PIT must obtain additional permits, approvals and/or sub-tidal leases beyond these proceedings before it may construct its proposed pier project. Other state and federal agencies, including the United States Army Corps of Engineers and the State Department of Natural Resources, likely will require further study and analysis of environmental impacts and impose further conditions pursuant to their independent regulatory or proprietary authorities before granting approval to this project. Nothing in this Agreement shall be construed as limiting the ability or authority of other state or federal agencies to require further studies or impose conditions in addition to those provided for in the existing Shoreline Substantial Development Permit SHS 92-0020 and this Agreement. Nor shall this Agreement be construed as precluding the Appellants' right to submit whatever input they deem appropriate to other state and federal agencies in connection with these other processes. Notwithstanding

the above, on any issue or subject considered and resolved as part of this Agreement, Appellants shall not take a position contrary to that stated in this Agreement, unless based upon scientific information which the Parties reasonably believe was not available to them when the Agreement was executed or upon a material failure to implement the studies, analysis and environmental protection measures provided for in this Agreement. At least ten (10) days prior to Appellants' taking such a position in any other processes, Appellants' shall send a copy of any new scientific information to PIT.

2. Supplemental Permit Conditions. The County accepts and will incorporate into the existing Shoreline Substantial Development Permit, SHS 92-0020, the supplemental conditions set out in this paragraph ("Supplemental Permit Conditions") as additional mitigation requirements for the proposed Gateway Pacific Terminal development.

2.1. Wetlands. PIT will implement and comply with all of the provisions of the PIT Wetlands and Habitat Mitigation Plan set forth in Appendix A, provided that such plan is approved in final form by the United States Army Corps of Engineers, the State Agencies and the County in accordance with applicable requirements and this agreement.

2.2. Shading Impacts and Post Project Monitoring.

2.2.a. Reduce and Minimize Shading Impacts. Potential shading impacts associated with the pier structure will be further reduced as specified in this section.

2.2.b. Shade Model Group Composition. In order to provide scientific peer review to assess a model (the Shade Model) developed to predict the shading effects from the pier of the proposed project, the Parties formed the Model Group (SMG). The SMG consisted of Brian Williams and Kurt Fresh, Washington Department of Fish and Wildlife; Dr. Tom Mumford, Washington Department of Natural Resources; Dr. Paul Harrison, University of British Columbia, representing WEC; Marc Boulé, Lawrence Spurgeon, and Mark Pedersen, Shapiro and Associates, Inc., developers of the model for the Proponent; Dr. Ron Thom, Battelle Northwest Laboratories; Dr. Annette Olson, University of Washington; and Dr. Tim Nelson, Seattle Pacific University.

2.2.b.1. Pier Construction. The majority of the Shade Model Group has acknowledged that changes to the macroalgae community as a result of altering the available light, coupled with non shade environmental factors, can not be predicted with certainty. To offset this uncertainty, the construction of a macroalgae mitigation site (Phase 1) should be initiated prior to the commencement of pier construction. Pier construction shall not be initiated for a minimum of one macro algae colonization cycle (March 1 through June 15) following the construction of the Phase 1 Macro Algae Mitigation site. The Phase 1 and Phase 2 Macroalgae Mitigation Sites are specified in Appendix B, and shall be located such that pier construction activities will not impact the mitigation sites. Macroalgae colonization of the Phase 1 Macroalgae Mitigation Site shall not be used as a criterion that limits or restricts commencement of pier construction. In addition, in-water pier construction shall not occur during Department of Fish and Wildlife restricted times for protection of herring spawn and juvenile salmonids.

2.2.b.2. Macroalgae Mitigation Plan. PIT will construct and monitor the Phase 1 and Phase 2 (if required) mitigation sites, monitor the project site, and the control site as specified in the PIT Macroalgae Mitigation Plan Appendix B.

2.3. Herring Behavior.

2.3.a. Introduction. The proposed Pacific International Terminal (PIT) project site is within the documented spawning habitat for the Cherry Point herring stock. The State Agencies and WEC are concerned that the proposed trestle/wharf structures and/or the operation of the port facility could disrupt the near shore movement, schooling and spawning of the Cherry Point herring stock in the immediate vicinity of the proposed PIT port facility. The parties have worked cooperatively to develop a monitoring program which is designed to study the interaction of the herring stock at Cherry Point in relation to the PIT port facility and identify structural and operational contingencies which will be implemented by PIT in the event that significant disturbances are discovered. The monitoring program shall be referred to as the Herring Monitoring Program and is attached hereto as Appendix C. The Herring Monitoring Program is fully incorporated into this Agreement and is an essential condition thereof.

2.3.b. Implementation of Herring Monitoring Program. PIT will implement the pre-construction and post-construction monitoring provided for in the Herring Monitoring Program. Such monitoring shall proceed in accordance with the Survey Methods provided for in the Herring Monitoring Program. Monitoring will be performed by consultants approved by WDFW, in consultation with WEC. PIT will fund the entire cost of implementing the Herring Monitoring Program, including the purchase or lease of any necessary equipment and the compensation of WDFW approved consultants.

2.3.c. Monitoring Results. No later than 90 days after each season's monitoring activities, PIT's consultants shall distribute a draft monitoring report to the State Agencies and WEC for review and comment. The report shall contain a description of the monitoring activities conducted, the results of the monitoring, and an evaluation of whether any Significance Thresholds have been reached.

2.3.d. Contingency Measures. PIT will implement all applicable Contingencies provided for in the Herring Monitoring Program (Appendix C) if WDFW determines that a Significance Threshold described in the Herring Monitoring Program has been reached. In making such a determination, WDFW shall review PIT's draft report and consult with WEC.

2.3.e. Additional Mitigation. If after implementation of all applicable contingencies provided for in 2.3.d. above, the monitoring program finds continued significant impacts to herring behavior, then the parties will meet and confer to develop and implement a plan for additional mitigation measures to prevent, avoid or mitigate such impacts. Nothing in the Herring Monitoring Program or this Agreement shall in any way limit the ability of WDFW to impose additional requirements under its statutory authority if necessary to prevent significant impacts to the Cherry Point herring stock.

2.4. Ballast Water Monitoring System. PIT agrees to comply with the attached plan for initiating and operating a vessel ballast water monitoring and contingency system. This system requires vessels intending to call at Gateway Pacific Terminal to perform open ocean ballast water transfers in order to greatly reduce the incidence of introduction of non-native organisms to local waters. See Appendix D.

2.5. Sediment, Tissue, and Water Quality Monitoring. PIT will fund annual sampling of sediments, marine water and shellfish and/or other identified indicator species in the vicinity of the project site in accordance with the State Sediment Management Standards/Sediment Sampling and Analysis Plan Appendix and the Puget Sound Estuary Program 1996 Protocols. PIT shall develop and submit for review and approval to the State Agencies a plan for sediment, marine biota (caged mussels and herring embryo) and water quality sampling and monitoring. The plan shall include background and annual sampling commencing on the effective date of this settlement in accordance with protocols, sampling design guidance and a schedule provided by Ecology. The background sampling design shall provide a scientifically sound basis for establishing existing pollutant levels and related biological conditions in the proposed Department of Natural Resources lease area for, at a minimum, the following parameters identified in Appendix E. The annual sediment sampling design shall provide a scientifically sound basis for comparison of the background data to the annual results in order to detect changes or trends in the samples over the long term. All sampling and monitoring shall be done by a contractor approved by the Parties. If, due to project operations, pollutant concentrations exceed the action levels set forth in Appendix E (and the state agencies determine that facility construction or operations have caused or contributed to such exceedences), PIT will implement all mitigation measures which the State Agencies reasonably determine to be necessary to compensate for such impact and to prevent and avoid such exceedences in the future.

2.6 Pier Design. PIT shall reduce the shading of aquatic vegetation and the potential impacts on migrating juvenile salmonids and/or herring through the following mitigation actions:

2.6.a. Ship Pier Trestle Alignment. PIT has aligned the main ship pier trestle in a manner that avoids potential shading of eelgrass and reduces potential shading of attachment macro algae species and avoids potential impacts to herring dispersion into the embayment. The final design of the ship pier trestle alignment shall be submitted to the State Agencies for review for consistency with applicable requirements and this agreement prior to construction.

2.6.b. Mapping. PIT has provided the State Agencies with accurate maps of the current location and area coverage of the *Zostera marina*, and attachment macro algae. The mapping includes an overlay of the location of the proposed pier that demonstrates the potential shading impact. In accordance with Appendix B, such mapping shall be updated within two (2) years of commencement of project construction activities. All relevant aerial photographic data shall be incorporated. The purpose of such mapping shall be to provide an accurate baseline by which to base and compare post project monitoring.

2.6.c. Pier Trestle Height and Piling Configuration. PIT has designed the pier height and piling locations to enhance light refraction and diffusion under and around the structures, in particular in the critical zone from the ordinary high water line out to the -25 tide elevation (MLLW= 0.00). The height of the pier trestle at MLLW will be approximately 37.3 feet above MLLW and the final design of the pier trestle height and piling configuration shall be reviewed for consistency with applicable requirements and this agreement by the State Agencies.

2.6.d. Use of Grating. PIT shall ensure maximum light passage to the water. The pier design shall incorporate grating or other light transmission structures along sections of the pier trestle roadway surface from the Ordinary High Water Line (OHW) to the -25 tide elevation (MLLW = 0.00). PIT will select a grating or other light transmission structure that maximizes the open space element while minimizing the thickness of the grating and operational environmental impact. A plan for use of

grating or other light transmission structure must be submitted for review for consistency with applicable requirements and this agreement by the State Agencies.

2.6.e. Conveyer and Piping Design. PIT shall design and construct any conveyor system to be totally enclosed within a gallery and shall equip the gallery with automatic shut off systems to maximize safety of the system and minimize noise and dust. The final design of any conveyer and gallery shall be reviewed for consistency with applicable requirements and this agreement by the State Agencies prior to construction.

2.6.f. Light Reflective Design. PIT agrees to use a commercially available light reflective coating on the underside of the pier and trestle over the macroalgae growing zone.

2.7 Littoral Drift and Wave Dampening.

2.7.a. Wave Analysis. PIT has provided a wave analysis of littoral drift and wave dampening for review with applicable requirements and this agreement by the State Agencies. The State Agencies acknowledge that the studies provided by PIT to date, taken together with required monitoring, represent a significant contribution to the overall effort envisioned for the Cherry Point Reach. Given due consideration for existing studies and ongoing efforts, PIT shall cooperate with the State agencies and participate, in a financially proportionate manner, in a Cherry Point reach-wide monitoring study of wave dampening and littoral drift. Notwithstanding the above, PIT shall not be required to participate in a Cherry Point reach-wide monitoring study of wave dampening and littoral drift if it decides not to build the pier.

2.7.b. Barge and Ship Pier and Trestle Location. PIT shall avoid wave dampening and impacts to littoral drift by appropriate placement and operation of the pier and trestle. Existing studies have predicted that the location, construction, and design of the pier and trestle will not significantly impact littoral drift or wave dampening. A portion of the study described in subsection "a" above will be focused on verification of the predicted wave dampening and littoral drift impacts. Final construction plans shall be reviewed, revised (if warranted) and reviewed for consistency with applicable requirements and this agreement by the State Agencies in consideration of the most up-to-date scientifically sound data regarding wave dampening and littoral drift.

2.7.c. Vessel Traffic Log. PIT shall maintain a log detailing each vessel that utilizes the pier, including the vessel's tonnage, length width and primary cargoes, the time spent at the dock and at anchorage in the vicinity, the location docked or anchored, and the initial, final and average draft of the vessel and any initial, periodic and final stability calculations performed by the vessel. A copy of the log shall be supplied to Ecology on a quarterly basis and Ecology shall have access to the electronic version of the database maintained by PIT upon reasonable notice.

2.8 Facility Construction.

2.8.a. Best Management Practices. PIT has committed to using best management practices and has submitted draft plans to avoid and/or minimize the environmental impacts of construction and build-out. The final plan shall be reviewed for consistency with applicable requirements and this agreement by the State Agencies.

2.8.b. Construction Permits. PIT will obtain all necessary building permits, stormwater permits, and fill and grade permits and state approvals prior to upland site improvement construction.

2.8.c. Stormwater Runoff Calculations and Management Plan. PIT site development will be pursuant to the Stormwater Management Plan developed in accordance with Whatcom County standards, including the Whatcom Development Standards. In addition, the Stormwater Management Plan shall be developed in accordance with the Department of Ecology Stormwater Guidelines and Appendix F of this Agreement. Prior to construction, the Stormwater Management Plan, including the stormwater runoff calculations, shall be submitted to the State Agencies for their review for consistency with applicable requirements and this agreement. See Appendix F for specific requirements and objectives for stormwater management, as summarized by the Department of Ecology.

2.8.d. Pier Trestle Construction Scheduling. PIT shall submit a plan to the State Agencies with a schedule for pier trestle construction activities that avoids or minimizes the impacts of construction on juvenile salmonid migration, herring spawning, and any other fish and wildlife reproductive activities at the project site. In any event, PIT shall not conduct any construction activities below the ordinary high water line during the herring spawning season between March 15 and June 15 or as determined otherwise by WDFW. The plan shall be reviewed for consistency with applicable requirements and this agreement by the State Agencies.

2.8.e. Pier and Trestle Construction Methods. PIT will construct the piers and trestle on pilings. Only concrete, steel, or recycled plastic piling shall be used. PIT will minimize the number of piles driven in accordance with reasonable design standards and with the design conditions in paragraphs 2.3 and 2.4 above.

2.9 Facility Operations.

2.9.a. Spill Prevention, Preparedness and Response Plans. PIT shall prepare an Incident Response Plan prior to construction of the piers addressing construction and operational spills. The Incident Response Plan shall address applicable provisions of 33 C.F.R. Part 154 and be submitted to Ecology for review for consistency with applicable requirements and this agreement. PIT shall record the approved Incident Response Plan with the County prior to beginning construction. The Incident Response Plan shall identify all applicable requirements, responsible agencies, establish detailed internal and external spill reporting requirements; and it shall be updated annually. PIT agrees to not allow bunkering by vehicle or other fuel transfers of over 1,000 gallons to vessels using their pier or terminal, except in emergency situations authorized in writing in advance by DOE on a case-by-case basis. For fuel transfers of 1,000 gallons or less, DOE shall be sent prior written notification identifying the party, schedule and circumstance. DOE reserves the right to limit or prohibit any and all fuel transfers as a result of monitoring and/or observations indicating related adverse impacts.

2.9.b. Spill Response Equipment. In order to provide an immediate response capability for routine operational spill response from the facility and vessels, PIT agrees to acquire and maintain a rapid deployment heavy spill containment boom sufficient to circle the largest anticipated vessel plus 50%. The boom shall be stored on the dock at a location convenient for its rapid deployment. PIT agrees that dock personnel shall be equipped and thoroughly trained for rapid boom deployment including annual drill and training in conjunction with Ecology.

2.9.c. Conveyer and Piping. PIT shall operate any conveyor system, including ship loading or unloading systems to maximize safety of the system and minimize noise and dust under Best Management Practices, including Best Available Control Technology.

2.9.d Operating Protocols. PIT shall develop and put into place operating and safety protocols for each product, for both storage and transfer prior to vessel use of the piers. The protocols shall address facility/vessel pre-transfer conferences, vessel calculations for loading stability, terminal watch keeping, terminal cargo inspections and shall be integrated with the emergency procedures required in the "Spill Prevention, Preparedness, and Response Plans" section above. The operating and safety protocols shall be submitted for review for consistency with applicable requirements and this agreement by the Department of Ecology.

2.9.e. Regardless of other operating protocols, no vessels shall be moored or operated at the facility landward of the -25 tide elevation (MLLW = 0.00).

2.10. Navigation.

2.10.a. Vessel Traffic Analysis. Pursuant to RCW 43.21I.030(3), Ecology shall oversee a Vessel Traffic Analysis which describes the current environment in detail and models the changes and impacts to vessel traffic safety and the environment resulting from the operation of the GPT facility and recommends operating protocols that will reduce, to the greatest extent feasible, the risk of vessel collisions, powered and drift groundings, allisions, spills, routine discharges and other incidents resulting from the operation of the GPT facility. The scope of the vessel traffic analysis is more fully described in Appendix G. The analysis shall be performed by Jack Herrald Ph.D. and Captain Jim Townley USCG (ret.) as independent third party consultants under contract with PIT. Ecology shall appoint a technical staff to oversee the study. PIT will fund the entire cost of the Vessel Traffic Analysis, including reasonable administrative costs incurred by Ecology. The study shall be completed six months prior to the initiation of construction of the facility including the pier or wharf.

2.10.b. Vessel Safety Committee. Pursuant to RCW 43.21I.030(2) and 88.46.200, Ecology shall appoint an ad hoc, advisory marine safety committee ("Committee"). PIT will reimburse Ecology for all reasonable and necessary Committee expenses. Membership on the Committee will be open to at least one representative from Department of Fish and Wildlife, Department of Ecology, the Washington Environmental Council, Whatcom County and PIT, the Puget Sound Pilots Association and representatives of other Cherry Point industries as well as other interested parties selected by the Department of Ecology. On the basis of the Vessel Traffic Analysis and other pertinent information, the Committee shall recommend revised vessel operating protocols and other mitigation measures, not inconsistent and to be coordinated with operating protocols required of other Cherry Point industries. In addition, such operating protocols shall be as effective as the "state of the art" operating protocols within the shipping and terminal industry, which shall, to the greatest extent feasible, reduce the vessel traffic risk resulting from the operation of the GPT facility. To the extent feasible, the Committee's work and membership will be integrated with a broad North Puget Sound Risk Management analysis effort. In developing operating protocols and other mitigation measures, the Committee will give great weight to the recommendations of the Vessel Traffic Analysis provided for in the preceding paragraph.

2.10.c. Implementation of Mitigation. PIT will immediately implement operating protocols and mitigation measures recommended by the Committee which involve on-site operations and do not require a formal rulemaking to be effective. If appropriate Ecology will initiate a rulemaking to consider the incorporation of off-site operating protocols and mitigation measures recommended by the

Committee into the regional marine safety plan provided for in RCW 88.46.200. Ecology shall complete the rulemaking prior to the date of projected pier operations. The parties to this Agreement agree to make good faith efforts to support the adoption by Ecology of the off-site operating protocols and mitigation measures recommended by the Committee.

2.10.d. Timing of Pier Operations. Operation of the GPT facility will not commence until PIT implements the on-site operating protocols and mitigation measures recommended by the Committee.

2.10.e. Tidal Current Study. PIT shall prepare and file with the County a tidal current study which shall be developed in consultation with interested stakeholders such as the Washington State Pilots Association, treaty and non-treaty commercial fishermen's groups, and adjacent shoreline industries. The tidal current study shall be prepared in time for utilization and incorporation in the Vessel Traffic Analysis provided for in paragraph 2.10.a. and shall be reviewed for consistency with applicable requirements and this agreement by the State Agencies.

2.11. Vessel Mooring Study and Plan.

2.11.a. PIT agrees to hire a marine engineering consultant to review the report developed by oil terminal operators in San Francisco Bay at the request of the California Lands Commission relating to vessel mooring standards. This report establishes safe vessel mooring standards, configurations and procedures to be used by vessels visiting the docks under differing tidal current and wind conditions to prevent mooring hawser failure and subsequent drift loss of the vessels. The report establishes specific mooring hawser standards and configurations for each class of vessels that visit the docks. The report also requires that product transfer operations be scaled back or shutdown during certain inclement weather and sea state conditions that may place the operation at risk.

2.11.b. After review of the California study, PIT's marine engineering consultant will prepare a draft report establishing safe vessel mooring standards, configurations and procedures for the PIT dock. The standards and procedures will be specific to the sea and weather conditions experienced in the Cherry Point area and address each class of vessels that will visit the facility. The report will also recommend provisions for real-time wind and current data acquisition at the dock with telemetry to the primary control station and appropriate alarms. The draft report shall be submitted to Ecology for review for consistency with applicable requirements and this agreement 6 months prior to the first anticipated vessel moorage at the dock. PIT agrees to fully implement the standards and procedures contained in the final approved report through its dock and terminal operations plan and through requirements placed on visiting vessels. PIT further agrees to update the plan every 5 years after initial approval.

2.12 Public Access and Aesthetics. PIT has determined that it will convey to Whatcom County for park and conservation purposes the lands depicted in Appendix H under the terms and conditions of the conveyance document included in Appendix H. All the parties hereto acknowledge that said agreement to convey is voluntary in all respects and was not required by any party as a prerequisite for settlement of the appeals referred to in this agreement. Nothing in this agreement shall be construed as affecting the state's rights under the public trust doctrine.

2.13 Voluntary Funding. PIT further agrees to pay the Department of Ecology or any designee, $50,000.00 within thirty (30) days following commencement of construction of its marine structures for its ocean-going terminal at Cherry Point. In addition, PIT will pay Department of Ecology or its designee $10,000.00 per year for a total of five (5) years. The payment of these yearly installments

shall commence thirty (30) days following substantial completion of the park described above. The subsequent four (4) installments shall be made upon the yearly anniversary of the payment of this first installment.

3. **Environmental Appellants' Interests.** PIT and the State Agencies shall provide WEC with the results of all monitoring conducted pursuant to this Agreement and copies of all logs, reports, plans or other documents required to be submitted to the State Agencies. Within 10 days of the execution of this Agreement, WEC shall designate one representative to receive these documents. Upon the request of WEC, the parties to this Agreement will meet and confer to discuss the need for additional mitigation measures to prevent, avoid or mitigate unanticipated environmental impacts. The parties agree to make good faith efforts to resolve disputes over the need for additional mitigation measures before regulatory action is taken by the State agencies. The procedures for resolving disputes between the WEC and PIT over the implementation of this Settlement Agreement shall be governed by a separate agreement between PIT and WEC.

4. **Whatcom County Plan Amendments.**

4.a. WEC, the State Agencies and the Whatcom County Administration agree to actively support an amendment to the Whatcom County Shoreline Master Program (SMP) which would prohibit additional on-water port development occurring within the Cherry Point Management Area, with the exception of the PIT project and existing piers. The amendment to the SMP that will be proposed to accomplish these objectives shall be substantially in the form contained in Appendix I. The proposed SMP amendment shall be processed in accordance with WAC chapter 173-26 and other applicable law. The WEC, State Agencies and Whatcom County agree to support the proposed SMP amendment and to work cooperatively towards its adoption by the governmental entities by actions that will include, but are not limited to, letters and testimony in support of the amendment.

4.b. WEC, the State Agencies and the Whatcom County Administration agree to actively support an amendment to the Whatcom County Comprehensive Plan (Comp. Plan) which would prevent further on-water port development in the Cherry Point Management, with the exception of the PIT project and existing piers. The amendment to the Comp. Plan that will be proposed to accomplish this objective shall be substantially in the form contained in Appendix J. The proposed Comp. Plan amendment shall be processed in accordance with the applicable Whatcom County Code provision and other applicable law. WEC and the State Agencies agree to support the proposed Comp. Plan amendment and to work cooperatively towards its adoption by Whatcom County , by actions that will include, but are not limited to, letters and testimony in support of the amendment.

4.c. The Whatcom County Administration agrees to initiate the above amendment processes within sixty days of signing this settlement and to support and process the proposed SMP and Comp. Plan amendments in good faith, and will submit a final decision to the Department of Ecology according to the agreed upon public process and schedules set forth in Appendix K. The Department of Ecology and the County will fully comply with the public comment and participation requirements of RCW Chapter 34.05 and WAC Chapter 173-19.

4.d. The Department of Ecology agrees to consider and process the County's submittal on the proposed SMP amendment in good faith and according to the agreed upon process and schedules set forth herein and in Appendix K. The Department of Ecology will determine whether the County's submittal is consistent with the Shoreline Management Act.

4.e. The non-governmental parties and WDFW agree not to appeal the approval of the proposed SMP and Comp. Plan amendments if they are approved in substantially the form attached hereto as Appendices I and J.

4.f. All the parties acknowledge that PIT has not sought to alter Whatcom County's or other jurisdictions' development regulations so as to affect other land owners in the vicinity of PIT. Any participation by PIT or support of proposed development regulation modification, is at the behest of the other parties to this agreement.

5. General Provisions.

5.a. PIT accepts and shall comply with all of the Supplemental Permit Conditions set out in paragraph 2 above in development of the PIT project. In the event of conflict between the provisions of this agreement and any additional agreements, permits or other regulatory approvals, or the provisions of State and federal law or regulations the most restrictive provision shall control.

5.b. Regional Herring and Salmonid Studies. PIT agrees to participate with the State Agencies in the region-wide herring and salmonid studies and analysis described in Appendix L provided that:

1. the studies and analysis required by this settlement agreement may be acknowledged as a portion of the overall participation effort for the region-wide studies and analysis, and
2. the studies and analysis described in Appendix L may be changed by the State Agencies following input and further discussion with, WEC, other state and federal agencies, and other Cherry Point industries, and
3. PIT is not committed to participate in these studies unless it decides to construct and operate its ocean-going terminal at Cherry Point.

5.c. Regional Risk Assessment. PIT will cooperate and participate in a risk assessment, including an evaluation of cumulative impacts from development, coordinated by the State Agencies, provided that:

1. any studies, analysis or information required by this settlement agreement may be acknowledged as a portion of the overall participation effort for the region-wide risk assessment, and
2. the risk assessment described in Appendix L may be changed by the State Agencies following input and further discussion, WEC, other state and federal agencies, and other Cherry Point industries, and
3. PIT is not committed to participate in this risk assessment unless it decides to construct and operate its ocean-going terminal at Cherry Point.

5.d. PIT acknowledges that it has been informed by DNR that the processing and ultimate decision on an aquatic lease likely will depend in substantial part on the successful undertaking of these regional studies and the independent review of the project and its environmental impacts undertaken by the Commissioner of Public Lands and Department of Natural Resources taking into consideration the results of these regional studies.

5.e. The State Agencies and WEC shall dismiss with prejudice their petition for review (SHB No. 97-23) upon entry of this settlement agreement.

5.f. The County shall incorporate by reference all the Supplemental Permit Conditions set forth in this Agreement in the revised Shoreline Permit for the PIT project as provided in Part 2 above.

5.g. The State Agencies shall proceed cooperatively and expeditiously with necessary review and processing of the additional permits required for the Gateway Pacific Terminal project.

5.h. The parties agree that in carrying out the terms of this Agreement, they are operating in a relationship of trust and confidence and, except as provided herein, have neither done, nor will do, any acts that will diminish the value of this settlement Agreement to the other parties in any way or the ability of the parties to obtain the benefits of this Agreement.

5.i. Appendices A – L attached hereto, form a part of this Agreement and are incorporated by reference for all purposes. This Settlement Agreement and the attached Appendices and Exhibits incorporated by reference represent the entire agreement and understanding of the parties.

5.j. This Agreement shall be binding on and inure to the benefit of the parties, as well as their successors and assigns.

5.k. Except where expressly so designated, the terms of this Agreement are contractual and not mere recitals.

5.l. The parties recognize that this Agreement constitutes full, final, and complete settlement of this shoreline substantial development permit appeal by the parties and acknowledge that they have had the benefit of legal counsel concerning the effect of this Agreement. The persons executing this Agreement on behalf of the respective parties identified represent that they have full and approved authority to fully and completely bind the parties and the parties' officers, directors, successors, assigns, and employees to this Agreement for all purposes.

5.m. This Agreement does not affect the rights of any parties not signatory to this Agreement.

5.n. This Agreement may be executed in counterparts and is effective as to all parties upon the date of signature of the party last to sign.

PACIFIC INTERNATIONAL TERMINALS

By: _____
Its: _____

WHATCOM COUNTY

By: _____
Whatcom County Council Chair

WHATCOM COUNTY

By: _____
Whatcom County Executive

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: _____
Tom Fitzsimmons, Director

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE

By: _____
Jeff Koenings, Phd., Director

NORTH CASCADE AUDUBON
SOCIETY

By: _____
Its: PRESIDENT

PEOPLE FOR PUGET SOUND

By: _____
Its: _____

LEAGUE OF WOMEN VOTERS OF
BELLINGHAM

By: _____
Its: _____

OCEAN ADVOCATES

By: _____

WHATCOM COUNTY

By: _____
Whatcom County Executive

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: _____
Tom Fitzsimmons, Director

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE

By: _____
Jeff Koenings, Phd., Director

NORTH CASCADE AUDUBON
SOCIETY

By: _____
Its: _____

PEOPLE FOR PUGET SOUND

By: _____
Its: Executive Director

LEAGUE OF WOMEN VOTERS OF
BELLINGHAM

By: _____
Its: _____

OCEAN ADVOCATES

By: _____

Its: _____

WASHINGTON ENVIRONMENTAL COUNCIL

By: _____

Its: President

WHATCOM COUNTY

By: _____
Whatcom County Executive

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: _____
Tom Fitzsimmons, Director

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE

By: _____
Jeff Koenings, Phd., Director

NORTH CASCADE AUDUBON
SOCIETY

By: _____
Its: _____

PEOPLE FOR PUGET SOUND

By: _____
Its: _____

LEAGUE OF WOMEN VOTERS OF
BELLINGHAM

By: _____
Its: _____

OCEAN ADVOCATES

By: _____

APPENDIX A

Preliminary Wetland Mitigation Plan for the Gateway Pacific Terminal Project

Prepared for:

Pacific International Terminals
1801 Roeder Avenue, Suite 156
Bellingham, WA 98225

Prepared by:

Aqua-Terr Systems, Inc.
1999 Gripp Road
Sedro Woolley, WA 98216

March, 1996

1.0 EXECUTIVE SUMMARY

The subject parcel is located within unincorporated Whatcom County, east of the City of Ferndale (within Sections 17, 18, and 19 of Township 39 North, Range 1 East of the Willamette Meridian) (Figure 1). The total acreage of the Gateway Pacific Terminal (GPT) property is 1,092, but only the 60 acre area south of Henry Road and a 65 foot wide proposed rail connection was investigated (totaling approximately 100 acres). This is the area that will be impacted by the project and was the original area reviewed by Aqua-Terr Systems, Inc. (ATSI) (ATSI 1995). Additional areas were investigated for mitigation of impacted wetlands.

The proposed project calls for the construction of a deep-water, multi-use, bulk and other cargoes, import and export facility. This property is one of only a few locations along the west coast of the United States where large transport ships can easily maneuver close to shore and is adjacent to a shoreline that can accommodate dry bulk storage and rail loops for ship to rail transport.

The entire area is a mix of forest, abandoned shrub dominated fields, and agricultural fields still in use. The terrain ranges from flat to gently rolling, except a ravine on the southeast portion of the site with moderate slopes, and moderate to steep bluffs along the shoreline. An unnamed seasonal stream is associated with the ravine.

Palustrine emergent, scrub-shrub, and forested wetlands are located in the proposed impact area for this project (ATSI 1995). The wetlands meet all three wetland parameters, but by differing degrees. In general, all on-site wetlands display a predominance of hydric vegetation, hydric soils displaying low chromas and mottling, and soils with wetland hydrology field indicators such as oxidized root channels. The proposed project plan requires filling 5.85 acres of wetlands on this parcel. Of the 5.85 acres proposed to be filled, 4.30 acres are farmed seasonally saturated palustrine emergent wetlands, 1.45 acres are seasonally saturated palustrine scrub-shrub wetlands, and 0.1 acres are seasonally saturated palustrine forested wetlands.

This mitigation project will directly and indirectly compensate for lost wetland acreage and function. **Five goals** have been established for the mitigation project. The **first** goal is to create 5.9 acres of seasonally saturated palustrine forested/scrub-shrub wetland to provide a 1:1 areal replacement ratio with greater functional value for wetlands filled. The **second** goal is to enhance a 16.2 acre monotypic stand of reed canarygrass into a diverse palustrine forested wetland habitat. The **third** goal is to assure the protection of the on-site stream corridor by placing the stream channel and the associated riparian area in a conservation easement recorded on the property deed (this encompasses approximately 50 acres). The **fourth** goal is to conduct a study on a designated 1.5 acre plot researching the natural regeneration of vegetation within seasonally saturated, palustrine emergent agricultural fields and also investigating the success of selected facultative upland and facultative wetland plants planted over a range of hydrogeomorphic regimes. The **fifth** goal is not directly related to wetland disturbance but addresses cultural functions lost on a regional basis. This goal will provide compensation for the local loss of natural resources, in this case western red cedar trees, important to the Lummi Indian Tribe's culture heritage.

In summary, compensation for filling 5.85 acres of predominately farmed palustrine emergent wetlands, 5.9 acres of palustrine scrub-shrub and palustrine forested wetland will be created, 16.2 acres of low grade palustrine emergent wetland will be enhanced, a 50 acre riparian corridor will be placed in a conservation easement, a research project on wetland ecology will be funded, and cultural resources important to the Lummi Indian Tribe will be provided.

2.0 PROJECT DESCRIPTION

2.1 Project Location

The total acreage of the Gateway Pacific Terminal (GPT) property is 1,092 (+/–), but only the 60 (+/–) acre area south of Henry Road and a 65 foot wide proposed rail connection (totaling approximately 100 acres) was investigated. This is the area that would be impacted by the project and was the original area reviewed by ATSI. Additional areas were investigated for mitigation of impacted wetlands.

The parcel lies within unincorporated Whatcom County, east of the City of Ferndale (within Sections 17, 18, and 19 of Township 39 North, Range 1 East of the Willamette Meridian) (Figure 1). Figure 2, a 1987 aerial photograph, and Figure 3, a map of the delineated wetlands within the impact area, show the size and location of the project site. The site is bordered on the north and west by the ARCO oil refinery, to the east by farms, wooded acreage and State of Washington Department of Natural Resources Trust Lands, and to the south by the Strait of Georgia. This portion of the County, including the subject parcel, is zoned Heavy Industrial. Surrounding land uses include: ARCO and TOSCO oil refineries, INTALCO's aluminum plant, rural residential, agricultural, and wooded tracts used for timber. Several roads border or pass through the property including: Aldergrove Road to the north, Gulf (Powder Plant) Road to the east, and Henry Road through portions of the south. Lonseth Road also passes east–west near the center of the property. Several decaying sheds, old foundations from farm houses and outbuildings are located south of Henry Road and near the intersection of Aldergrove and Gulf Roads.

The entire area is a mix of forest, abandoned shrub dominated fields and agricultural fields still in use. The terrain ranges from flat to gently rolling, except a ravine on the southeast portion of the site with moderate slopes, and moderate to steep bluffs along the shoreline. An unnamed seasonal stream is associated with the ravine.

2.2 Responsible Parties

Jeff Kaspar
Gateway Pacific Terminal
1801 Roeder Avenue, Suite 156
Bellingham, Washington 98225

2.3 Description of Project and History

The proposed project is for the construction of a deep–water, multi–use, bulk and other cargoes, import and export facility. This property is one of only a few locations along the west coast of the United States where large transport ships can easily maneuver close to shore and is adjacent to a shoreline that can accommodate dry bulk storage and rail loops for ship to rail transport. The southerly 60 acre portion of the subject parcel will be the most heavily impacted. The other areas in Figures 2 and 3 will be impacted by the rail line only.

The proposed project site has been under various ownership and was actively farmed up until the late 1960s. Farming included commodity crops such as rye, potatoes, and hay, as well as dairy and chicken farms, and scattered woodlots for firewood and logging. The present condition, with open fields and wood lots, has been stable for at least 50 years as indicated by a 1950 aerial photograph (ATSI 1995) (indicating the southerly parcel). Discussions with retired neighbors that have lived and worked in the Cherry Point area for most of their lives confirm past and current land uses (ATSI 1995).

When the Cherry Point area was rezoned from rural in the early 1970's to Heavy Industrial, various entities began to collect the farmlands into larger blocks of land as speculative ventures. Many of the farms have not actively produced commodity crops since that time, but cattle, hay and limited commodity crops are grown on most fields. The subject parcel has been compiled from two separate owners.

The proposed project plan requires filling 5.85 acres of wetlands on this parcel. Of the 5.85 acres proposed to be filled, 4.30 acres are farmed seasonally saturated palustrine emergent wetlands, 1.45 acres are seasonally saturated palustrine scrub-shrub wetlands, and 0.1 acres are seasonally saturated palustrine forested wetlands.

This mitigation plan will directly and indirectly compensate for lost wetland acreage and function. **Five goals** have been established for the mitigation project. The **first** goal is to create 5.9 acres of seasonally saturated palustrine forested/scrub-shrub wetland to provide a 1:1 areal replacement ratio with greater functional value for wetlands filled. The **second** goal is to enhance a 16.2 acre monotypic stand of reed canarygrass into a diverse palustrine forested wetland habitat. The **third** goal is to assure the protection of the on-site stream corridor by placing the stream channel and the associated riparian area in a conservation easement recorded on the property deed (this encompasses approximately 50 acres). The **fourth** goal is to conduct a study on a designated 1.5 acre plot researching the natural regeneration of vegetation within seasonally saturated, palustrine emergent agricultural fields and also investigates the success of selected facultative upland and facultative wetland plants planted over a range of hydrogeomorphic regimes. The **fifth** goal is not directly related to wetland disturbance but addresses cultural functions lost on a regional basis. This goal attempts to provide a compensation for the regional loss of natural resources, in this case western red cedar trees, important to the Lummi Indian Tribe's culture heritage.

Table 1 compares acres of wetland lost from proposed impacts with acres of wetland created, enhanced, and protected as part of the proposed mitigation. A total of 5.85 acres of wetlands are proposed to be filled for this project, most of which are low value, seasonally saturated agricultural palustrine emergent wetlands, that are cut for hay on a yearly basis. Compensation for this disturbance will include replacement of the 5.85 acres of palustrine emergent wetlands with 5.9 acres of palustrine forested/scrub-shrub wetlands (seasonally flooded/saturated). In addition, enhancement of 16.2 acres of low value wetland, protection of a high value riparian corridor and its headwaters, and provide funding for a research project on local wetland ecology will also occur. In summary, in compensation for filling 5.85 acres of mostly low value wetland, 73.6 acres of wetlands and uplands will be protected, enhanced, and created.

Table 1. Total area and classes of wetlands to be impacted and proposed compensation for mitigation

Impacts	**Compensation**			
Filled	Created	Enhanced	Protected	Research
4.30 acres seasonally saturated isolated ag. PEM. **1.45** seasonally saturated isolated PSS **0.1** seasonally saturated isolated PFO	**5.9** acres seasonally saturated PSS/PFO connected to riparian corridor	**16.2** ac. seasonally saturated, seasonally flooded PSS/PFO Meanders added to stream channel	100 feet on each side of stream channel in a native growth protection easement recorded on the plat Created wetlands, enhanced wetlands, buffers and research area in a native growth protection easement	Funding for a wetland ecology research project on a **1.5** acre area near the enhancement and creation area
Total wetland acres to be filled: **5.85**	Total wetland acres created: **5.9**	Total enhanced wetland acres: **16.2**	Total acres protected: **50**	Total acres dedicated to research: **1.5**
Total acres of wetland disturbed: **5.85**	Total acreage provided in compensation: **73.6**			

2.4 Wetland Delineation

The project site includes palustrine emergent (PEM), palustrine scrub–shrub (PSS), and palustrine forested (PFO) wetlands (ATSI 1995). The wetlands meet all three wetland parameters, but by differing degrees. In general, all on–site wetlands display a predominance of hydric vegetation, hydric soils with low chromas and mottles, and soils displaying wetland hydrology field indicators such as oxidized root channels.

Most of the wetlands impacted by this project (4.30 out of a total 5.85 acres) are seasonally saturated palustrine emergent wetlands are used as hayfields or pasture for cattle. Of the remaining 1.55 acres of wetlands, 1.45 acres are seasonally saturated palustrine scrub–shrub and 0.1 acre are seasonally saturated palustrine forested.

The wetlands were categorized using both the Whatcom County and the Washington Department of Ecology (DOE) Wetland Rating Systems (ATSI 1995). Using the Whatcom County Wetland Rating Category System (Note: the project is vested with the Whatcom County Critical Areas Ordinance) the PEM wetlands south of Henry Road are unregulated by Whatcom County, but are categorized as Category IV wetlands by the DOE. The remaining PEM wetlands are Category IV wetlands using either system. Both the PSS and PFO wetlands are Category III wetlands using either system.

Using the DOE wetland characterization sheets, identified important wetland functions include: water quality in the palustrine emergent wetlands; human impacts to wetlands, buffer structure and function, breeding, rearing, feeding, and wintering habitat for fish and/or wildlife, water quality, flood and storm drainage protection, and support of baseflow in the palustrine scrub–shrub wetlands; and human impacts to wetlands, buffer structure and function, water quality, and flood and storm drainage protection functions in the palustrine forested wetlands (ATSI 1995).

3.0 ECOLOGICAL ASSESSMENT OF IMPACT SITE

3.1 Vegetation

This parcel includes a variety of vegetation communities including upland forest, upland fields, upland shrub, palustrine emergent wetlands, and palustrine forested/scrub–shrub wetlands. Historically, the large parcels making up the project area were cleared and converted to agricultural fields and pasture. Today, fields south of Henry Road and along Aldergrove Road continue to be farmed in forage crops, but others have been abandoned and support forested and shrub vegetation. Some fields have been used intermittently as pasture for cattle, but the fields south of Henry Road have never been used for livestock grazing.

Seasonally saturated palustrine emergent wetlands are located in minor depressions and along drainages in fields and are dominated by non–native and invasive herbaceous plant species. Seasonally saturated palustrine forested and scrub–shrub wetlands are located within upland forests and shrub habitats and are dominated by native plant species. Below is a description of the on–site plant communities:

Upland Forest – Upland forest occupies the northwestern one–third of the property, as well as patches within fields and along the seasonal drainage. Most of the upland forest is a deciduous forest dominated by red alder (*Alnus rubra*) intermixed with paper birch (*Betula papyrifera*), western red cedar (*Thuja plicata*), and Douglas fir (*Pseudotsuga menziesii*). Understory species include: vine maple (*Acer circinatum*), snowberry (*Symphoricarpos albus*), Indian plum (*Oemleria cerasiformis*), red elderberry (*Sambucus racemosa*), salmonberry (*Rubus spectabilis*), sword fern (*Polystichum munitum*), and trailing blackberry (*Rubus ursinus*). The herbaceous layer is heavily shaded and sparse in most areas.

Upland Shrub – Upland shrub dominates logged areas and abandoned agricultural fields. This habitat type is most prominent at the southeast corner of Aldergrove and Gulf Roads, in the logged areas north of Lonseth Road and in isolated patches on the north and south sides of Henry Road. This habitat is typified by a regenerating canopy 15 to 20 feet high of red alder and paper birch. A dense shrub layer with Himalayan and evergreen blackberries (*Rubus discolor* and *R. laciniatus*), salmonberry, red elderberry, snowberry, thimbleberry (*Rubus parviflorus*), trailing blackberry and bracken fern (*Pteridium aquilinum*) standing 6 to 10 feet high. Except for exceptionally tall species (e.g. bracken fern), the herbaceous layer has been shaded out.

Upland Fields – Upland fields dominate along Aldergrove Road, the southwest ridge from Aldergrove Road towards Lonseth Road, and fields south of Henry Road. The fields are dominated by a facultative community of non–native pasture grasses and herbs. Representative species include red fescue (*Festuca rubra*), vernal sweetgrass (*Anthoxanthum odoratum*), meadow foxtail (*Alopecurus pratensis*), velvet grass (*Holocus lanatus*), redtop (*Agrostis alba*), hop clover (*Trifolium dubium*), Canadian thistle (*Cirsium arvense*), oxeye daisy (*Chrysanthemum leucanthemum*), reed canarygrass (*Phalaris arundinacea*), English and common plantains (*Plantago lanceolata* and *P. major*), and white clover (*Trifolium repens*).

Palustrine Emergent Wetlands (PEM) – PEM wetlands are located within depressions and shallow swales in the upland fields and along the northern portion of the seasonal drainage (Figure 3). The wetlands are composed of a single vegetation layer (herbaceous) with little complexity. They support non–native and invasive plant species dominated by, reed canary grass, meadow foxtail, red fescue, soft rush (*Juncus effusus*), and velvet grass. Additional species include: sawbeak sedge (*Carex stipata*), hare's–foot sedge (*Carex leporina*), slough sedge (*Carex obnupta*), bird's–foot trefoil (*Lotus corniculatus*), white clover (*Trifolium repens*), redtop, and Pacific silverweed (*Potentilla anserina*).

Palustrine Forested/Scrub–Shrub Wetland (PFO/SS) – Very few true forested wetlands are located within the study area. In most cases, the wetlands are dominated by shrubs, but have an upland canopy that extends over the wetland (Figure 3). The actual wetland plants include: salmonberry, black twinberry (*Lonicera involucrata*), hardhack (*Spiraea douglasii*), Nootka rose (*Rosa nootkana*), Hooker's willow (*Salix hookeriana*), Pacific willow (*S. lasiandra*), and slough sedge. The over reaching canopy is predominately red alder.

3.2 Water Regime

The topography within the study area is generally as flat to gently rolling terrain with shallow swales and small ridges. Moderate to steep bluffs are located along the marine shoreline and within the ravine located in the southeast corner of the study site. Site surface and subsurface drainage is directed towards the south. The majority of site surface drainage, either directly or indirectly, drains into the unnamed seasonal stream that flows into the Strait of Georgia approximately one–quarter mile west of Gulf Road. However, numerous ditches and roads intercept the natural hydrology of some wetlands.

The primary factors influencing the hydrology on this property are direct precipitation, stratigraphy, topography, soil texture, and a seasonally high perched water table. The average annual precipitation is 30 to 40 inches, with most falling in the months of November, December, January, February, and March. The average growing season is about 180 days, and begins mid–March and ends the first part of November. The stratigraphy of Whitehorn silt loams is a series of slowly permeable soil horizons that are composed of layers of silt loams, loams, and sandy loams. Typically, subsoils underlying the wetlands have a silty clay subsoil, but some are very sandy. Dense silty clay prevents surface water collected from direct precipitation from percolating downward, resulting in saturated or inundated surficial conditions whereas sandy subsoils allow surface water to percolate faster, not allowing wetland hydrology to accumulate. The majority of the site wetlands are underlain by Whitehorn silt loam, which technically,

has a seasonal perched high water table at a depth of 0 to 12 inches from the surface November through May. Although, ATSI (1995) data show the high water table varies on this site from 0 to 20 inches from the surface.

Hydrology within the agricultural fields is not well defined and the fields are saturated only on a seasonal basis. No primary field indicators of wetland hydrology were observed in many of the PEM wetlands, but secondary indicators included oxidized root channels in the upper 2 to 3 inches of the soil and local soil survey data indicating the presence of a seasonally high perched water table early in the growing season. Interviews with local farmers suggest that the agricultural fields can be farmed (plowed) late in the season (October and November) and as early as late April in most years, indicating that wetland hydrology is absent in the later growing season and present only very early in the growing season.

The National Wetland Inventory (NWI) indicates both seasonally saturated and seasonally flooded hydrologic conditions within the on-site wetlands. However, on-site data indicates that the majority of the on-site wetlands are seasonally saturated during the growing season and inundation is rare. Within these soil types, seasonally flooded wetlands generally display low matrix chromas and mottling to the surface demonstrating fluctuating water levels near and at the soil surface. However, data collected from some sample plots had matrix chromas between 2 and 3 with no mottles in the upper 12 inches of the soil surface. Chromas were not low enough to indicate prolonged saturation near the surface and the lack of mottles implies a stable water table below the major root zone during the growing season.

3.3 Soils

The Soil Conservation Service (SCS) indicates the presence of five soil series within the study area. The dominant soil series is Whitehorn silt loam, which occupies approximately 90 percent of the site. Whitehorn silt loam is listed as hydric on the local Hydric Soils List (SCS 1991). A ridge of non-hydric Birchbay silt loam extends from the corner of Aldergrove and Gulf Roads southwest to the west end of Henry Road. A ribbon of non-hydric Kickerville silt loam parallels the southwestern Birchbay soil on the west portion of the site, but most of this has been extensively disturbed by borrow pit activities. Non-hydric Whatcom silt loams are found on the western portion of the property between Aldergrove and Henry Roads as well as within the ravine on the eastern side of the parcel. Non-hydric Neptune very gravelly sandy loam occurs along the marine shoreline.

Indicators of wetland hydrology and vegetation were often difficult to distinguish within the agricultural fields. In those cases, the hydric soil criteria was used as the primary indicator for wetland determination in combination with any wetland hydrology or vegetation indicators available. Most on-site agricultural fields are underlain by Whitehorn silt loam. Although this soil series is indicated as hydric, hydric indicators were not located at all sample plots. Plots that displayed a topsoil color of 10 YR 3/2 or 3/3 with no evidence of mottling were designated as uplands: whereas soils within plots with topsoil colors of 10YR 2/1, 2/2 or 3/2 with mottles were considered hydric. The depth of the topsoil in the uplands exceeded 12 inches, but was usually less than 12 inches in the wetland soils. The subsoil was similar throughout the Whitehorn series, with a matrix color of 10YR 5/1-5/3 with distinct to prominent mottles. In some cases the matrix had a chroma of 3; not typically considered an indicator chroma, in others the matrix chroma was 2 without mottles.

3.4 Fauna

Wildlife utilizing this parcel are typical of species found in agricultural and deciduous forested areas in the marine shoreline areas of Whatcom County. In-depth studies have been performed on terrestrial birds and amphibians on the site, and other studies have included additional data on mammals, fish and invertebrate populations (ATSI 1995, Shapiro and Associates 1994).

A study was conducted by ATSI of the inland bird populations on this site in 1995 (ATSI 1995). The results of the study indicate the parcel supports birds typical of the local area. A total of 564 birds of 44 different species were observed during the spring of 1995 (ATSI 1995). The greatest numbers of birds were observed in the field habitats and the lowest numbers in the forests. The greatest species diversity was observed in the field and edge habitats, however other habitats had only slightly lower diversity.

The only priority bird species observed during the ATSI bird survey were bald eagles (*Haliaeetus leucocephalus*), great blue herons (*Ardea herodias*) and pileated woodpeckers (*Dryocopus pileatus*) (ATSI 1995). Bald eagles are a federal and state listed threatened species (WDFW 1995). Bald eagles were observed flying over the parcel in three instances. One mature and one immature eagle were observed, at separate times, flying parallel to the shoreline. In a third observation, a mature bald eagle was observed on the north side of the parcel. During another observation period in the Fall of 1995, two mature bald eagles were observed perched in a cottonwood tree at the mouth of the ravine and an immature eagle was observed flying from this location northwest, along the shoreline (ATSI staff, Nov. 1995).

Pileated woodpeckers are a state listed Candidate Species (WDFW 1995). Two observations of a single pileated woodpecker were made on different days along the shoreline. Because these observations were made on different days, it was not determined whether this was the same individual or if two birds utilize the site. Within the areas the pileated woodpeckers were observed, no trees were observed large enough to serve as nesting sites, but these habitats may serve as forage areas.

A great blue heron rookery is located northwest of the site on ARCO property (Norman per. comm.). Approximately 200 nests are present within this rookery. A regular flight pattern of great blue herons occurs near the seasonal stream corridor. The birds appeared to be flying to and from the rookery and shallows near Sandy Point during low tides (ATSI 1995). The great blue heron is listed as a State Monitor species and their breeding areas are listed as priority areas by the Washington Department of Fish and Wildlife (WDFW 1995, WDW 1994).

A large concentration of surf scoters (*Melanitta perspicillata*) was observed off-shore on May 9. Large concentrations of this species are known to congregate in this area to feed on herring spawn (Wahl 1994).

An amphibian and reptile survey was conducted by Shapiro and Associates, Inc. in 1993 (Shapiro 1994). Two frog species, two salamander species, and one reptile species were observed on the property. Red-legged frogs (*Rana aurora)* and Pacific chorus frogs (*Pseudacris regilla),* adults and tadpoles, were observed on the property. Tadpoles were observed in stagnant water pools and the brackish marsh. Northwestern salamander (*Ambystoma gracile*) and long-toed salamander (*A. macrodactylum*) were encountered under woody debris. A dead rough skinned newt (*Taricha granulosa*) was observed by ATSI staff on Gulf Road. According to distribution maps, five other amphibian species may occur in the vicinity of the project area (Leonard, et. al. 1993) including the Pacific giant salamander (*Dicamptodon tenebrosus*), western redback salamander (*Plethodon vehiculum*), ensatina (*Ensatina eschscholtzii*), western toad (*Bufo boreas*), and the non-native bullfrog (*Rana catesbeiana*).

Evidence of the following mammal use on the site has been documented: black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), raccoon (*Procyon lotor)*, opossum (*Didelphis marsupialis*) and mink (*Mustela vison*) (ATSI 1995 and Shapiro 1994). Other species may include: shrews, voles, deer mice, weasel, and skunk (Shapiro 1994).

Little information is available concerning fish populations on the parcel. The only possible fish habitat observed on the site are portions of the seasonal stream. The Shapiro Stream Habitat Survey (1994) indicates the possibility of chum (*Oncorhynchus keta)* or cutthroat trout (*O. clarkii)* use of the stream, but this was not confirmed and is doubtful. The Shapiro report goes on to state (ATSI staff concurs) the

hydroperiod of flow within the stream is not sufficient to provide habitat for these species. Other possible resident fish may include three-spine stickleback (*Gasterosteus aculeatus*) and sculpin (*Cottus sp.*). The only fish species observed during stream surveys performed by Shapiro staff was three-spine stickleback. To summarize, this is a seasonal stream that will not support fish from mid-Spring to mid-Fall due to absence of water. A large log and debris pile at the mouth of the stream also limits access to the stream to high tides only.

3.5 Functions and Values of Impacted Wetlands

Wetland Characterization sheets developed by the Washington Department of Ecology were used to assess the functional values of the on-site wetlands that would be impacted as the result of this project. Wetland functions have been divided into primary categories of wetland condition, buffers, wildlife habitat, fisheries habitat, hydrology, cultural values, shoreline stabilization, and heritage value. Within these primary categories individual functions are assessed point values of 1-3. Functions having values of 1 are considered low value; functions with values of 2 have moderate value; and functions with 3 points have high values.

Table 2 indicates the functions addressed for the PEM wetlands south of Henry Road and their associated values (Figure 3). Only water quality functions received values "moderate" or greater. The remaining functions received "low" values.

The overall wetland condition has a moderate to low value. The wetlands have been extensively impacted by past agricultural practices. The acreage south of Henry Road has been actively farmed for over 50 years. The wetlands and surrounding uplands are fields dominated by non-native pasture grasses that are presently mowed for hay. Each PEM wetland within this area is under one-half acre in size and is hydrologically isolated. Hydrological alterations include ditches within the fields and along Henry Road. The ditches along Henry Road may have had the greatest impact by separating wetlands in the southern fields from upgradient surface and subsurface drainage from wetlands on the north side of Henry Road.

The buffer surrounding these wetlands is mowed agricultural upland fields dominated by non-native grasses with small areas of forested/shrub habitat. The wetlands are greater than 100 feet from any other habitat type, but marine, forest, and shrub habitats are located within one-quarter mile. The vegetation cover between the wetlands and other habitats is mowed grass, providing low cover values.

Table 2. Palustrine Emergent Wetlands Functions and Values south of Henry Road

FUNCTION	VALUE
Human impacts to wetlands	1.5
Buffer structure and function	1.5
Breeding, rearing, feeding, and wintering habitat for fish and/or wildlife	1
Water quality	2
Flood and storm drainage protection	1
Support of baseflow	1
Shoreline stabilization	N/A
Sea level rise	N/A
Groundwater exchange	1
Cultural values	0
Heritage value	0

Habitat value within these wetlands is low. The low value is associated with their small size, isolated nature, and lack of structural diversity. As mentioned previously, the PEM wetlands are all under one–half acre in size and are hydrologically isolated. The buffer area is predominately mowed agricultural fields. Vegetation within the wetlands is dominated by non–native plant species consisting of a single vegetation class. The wetlands have a simple shape and no interspersion of wetland classes, resulting in reduced edge habitat. No significant habitat structures (e.g. downed logs, snags and/or perches) were observed within these wetlands or their associated buffers. The only connection to other habitat types is via mowed open fields. There is no connection to fish habitat.

The PEM wetlands serve "low" to "moderate" hydrological functions. The wetlands are located in shallow depressions underlain with silt and clay. The average surrounding slope is low (<3%). There is no apparent inlet or outlet to the wetlands. The wetlands are isolated and water is removed primarily through direct evaporation and evapotranspiration. The ditches have altered the natural hydrology of the wetlands, separating them from upgradient drainage. The wetlands are vegetated with pasture grasses, that may aid water quality during the growing season.

Cultural and Heritage values of these wetlands are "low". This is based on the small size, dominance by non–native and invasive plant species, disturbance, location on private property, and because the parcel is not known to be listed as a local, State, or Federal heritage site.

Table 3 indicates the functions addressed for the palustrine scrub–shrub wetlands (immediately north and south of Henry Road) and their associated values. Functions with the highest values are: human impact, buffer structure and function, wildlife habitat, water quality, flood and stormwater protection, and support of baseflow. The remaining functions received "low" values.

Human impact to these wetlands has been moderate. The wetlands have experienced alterations resulting from past logging, agriculture, and livestock grazing, but are now regenerating. Based on aerial photographs and interviews with local farmers, most of these fields were cleared and used in the past for agricultural crops and livestock grazing. The fields are now abandoned and support dense shrub communities. Other disturbances include logging within wetlands and ditches that have interrupted the natural hydrology to the wetlands. The wetlands are dominated by non–native vegetation, but also include native plants. Probable pollutants could include sedimentation and nutrient inputs from past agricultural and logging activities.

Table 3. Palustrine Scrub–Shrub Wetland Functions and Values.

FUNCTION	VALUE
Human impacts to wetlands	2
Buffer structure and function	2.5
Breeding, rearing, feeding, and wintering habitat for fish and/or wildlife	2
Water quality	3
Flood and storm drainage protection	2
Support of baseflow	2
Shoreline stabilization	N/A
Sea level rise	N/A
Groundwater exchange	1
Cultural values	0
Heritage value	0

The wetlands are buffered by a mix of forested/shrub, mowed agricultural fields and roads. The buffer is greater than 100 feet where forest, shrub and fields occur.

These wetlands have moderate wildlife habitat values. The wetlands include both palustrine emergent and palustrine scrub-shrub wetland classes with moderate interspersion and shape. Although open water is present and the wetlands are dry during the summer. Clumps of willows and small trees serve as perches for raptors in these fields. No other habitat features were identified. The wetlands are connected to other habitats via the on-site seasonal stream, but much of the riparian vegetation is limited to reed canarygrass. Fish do not inhabit these wetlands.

Water quality functions have "high" values. The wetlands have a combined large size, moderate level of disturbance, slow rate of water movement, and dense vegetation combined to provide significant water quality functions. These same features combined with the wetlands direct and indirect association with the on-site stream, allowing them to provide moderate values in flood and stormwater abatement, and support of the base flow of the stream. There is little data associated with the wetlands interaction with groundwater, but some on-site wetlands have a sandy subsoil indicating a possible interaction.

Cultural and Heritage values of these wetlands are "low". This is based on the disturbance, location on private property, and because the parcel is not known to be listed as a local, State, or Federal heritage site.

Table 4 indicates the functions addressed for the palustrine forested/scrub-shrub wetlands, located immediately north and south of Lonseth Road, and their associated values. Functions that have the highest values are: the overall wetland condition, buffer structure and function, water quality and flood and stormwater abatement. The remaining functions received "low" values.

Human impacts to these wetlands have been moderate. Logging has occurred in the past which has reduced the total canopy cover and allowed non-native blackberries to invade in some and in others the wetlands have recovered from logging that occurred more than 10 years ago. Peripheral ditches along the roads may have altered the original hydrology, but sufficient hydrology remains to support these communities. Past logging may have temporarily increased sediment loads, but no pollutants are currently apparent.

Table 4. Palustrine Forested/Scrub-Shrub Wetland Functions and Values.

FUNCTION	VALUE
Human impacts to wetlands	3
Buffer structure and function	2.5
Breeding, rearing, feeding, and wintering habitat for fish and/or wildlife.	1.5
Water quality	3
Flood and storm drainage protection	2
Support of baseflow	1
Shoreline stabilization	N/A
Sea level rise	N/A
Groundwater exchange	1
Cultural values	0
Heritage value	0

Buffers around the wetlands are composed of forest and shrub vegetation greater than 100 feet wide. These wetlands have low to moderate wildlife habitat functions. No open water component is present. Palustrine forested and scrub-shrub wetland classes are both present. Emergent vegetation is present, but makes up less than 10 percent of the community. Simple interspersion occurs between the wetland classes with moderate to complex wetland shapes. Habitat features include fallen logs, small snags and perches. There are narrow corridors with forested to herbaceous vegetation cover to other habitats. There is no documentation that these wetlands are connected to a fish habitat.

Water quality functions have "high" values. The wetlands are moderately (30 to 75% areal cover) vegetated with persistent and non-persistent vegetation. Because the wetlands are located in isolated depressions, water movement is slow to non-existent. The surrounding area around the wetlands has low (3% to 8%) slopes. These features provide the wetlands with high nutrient trapping features.

Cultural and Heritage values of these wetlands are "low". This is based on the disturbance, location on private property, and because the parcel is not known to be listed as a local, State, or Federal heritage site.

3.6 Water Quality

No surface water observed.

3.7 Buffers

Buffers surrounding the palustrine emergent wetlands are predominately closely mowed agricultural upland fields dominated by non-native grasses, with small areas of forested/shrub habitat. The wetlands are greater than 100 feet from any other habitat type, but marine, forest, and shrub habitats are located within one-quarter mile. The vegetation cover between the wetlands and other habitats is mowed grass, providing little cover for wildlife.

The palustrine forested and scrub-shrub wetlands are buffered by a mix of forested/shrub, mowed agricultural fields and roads. The buffers are greater than 100 feet where forest, shrub and fields occur.

3.8 Wetland Rating

Based on the Whatcom County and the DOE Wetland Rating System, the PEM wetlands (south of Henry Rd and on the west edge of the site) are unregulated Category IV wetlands; the remaining PEM wetlands (to the north and extreme east) are regulated Category IV wetlands. The DOE four tiered rating system designates these wetlands as Category IV wetlands. These ratings are based on small size (less than one-half acre in size), isolation, hydrological alteration, and the presence of a single wetland class dominated by vegetation that is primarily non-native, invasive wetland species.

The Whatcom County Wetland Rating System indicates the palustrine scrub-shrub wetlands are Category III wetlands. The DOE four tiered rating system designates these wetlands as Category III wetlands. These ratings are based on combined size of greater than 5 acres, hydrological connection to a seasonal stream, and the presence of two wetland classes dominated by both non-native and native vegetation.

The Whatcom County Wetland Rating System places the palustrine forested/scrub-shrub wetlands (predominately north of Lonseth Road) in Category III. The DOE four tiered rating system designates these wetlands as Category III wetlands. These ratings are based on a total size greater than 5 acres, hydrological isolation, moderate complexity, forested class and vegetation dominated by a mix of native and non-native plant species.

Based on the Whatcom County Water Categories rating system, the on-site stream is a Type 4 Water below Henry Road and a Type 5 Water above. This rating is based on the streams seasonal nature, no records of use by anadromous fish or game fish, and no domestic use. The average channel width is between 2 and 3 feet in most areas and 3 to 6 feet south of Henry Road, although some areas of the channel have been widened by ditching in the fields on the north part of the site near Aldergrove Road.

3.9 Position and Function of Wetlands in Landscape

The proposed impact area lies within the watershed of the on-site stream. This unnamed stream is a small, seasonal drainage that flows into the Strait of Georgia. The stream is approximately 1.25 miles long and has a drainage area of approximately 800 acres (Shapiro 1994). The headwaters of the stream are located on a relatively flat terrace, most of which is ditched. The lower reaches of the stream flows through a ravine into the Strait of Georgia.

A forested and shrub dominated riparian corridor is present along most of the stream, except near its headwaters. Vegetation in the headwaters vicinity is predominately reed canarygrass.

4.0 MITIGATION GOALS, OBJECTIVES AND PERFORMANCE STANDARDS

4.1 Goals

This mitigation plan will directly and indirectly compensate for lost wetland acreage and functions. **Five goals** have been established for the mitigation project. The **first** goal is to create 5.9 acres of seasonally saturated palustrine forested/scrub-shrub wetland to provide a 1:1 areal replacement ratio with greater functional value for wetlands filled. This 5.9 acres of seasonally saturated palustrine forested/scrub-shrub wetlands will be created to compensate for filling 4.30 acres of seasonally saturated farmed palustrine emergent wetland, 1.45 acres of seasonally saturated scrub-shrub wetland and 0.10 acre of seasonally saturated forested wetland.

The **second** goal is to enhance a 16.2 acre monotypic stand of reed canarygrass into a diverse forested wetland habitat. In order to meet this goal, the dominance of reed canarygrass in 16.2 acres of the field in the southwest corner of Aldergrove and Gulf Roads will be reduced. Native tree, shrub, and herbaceous plants will be planted and large organic debris (logs and root masses) placed, to diversify the community and provide habitat and food chain support for native mammals, birds, amphibians and aquatic macroinvertebrates. A complex hydrologic regime of seasonally flooded to seasonally saturated wetlands will be created.

The **third** goal is to assure the protection of the on-site stream corridor. The stream channel and the associated riparian area (100 feet on both sides of channel) would be placed in a conservation easement recorded on the property deed (encompassing approximately 50 acres).

The **fourth** goal is to conduct a study on a designated 1.5 acre plot. The study will research the natural regeneration of vegetation within seasonally saturated, palustrine emergent agricultural fields. It addition the study will investigate the success of selected upland, facultative upland, and facultative wetland plants planted over a range of hydrogeomorphic regimes.

The **fifth** goal is not directly related to wetland disturbance but addresses cultural functions lost on a regional basis. This goal will provide compensation for the local loss of natural resources (specifically western red cedar) important to the Lummi Indian Tribe's culture heritage.

4.2 Objectives and Performance Standards

To achieve the above goals the following objectives have been defined. Performance standards have been included to provide measurable values of specific variables to establish that objectives have been met.

Goal 1: Create 5.9 acres of seasonally saturated palustrine forested/scrub–shrub wetland to provide a 1:1 areal replacement ratio with greater functional value for wetlands filled.

Water Regime

A. A seasonally saturated hydrologic regime will be present within the created wetland areas.

> Performance Standard: A minimum of 5.9 acres will be saturated within the upper 12 inches of the soil horizon for at least 21 days during the early growing season (March/April) (Figure 5).

Vegetation Structure

A. The created wetland areas will be vegetated with a minimum of 5.9 acres of palustrine forested/scrub–shrub vegetation class with canopy, shrub, and herbaceous vegetation layers. Partial planting of the plants will occur one year after construction to allow confirmation of the hydrological regime. Monitoring will occur over a ten year period on a seasonal basis with reports written the 1st, 3rd, 5th, 7th, and 10th years post construction/planting.

> **First year monitoring.** Performance Standard: Native plant species will have a minimum cover of 15% after the first year.
>
> **Third year monitoring.** Performance Standard: Native plant species will have a minimum cover of 25% after the third year.
>
> **Fifth year monitoring.** Performance Standard: Native plant species will have a minimum cover of 50% after the fifth year.
>
> **Seventh year monitoring.** Performance Standard: Native plant species will have a minimum cover of 75% after the seventh year.
>
> **Tenth year monitoring.** Performance Standard: Native wetland forest vegetation will cover the 5.9 acre site with 50% canopy cover, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Goal 2: Enhance a 16.2 acre monotypic stand of reed canarygrass into a diverse palustrine forested wetland habitat.

Water Regime

A. Both seasonally saturated and seasonally flooded hydrologic regimes will be present within the enhancement area.

> Performance Standard: A minimum of 16.2 acres will be a complex (an approximate 8.1 acres of each) of seasonally saturated and seasonally flooded soils. The saturated zone will occur within the upper 12 inches of the soil horizon for at least 21 days during the early growing season

(March/April). The flooded zone will also occur for 21 days during the growing season with an approximate depth of 24 inches.

Vegetation Structure

A. The dominance of reed canarygrass will be reduced within the mitigation area within ten years.

Performance Standard: Less than a 25% cover of reed canarygrass, measured along permanent transects with at least 20X50 cm rectangular quadrats systematically placed along transects, will be present after ten years.

B. The wetland will be vegetated with a minimum of 16.2 acres of palustrine forested, scrub-shrub and emergent vegetation classes composed of native plant species. Percent cover of the vegetation and number of live and dead plants (by species) will be measured along permanent transects using at least 20X50 cm quadrats. Partial planting of the plants will occur one year after construction to allow confirmation of the hydrological regime. Monitoring will occur over a ten year period on a seasonal basis with reports written the 1st, 3rd, 5th, 7th, and 10th years post construction/planting.

First year monitoring. Performance Standard: Native plant species will have a minimum cover of 15% after the first year.

Third year monitoring. Performance Standard: Native plant species will have a minimum cover of 25% after the third year.

Fifth year monitoring. Performance Standard: Native plant species will have a minimum cover of 50% after the fifth year.

Seventh year monitoring. Performance Standard: Native plant species will have a minimum cover of 75% after the seventh year.

Tenth year monitoring. Performance Standard: Native wetland forest vegetation will cover the 16.2 acre site with 50% canopy cover, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Habitat Attributes

A. The enhancement area will provide habitat for at least four species of **amphibians** within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for both terrestrial and aquatic amphibian species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present within the enhancement area early in the growing season (Feb.–July). To restrict occupation by bullfrogs (*Rana catesbeiana*) year-long inundation within the enhancement area will be avoided.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

B. The enhancement area will provide habitat for at least four species of **aquatic insects** within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for aquatic invertebrates. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present within the enhancement area early in the growing season (Feb.–July).

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

C. The enhancement area will provide habitat for at least three **waterfowl** species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide nesting sites, cover and forage areas for waterfowl species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present within the enhancement area early in the growing season (Feb.–July).

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Performance Standard: A minimum of 5 temporary nesting boxes suitable for cavity nesting waterfowl (e.g. wood duck, hooded merganser) will be placed around the mitigation area.

D. The enhancement area will provide habitat for at least two **mammal** species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for mammal species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years to provide cover and forage for mammal species.

E. The enhancement area will provide habitat for at least five **passerine** bird species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide nesting sites, cover and forage areas for passerine species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present within the enhancement area early in the growing season (Feb.–July).

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Performance Standard: A minimum of 5 temporary nesting boxes suitable for passerine species will be placed around the mitigation area (e.g. tree and violet green swallows, black-capped chickadee, Bewick's wren).

Goal 3: Assure the protection of the on-site stream corridor. The stream channel and the associated riparian area (100 feet on both sides of channel) will be placed in a conservation easement recorded on the property deed (total area encompasses approximately 50 acres).

Goal 4: Conduct a study on a designated 1.5 acre plot researching the natural regeneration of vegetation over time of a seasonally saturated, palustrine emergent agricultural field and investigate the success of selected upland, facultative upland, and facultative wetland plants planted over a range of hydrogeomorphic regimes within this field.

A. Record the natural successive changes over time in an agricultural palustrine emergent wetland over a range of hydrogeomorphic regimes.

B. Investigate the success of selected upland, facultative upland, and facultative wetland plant species planted over a range of hydrogeomorphic regimes.

Goal 5: This goal is not directly related to wetland disturbance, but addresses cultural functions lost on a regional basis. This goal will provide compensation for the local loss of natural resources important to the Lummi Indian Tribe's culture heritage.

A. Natural resources available for harvest by the Lummi Indian Tribe will be established to provide totem pole stock and cedar bark for future cultural uses by the Lummi Indian Tribe.

5.0 PROPOSED MITIGATION SITE

5.1 Site Description

The proposed mitigation areas are located on the parcel and within the on-site watershed. The parcel lies within unincorporated Whatcom County, east of the City of Ferndale (within the northeast quarter of Section 18, Township 39 North, Range 1 East of the Willamette Meridian) (Figure 1). The subject area is located in a farmed 40 acre field in the southwest corner of Aldergrove and Gulf Roads and along the riparian corridor (Figure 4). This plan includes creation of 5.9 acres of palustrine forested/scrub-shrub wetland, enhancement of 16.2 acres of a reed canarygrass dominated palustrine emergent wetland, protection of a high quality riparian corridor, and funding for a research project on wetland ecology.

5.2 Ownership

Jeff Kaspar (contact person)
Pacific International Terminals
Gateway Pacific Terminal
1801 Roeder Avenue, Suite 156
Bellingham, Washington 98225

5.3 Rational for Choice

The entire parcel (1,092 acres) was searched for potential mitigation sites. The final site selection was based on future protection, connection to an existing riparian corridor, degraded conditions of existing wetlands, access for heavy equipment, and ownership. Since much of the immediate area is presently designated as wetland palustrine forested (PFO), palustrine scrub–shrub (PSS), palustrine emergent (PEM), or high quality upland, a degraded 16.2 acre, low value PEM wetland and ditched stream channel were chosen for enhancement. In addition, 5.9 acres of PFO/PSS will be created in the same area, further enhancing this area.

Water regime

The site currently supports wetlands and the upland soils have a silty/clay subsoil that is suitable for wetland creation. The primary factors influencing the hydrology in the mitigation area are seasonal flooding, direct precipitation, and topography. Seasonal flooding from the on–site seasonal stream and upgradient runoff appear to be the forces driving on–site's wetland hydrology. In addition, a seasonal perched high water table may contribute to the hydrology in the late winter and early growing season. The wetland area is underlain by Whitehorn silt loam, that technically has a seasonal perched high water table at a depth of 0 to 1 foot from the surface November through May.

The National Wetland Inventory map indicates seasonally flooded hydrologic conditions within the chosen mitigation area. Typically, on–site wetland soils display low matrix chromas and mottling to the surface demonstrating fluctuating water levels near and at the soil surface.

A hydrology study was conducted in the area of the proposed mitigation, and other areas of the site by Shapiro and Associates, Inc. from November 1994 through October 1995 (Shapiro and Associates 1995. Their monitoring data indicate soils within the enhancement area are saturated to the surface or flooded with up to 6 inches of water from December until mid–May. After May the water table quickly drops and remains at 2 feet or below the surface throughout the summer.

Buffers

The proposed mitigation site is currently buffered by field and forest vegetation. The buffer within 100 feet of the existing wetland is dominated by non–native grasses on the northwest side, Gulf Road on the east, and regenerating shrub and forest vegetation on the south. Beyond the immediate buffer, forest and shrub vegetation dominate on the east side of Gulf Road and to the south and west of the mitigation area: the ARCO Refinery is located on the north side of Aldergrove Road. A shrub and forested community forms a dense riparian system up and down gradient of the on–site stream. The on–site reach of the seasonal stream lays within a ditch choked with reed canarygrass. Prior to ditching, the stream was probably a headwaters wetland with no channel. The ditch was presumably dug to facilitate drainage for agricultural use.

Surrounding land uses include: fallow fields to the east, forested tracts to the west and south, and Heavy Industry with rail to the north. The immediate use of the land for the selected mitigation site is a seasonally mowed hay field.

Soils

The silty Whitehorn silt loam soils on this site are suitable for wetland enhancement as is the neighboring Kickerville silt loam. They will provide sufficient hydrology as evidenced by the existing wetland. A silty–clay subsoil, found in both soil series, ensures slow percolation rates.

Reed canarygrass currently dominates the site and will require treatment. Because reed canarygrass occurs upstream and cannot be controlled, fumigation or importation of "clean" soils is not cost effective. The money saved will be used in a regular maintenance program. Site soils are also discussed in detail in Section 4.2 of this document.

Zoning

Current zoning for this site and the immediate area is Heavy Industrial.

6.0 Ecological Assessment of Mitigation Site

6.1 Vegetation

Vegetation within the proposed mitigation site is predominately agricultural palustrine emergent wetlands, but also includes agricultural upland fields. This site is currently farmed for forage crops. Seasonally saturated palustrine emergent wetlands are located in a flat depression southeast of a prominent upland ridge. The vegetation within the uplands and wetlands is dominated by non-native herbaceous plant species. Seasonally saturated and flooded scrub-shrub wetlands are located south and east of the mitigation site and are dominated by both non-native and native plant species. A ditched seasonal stream passes through the wetland, but is choked with reed canarygrass (Figure 4). Below is a description of the vegetation communities within the mitigation (creation, enhancement, and study) areas:

Upland Fields – Upland fields dominate the ridge running from Aldergrove Road towards Lonseth Road. Approximately 13 acres of upland field are located within the proposed mitigation area. The fields are dominated by a facultative community of non-native pasture grasses that is mowed annually. Representative species include: red fescue (*Festuca rubra*), vernal sweetgrass (*Anthoxanthum odoratum*), meadow foxtail (*Alopecurus pratensis*), velvet grass (*Holocus lanatus*), redtop (*Agrostis alba*), hop clover (*Trifolium dubium*), Canadian thistle (*Cirsium arvense*), oxeye daisy (*Chrysanthemum leucanthemum*), reed canarygrass (*Phalaris arundinacea*), English and common plantains (*Plantago lanceolata* and *P. major*), and white clover (*Trifolium repens*).

Palustrine Emergent Wetlands (PEM) – PEM wetlands are located within a flat depression at the headwaters of the seasonal stream corridor. Approximately 16.2 acres of PEM wetlands are located within the immediate proposed mitigation area. The wetlands are composed of a single vegetation class (herbaceous) with little complexity and is mowed annually. These wetlands support non-native and invasive plant species, predominately reed canarygrass, but meadow foxtail, red fescue, soft rush (*Juncus effusus*), velvet grass, sawbeak sedge (*Carex stipata*), bird's-foot trefoil (*Lotus corniculatus*), white clover (*Trifolium repens*), and redtop (*Agrostis alba*) are also present.

6.2 Water Regime

The topography within the mitigation area can be generally defined as flat to gently rolling terrain with a prominent ridge along the northwest side. Site surface and subsurface drainage is directed towards the south, off the adjacent ridge. A ditched seasonal stream crosses the subject area, although the ditch has not been maintained and is choked with reed canarygrass. The majority of the surface drainage either directly or indirectly drains into the unnamed seasonal stream, which flows into the Strait of Georgia approximately one mile south of the mitigation site.

A significant portion of the hydrology supporting this wetland originates from seasonal flooding of the site stream and poor soil percolation. Other factors influencing the hydrology within this wetland are direct

precipitation, stratigraphy, topography and soil texture. The average annual precipitation is 30 to 40 inches, with most falling in the months of November, December, January, February, and March. The average growing season is about 180 days and begins mid–March and ends the first part of November. The majority of the site wetland is underlain by Whitehorn silt loam, that, for this location, has a seasonal perched high water table at a depth of 0 to 12 inches from the surface November through May. The stratigraphy of Whitehorn silt loams is a series of slowly permeable soil horizons that are composed of layers of silt loams, loams, and sandy loams. Typically, subsoils underlying the wetlands have a silty clay subsoil. Dense silty clay prevents surface water collected from direct precipitation from percolating downward, resulting in saturated or inundated soil conditions, forming a perched high water table.

6.3 Soils

The Soil Conservation Service (SCS) indicates the presence of two soil series within the mitigation area. The dominant soil series is Whitehorn silt loam, which occupies the low areas within the site. Whitehorn silt loam is listed as hydric on the local Hydric Soils List (SCS 1991). A ridge of non–hydric Birchbay silt loam extends from the corner of Aldergrove and Gulf Roads southwest to the end of Lonseth Road.

6.4 Fauna

Although no sample plot was located in the mitigation area during bird surveys, notes were kept during site visits to this area (ATSI 1995). Birds observed included marsh wren, northern shrike, song sparrow, Savannah sparrow, common yellowthroat, barn and cliff swallows, northern harrier, and red–tailed hawk. Pacific chorus frogs were heard calling in the area and one dead rough–skinned newt was collected from the adjacent road (Gulf Road). No mammals were observed within the mitigation area, but frequent observation of coyote and deer, scat and prints, indicates these species commonly use the area. Refer to Section 3.4 for further information.

6.5 Existing Functions and Values

The Wetland Characterization system developed by the Washington Department of Ecology was used to assess the functional values of the wetland currently located within the proposed mitigation site. Wetland functions are divided into primary categories of wetland condition, buffers, wildlife habitat, fisheries habitat, hydrology, cultural values, shoreline stabilization, and heritage value. Within these primary categories individual functions are assessed point values of 1–3. Functions having values of 1 are considered low value; functions with values of 2 have moderate value; and functions with 3 points have high values. Below is a summary for the palustrine emergent, reed canarygrass wetland proposed for enhancement.

Table 5 indicates the functions and associated values for the wetland currently present in the proposed mitigation area. Functions which serve "moderate to high" values are: human impact, water quality, flood and storm drainage protection, and support of baseflow. The remaining functions received "low" values.

Table 5. Wetland Functions Currently Present at Mitigation Site.

FUNCTION	VALUE
Human Impact	2
Buffer structure and function	1.5
Breeding, rearing, feeding, and wintering habitat for fish and/or wildlife.	1
Water quality	3
Flood and storm drainage protection	2
Support of baseflow	3
Shoreline stabilization	N/A
Sealevel rise	N/A
Ground water exchange	1
Cultural values	1
Heritage value	1

Several sources of human impact to this wetland have been observed. The surrounding land uses include regenerating forested tracts that were logged approximately 5 years ago, mowed agricultural land, and the ARCO refinery across Aldergrove Road. Gulf Road abuts the eastern side of the wetland. The headwaters to the on-site seasonal stream are the ditches along Gulf Road. Runoff from the roads may be a potential source of moderate pollutants entering the system. Other impacts include past ditching of the on-site seasonal stream and yearly mowing of the surrounding fields and wetland vegetation. The wetland is currently dominated by invasive plant species (reed canarygrass). The immediate buffers around the wetland are a mix of regenerating forest, mowed hay fields, and Gulf Road.

The current habitat value within this wetland is low. The wetland is composed of a single vegetation class dominated by non-native and invasive herbaceous plant species. No open water is present. The wetland has a moderate percentage of edge area for its shape. Habitat features such as snags, logs, or perches are absent from the wetland or the immediate buffer, except to the south, where low perches are present. Due to it's seasonal nature, the wetland and stream do not provide habitat for fish, but downstream the stream flows into a brackish marsh (one mile south) that may support fish. No fish have been found and are not considered to be present within the wetland.

Based on the Wetland Characterization forms, the wetland serves high water quality functions. This value is based on a relatively large size (> 10 acres, including off-site), moderate pollution inputs, slow water movement within the wetland, dense emergent vegetative cover, and moderately low slopes surrounding the wetland. Water movement is slow during flood periods to non-existent outside the flood season. The rate of movement within the wetland is slowed by low gradients and dense emergent vegetation.

The wetland serves moderate flood and stormwater abatement functions. The wetland is adjacent to a seasonal stream and is located at the headwaters of the stream. The wetland is located in a slight depression, providing low to moderate storage capacity. The dense emergent vegetation aids in reducing velocities and settling suspended sediment.

Because the wetland is adjacent to a seasonal stream, upgradient from a brackish marsh system, it has significant value in supporting the baseflow for the stream.

The wetland is not associated with any large body of water (lake, river, marine system), so does not serve functions associated with shoreline stabilization or sea level rise.

Heritage and Cultural values associated with this wetland are low. The wetland does not provide any apparent aesthetic value. It is a reed canarygrass dominated agricultural field. The wetland is not of a sensitive class and is not documented by the Natural Heritage Society as a high quality wetland. The site is not known to be on the National or State Register of Archaeological and Historic Sites and is not known to support any endangered, threatened, sensitive, or priority plant or animal species. The site is not identified in the any local Parks or Recreation Plans.

6.6 Expected Wetland Functions Post-Creation and Enhancement

Functional value will increase with most functions and at a minimum remain the same as a result of the proposed enhancement activities (Table 6). The only functions not expected to increase in value after enhancement are groundwater exchange and heritage value (heritage should however increase significantly as the created and enhanced wetlands mature). The soils underlying the wetland have a dense silt-clay layer restricting interaction with groundwater, enhancement activities would not change this. Heritage values are base on the presence of rare wetland communities and/or the presence of rare or sensitive plants or animals. Although the mitigation project will create palustrine forested wetlands, it will take many decades before the site would fit the description of a mature forested wetland.

Table 6. Expected Changes in Wetland Functional Values within Enhanced Wetlands.

Function	Current Value	Post-Enhancement Value
Human Impact	2	3
Buffer structure and function	1.5	3
Breeding, rearing, feeding, and wintering habitat for fish and/or wildlife	1	3
Water quality	3	3
Flood and storm drainage protection	2	2
Support of baseflow	3	3
Shoreline stabilization	2	3
Sea level rise	N/A	N/A
Ground water exchange	1	1
Cultural value	1	2
Heritage value	1	1

Surrounding landscapes will include forested and shrub habitat to the south and west and a connection to the protected stream corridor. This adjoining stream corridor is a naturally vegetated corridor that extends from the mitigation site to the marine environment. This mitigation proposal places the stream corridor (100 feet on both sides of stream high water mark) in a conservation easement recorded on the property deed.

A rail line will be located approximately 50 feet west of the enhancement area and will lie between the creation areas. The area surrounding the rail line will be planted with native upland shrubs and trees to provide sound and visual buffers. Gulf Road is adjacent to the east side of the project with no upland buffer per se, however the current emergent vegetation will be enhanced with native tree and shrub species, providing a buffer with more diversity and structure.

The wetland lies at the headwaters of the seasonal stream. Wetland hydrology is currently provided by a straight ditch surrounded by non-native, herbaceous vegetation. The ditch will be rerouted to flow through

a series of seasonal pools and re-vegetated with native herbaceous, shrub, and tree species. Water movement through the existing wetland is slow and passes through dense emergent vegetation. Water movement through the mitigation area would continue to be slow and pass through a dense combination of herbaceous and woody vegetation. Although the wetland currently provides significant water quality functions, addition of woody plant species and increased structural diversity of the topography and vegetation will further increase water quality functions.

Current human impacts to the on-site wetland include ditching, road run-off, seasonal mowing, and past logging in the forested buffer to the south. Much of the water entering the wetland originates from road side ditches along Gulf Road. This water may contain some pollutants typical of road runoff (e.g. petroleum products and heavy metals). Increased channel area and floral diversity would increase the mechanical and biological treatment of pollutants within the mitigation area.

Habitat value within the mitigation area will increase in functional value. The wetlands are currently dominated by a single vegetation class (dominated by an invasive plant species) with no interspersion between wetland classes. No significant habitat features currently exist within the wetland. Enhancement of this area would increase the number of wetland classes from one to four and increase the percentage of native wetland plants. Habitat features (e.g. snags, logs, perches, islands) will be added during the construction and also will naturally form as the community matures. As mentioned previously, the mitigation area is connected to a larger riparian-marine corridor that will be protected under a conservation easement.

At present there is little cover over the stream channel other than reed canarygrass. Plantings of dense woody plant species will provide a canopy that will shade the water to maintain low water temperatures. Large organic matter (e.g. logs and root masses) will provide shelter for invertebrates and amphibians, add structural diversity, and will act as nurse logs.

6.7 Functions Summary

Table 7 provides a comparison of the existing wetlands to be filled with the changes in functions and values as the result of this project. A total of 5.85 acres of existing wetlands and their associated functions will be lost due to fill. The lost wetland acreage will be replaced by creating an equal area of wetlands within the proposed mitigation area. In addition, the values of all the functions found in the filled wetlands will be replaced and increased. The increase in value will be associated with a greater floral, faunal, and structural diversity; association with a seasonal stream and a riparian corridor; and placed in a native growth protection area.

Proposed enhancement of a wetland that is currently of low value will increase in value in most functions (Table 7). The vegetation diversity, both in species and structure will be increased, improving wildlife and water quality and quantity functions. The resultant project will also provide more diverse scenic opportunities therefore increasing the culture functions.

Table 7. Summary of the functions and values for the impacted and mitigated wetlands.

Functions	Existing PEM Wetlands (4.3 acres)	Existing PSS Wetlands (1.45 acres)	Existing PFO Wetlands (0.1 acres)	Created PSS/PFO Wetlands (5.9 acres)	Enhanced Wetlands (16.2 acres)
Wetland Condition	1.5	2	3	3	3
Buffer Structure and Function	1.5	2.5	2.5	3	3
Wildlife Habitat	1	2	1.5	3	3
Water Quality	2	2	3	3	3
Flood and Stormwater Protection	1	2	2	2	2
Support of Baseflow	1	2	1	3	3
Shoreline Stabilization	n/a	n/a	n/a	n/a	n/a
Groundwater Exchange	1	1	1	1	1
Cultural Value	0	0	0	2	2
Heritage Value	0	0	0	1	1

6.8 Existing Water Quality

No water quality data has been collected to date.

6.9 Existing Buffers

The proposed mitigation site is currently buffered by field and forest vegetation. The buffer within 100 feet of the existing wetland is dominated by non-native grasses on the north and west side, Gulf Road on the east, and regenerating shrub and forest vegetation on the south. Beyond the immediate buffer, forested and shrub vegetation dominate on the east side of Gulf Road and to the south and west of the mitigation area, the ARCO refinery is located on the north side of Aldergrove Road.

Surrounding land uses include: fallow fields to the east, forested tracts to the west and south, and Heavy Industry with rail to the north.

6.10 Wetland Rating and Water Type

Based on the Whatcom County Wetland Rating System, this palustrine emergent wetland is a Category III wetland. The DOE four tiered rating system also designates this wetland as a Category III wetland. These ratings are based on a size of greater than 5 acres, hydrological connection to a seasonal stream, and the presence of one wetland class dominated by non-native and invasive vegetation (ATSI 1995).

Based on the Whatcom County Water Categories Rating System, the on-site stream is a Type 5 Water within the reach on the mitigation site. This rating is based on the streams seasonal nature, no records of use by anadromous fish or game fish, and no domestic use. The average channel width is between two and three feet in most areas. Within the reach on the mitigation site, the stream has been ditched and is currently choked with reed canarygrass.

6.11 Position and Function of Wetland in Landscape

The proposed mitigation enhancement site is located at the headwaters of an unnamed seasonal stream. Water collects from upstream ditches and flows southwest across the subject area. The stream flows within a ditch across the subject field and enters a braided channel south of the mitigation area. The stream flows through a large ravine, approximately 1/2 mile down gradient from the proposed mitigation area.

6.12 Site Constraints

None identified.

7.0 FINAL SITE PLAN

7.1 Methods

Goal 1: Create 5.9 acres of seasonally saturated palustrine forested/scrub-shrub wetland to provide a 1:1 areal replacement ratio for wetlands filled.

Water Regime

A. A seasonally saturated hydrologic regime will be present within the created wetland areas.

> Performance Standard: A minimum of 5.9 acres will be saturated within the upper 12 inches of the soil horizon for at least 21 days during the early growing season (March/April).
>
> **Method for Performance Standard:** Seasonally saturated wetlands will be created by removing the top 12 to 24 inches of topsoil to expose the perched water table from a total of 5.9 acres of upland (hydrology data from Shapiro 1995).

Vegetation Structure

A. The created wetland areas will be vegetated with a minimum of 5.9 acres of palustrine forested/scrub-shrub vegetation class with canopy, shrub, and herbaceous vegetation layers. Partial planting of the plants will begin one year after construction to allow confirmation of the hydrological regime. Monitoring will occur over a ten year period on a seasonal basis with reports written the 1st, 3rd, 5th, 7th, and 10th years post construction/planting.

First year monitoring. Performance Standard: Native plant species will have a minimum cover of 15% after the first year.

Third year monitoring. Performance Standard: Native plant species will have a minimum cover of 25% after the third year.

Fifth year monitoring. Performance Standard: Native plant species will have a minimum cover of 50% after the fifth year.

Seventh year monitoring. Performance Standard: Native plant species will have a minimum cover of 75% after the seventh year.

Tenth year monitoring. Performance Standard: Native wetland forest vegetation will cover the 5.9 acre site with 50% canopy cover, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Methods for Performance Standard: Native emergent, shrub, and tree plant species from the list in Appendix C will be planted in random groupings of species. Plant sources will be from local nurseries using plants from the local gene pool. A combination of sprigs and seeds will be used in planting herbaceous plants. Plant material will be installed according to the specifications in Appendix C.

Goal 2: Enhance a 16.2 acre monotypic stand of reed canarygrass into a diverse forested wetland habitat.

Water Regime

A. Both seasonally saturated and seasonally flooded hydrologic regimes will be present within the enhancement area.

Performance Standard: A minimum of 16.2 acres will be a complex (an approximate 8.1 acres of each) of seasonally saturated and seasonally flooded soils. The saturated zone will occur within the upper 12 inches of the soil horizon for at least 21 days during the early growing season (March/April). The flooded zone will also occur for 21 days during the growing season with an approximate depth of 24 inches.

Methods for Performance Standard: Seasonally saturated and shallow seasonally flooded wetlands currently exist for the enhancement area. Additional deep (24 inches) flooded areas will be created by removing the top 6 to 12 inches of topsoil to expose the perched water table from approximately 1/2 of the area. In addition, small "islands" approximately 6 to 12 inches in height, using clean upland soil from adjacent areas, will be deposited within the flooded area. An excavator will be used to add meanders to the current straight, ditched stream channel. Soils removed for adding depth to the mitigation site will be transported off-site.

Vegetation Structure

A. The dominance of reed canarygrass will be reduced within the mitigation area within ten years.

Performance Standard: Less than a 25% cover of reed canarygrass, measured along permanent transects with 20X50 cm rectangular quadrats, will be present after ten years.

Method for Performance Standard: Reed canarygrass will be sprayed with glyphosate in the Spring. Several weeks after glyphosate application the field will be plowed, disked, and planted with a cover crop (Appendix C, such as annual rye). The field will be either entirely or spot sprayed between 30 to 45 days later and replanted with a cover crop. All spraying will be performed by a certified pesticide–herbicide applicator and monitored by a qualified biologist. If the reed canarygrass is greater than 24 inches high, it will be cut and bailed and will be allowed to grow approximately 2 inches prior to spraying.

B. The wetland will be vegetated with a minimum of 16.2 acres of palustrine forested, palustrine scrub–shrub and palustrine emergent vegetation classes composed of native plant species. Percent cover of the vegetation and number of live and dead plants (by species) will be measured along permanent transects using 20X50 cm quadrats. Partial planting of the plants will occur one year after construction to allow confirmation of the hydrological regime. Monitoring will occur over a ten year period on a seasonal basis with reports written the 1st, 3rd, 5th, 7th, and 10th years.

First year monitoring. Performance Standard: Native plant species will have a minimum cover of 15% after the first year.

Third year monitoring. Performance Standard: Native plant species will have a minimum cover of 25% after the third year.

Fifth year monitoring. Performance Standard: Native plant species will have a minimum cover of 50% after the fifth year.

Seventh year monitoring. Performance Standard: Native plant species will have a minimum cover of 75% after the seventh year.

Tenth year monitoring. Performance Standard: Native wetland forest vegetation will cover the 16.2 acre site with 50% canopy cover, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Methods for Performance Standard: Entire area will be planted with a representative sampling of the listed tree and shrub species (Figure 5 and Appendix C), bare root or 1 gallon containers, within groups of 5 to 10 plants spaced 20 to 100 feet apart, one year post excavation. The entire area will also be planted with a representative sampling of the below listed herbaceous species (herbs), bare root or seeds, within groups of 10 to 20 plants spaced 20 to 50 feet apart, two years post excavation. The herbaceous species will also be seeded (with seed hand collected locally), if practicable, randomly along the entire perimeter of the seasonally flooded areas, additional native plants may be included. The buffer and remaining area will be planted with annual rye. These plants and seeds will be planted in late winter (assume late February or mid March at the latest). This lapse of time will allow for a complete and thorough understanding of the seasonal variation within the water table, therefore increasing the success rate of the plantings. If natural recruitment of desired plants occurs prior to two years, planting will discontinue. Actual monitoring will begin the following summer (approximately one year after excavation) to allow time to observe natural vegetation recruitment and success of seed stock, bare root, and container plantings. It is the belief of the designer that natural recruitment of many plants will occur within one to two years of construction. It is therefore our intent to allow all natural non–invasive plants to become established and document their presence. Measurement of re–vegetation success will follow the first two years of construction and will consist of 50% cover (or one healthy plant per square meter of entire site). Success following three years post construction will be 100% cover of native and/or non–invasive species. If after the first two years following construction the goal

of one healthy plant per square meter is not obtained, the bare areas will be planted. Two as-built reports will be written, one post construction in the fall and the second post planting in early spring. All subsequent monitoring will occur on an annual basis during the fall (prior to the first killing frost) and reports the 1st, 3rd, 5th, 7th, and 10th year.

Habitat Attributes

A. The enhancement area will provide habitat for at least four species of **amphibians** within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for both terrestrial and aquatic amphibian species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present throughout the enhancement area early in the growing season (Feb.–July). To restrict occupation by bullfrogs (*Rana catesbeiana*) year-long inundation within the enhancement area will be avoided.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Methods for Performance Standards: Amphibian breeding habitat will be created by excavating pools with a variety of depths and sizes to maximize the potential breeding areas for a number of amphibian species (Figure 5). A variety of emergent plant species will be planted to provide support for amphibian egg masses. Pools will be excavated with low slopes and seasonal, but long duration standing water to provide breeding areas of northwestern salamanders, rough-skinned newts, red-legged frogs, Pacific chorus frogs, and long-toed salamanders that have long maturation rates. Pools with short inundation periods (3 to 5 weeks) will be created to facilitate Pacific chorus frogs and long-toed salamanders that utilize temporary pools. Approximately 200 each of logs and root masses will be spread throughout wetland areas to provide cover for amphibians.

B. The enhancement area will provide habitat for at least four species of **aquatic insects** within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for aquatic invertebrates. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present throughout the enhancement area early in the growing season (Feb.–July).

Method for Performance Standard: Snags will be installed at a variety of heights and angles. Root masses and logs in various stages of decay will be scattered randomly throughout the enhancement area. Logs or root masses located within 25 feet of the stream channel will be partially buried to prevent movement.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Method for Performance Standard: See above under Section A.

C. The enhancement area will provide habitat for at least three **waterfowl** species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide nesting sites, cover and forage areas for waterfowl species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present throughout the enhancement area early in the growing season (Feb.–July).

Method for Performance Standard: Snags will be installed at a variety of heights and angles. Root masses and logs in various stages of decay will be scattered randomly throughout the enhancement area.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Method for Performance Standard: Native emergent, shrub, and tree plant species from the list in Appendix C will be planted in random groupings of species. Plant sources will be from local nurseries using plants from the local gene pool. A combination of sprigs and seeds will be used in planting herbaceous plants. Plant material will be installed according to the specifications in Appendix C.

Performance Standard: A minimum of 5 temporary nesting boxes suitable for cavity nesting waterfowl (e.g. wood duck, hooded merganser) will be placed around the mitigation area.

Method for Performance Standard: Boxes will be constructed of cedar and measure 12" wide by 24" high. They will be installed on posts or snags throughout the enhancement area.

D. The enhancement area will provide habitat for at least two **mammal** species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide cover and forage areas for mammal species. Woody material will be > 12 inches in diameter and > 15 feet long.

Method for Performance Standard: Snags will be installed at a variety of heights and angles. Root masses and logs in various stages of decay will be scattered randomly throughout the enhancement area.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years to provide cover and forage for mammal species.

Method for Performance Standard: Native emergent, shrub and tree plant species from the list in Appendix C will be planted in random groupings of species. Plant sources will be from local nurseries using plants from the local gene pool. A combination of sprigs and seeds will be used

in planting herbaceous plants. Plant material will be installed according to the specifications in Appendix C.

E. The enhancement area will provide habitat for at least five **passerine bird** species within five years.

Performance Standard: A minimum of 50 snags, 200 logs, and 200 root masses will be randomly placed throughout the wetlands to provide nesting sites, cover and forage areas for passerine species. Woody material will be > 12 inches in diameter and > 15 feet long.

Performance Standard: Multiple areas (1 to 2 acres) of standing water with maximum depths of 24 inches shall be present within the enhancement area early in the growing season (Feb.–July).

Method for Performance Standard: Snags will be installed at a variety of heights and angles. Root masses and logs in various stages of decay will be scattered randomly throughout the enhancement area. Logs or root masses located within 25 feet of the stream channel will be partially buried to prevent movement.

Performance Standard: Three vegetation classes, dominated by native wetland forest vegetation, will cover at least 16.2 acres with a minimum canopy closure of 50%, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Method for Performance Standard: Native emergent, shrub, and tree plant species from the list in Appendix C will be planted in random groupings of species. Plant sources will be from local nurseries using plants from the local gene pool. A combination of sprigs and seeds will be used in planting herbaceous plants. Plant material will be installed according to the specifications in Appendix C.

Performance Standard: A minimum of 5 temporary nesting boxes suitable for passerine species will be placed around the mitigation area (e.g. tree and violet green swallows, black–capped chickadee, Bewick's wren).

Method for Performance Standard: Boxes will be constructed of cedar and measure 4" wide by 5" high. They will be installed on posts or snags throughout the enhancement area.

Goal 3: Assure the protection of the on–site stream corridor.

A. A sufficient buffer shall remain to maintain the current riparian corridor and habitat attributes.

Performance Standard: A 100 foot corridor on both sides of the on–site stream will be placed in a Native Growth Protection Area and protected.

Method for Performance Standard: Stream side buffer shall be field flagged prior to any nearby construction.

Goal 4: Conduct a study on a designated 1.5 acre plot researching the natural regeneration of vegetation over time within a seasonally saturated, palustrine emergent agricultural field, and investigate the success of selected upland, facultative upland, and facultative wetland plants planted over a range of hydrogeomorphic regimes within this field.

A. Record the natural successive changes over time in an agricultural palustrine emergent wetland over a range of hydrogeomorphic regimes.

Performance Standard: A minimum of 3 permanent transects will be established perpendicular to the water gradient within the 0.75 acre (1/2 of the 1.5 acre area) agricultural field (Figure 5).

Method for Performance Standard: Transects will be marked with rebar in the field. Data will be collected on numbers and types of species present, their percent cover, and their heights will be recorded from representative sample plots along the transects over a period of ten years. Statistical analysis will be performed to compare the above mentioned data between and among hydrological regimes.

B. Investigate the success of selected upland, facultative upland, and facultative wetland plant species planted over a range of hydrogeomorphic regimes.

Method for Performance Standard: The following plants will be planted approximately 1 meter apart in rows spaced approximately 2 meters apart: *Abies grandis, Acer circinatum, Acer macrophyllum, Betula papyrifera, Crataegus douglasii, Cornus stolonifera, Holodiscus discolor, Lonicera involucrata, Oemleria cerasiformis, Physocarpus capitatus, Picea sitchensis, Pinus contorta, Prunus emarginata, Pseudotsuga menziesii, Pyrus fusca, Rosa gymnocarpa, Rosa nutkana, Rubus spectabilis, Rhamnus purshiana, Sambucus racemosa, Spiraea douglasii, Symphoricarpos albus, and Tsuga heterophylla.*

Method for Performance Standard: Data will be collected on numbers and types of species present, their percent cover, and their heights will be recorded from representative sample plots along the transects over a period of ten years. Statistical analysis will be performed to compare the above mentioned data between and among species.

Goal 5: This goal is not directly related to wetland disturbance, but addresses cultural functions lost on a regional basis. This goal attempts to provide compensation for the regional loss of natural resources important to the Lummi Indian Tribe's culture heritage.

A. Natural resources available for harvest by the Lummi Indian Tribe will be established to provide totem pole stock and cedar bark for future cultural uses by the Lummi Indian Tribe.

Method for Performance Standard: Specific locations and numbers of trees outside the mitigation areas will be determined in a joint planning effort between the proponent and the Lummi Indian Tribe.

7.2 Soil Amendments

Although reed canarygrass is present, the original wetland soil will be used with minor modifications in topography. Treatment of the soil will include spraying with glyphosate, plowing, and planting with cover crops and native vegetation.

Approximately nine (9) acres of (clean, no invasive plants present) soil from the forest to the west, within the proposed rail loop, will be transferred and placed in approximately 200, 50 foot diameter seasonally saturated islands. These islands will be randomly scattered throughout the seasonally flooded area within the enhancement and creation site to create seasonally saturated zones in existing and created flooded areas (Figure 5). These soils are Birchbay silt loam with a loamy texture. The donor areas are dominated by native forest plant species such as red alder, paper birch, vine maple, red elderberry, western snowberry, and baldhip rose. No non-native or invasive plant species were observed in these areas during site visits (ATSI 1995).

7.3 Plant Material

Plantings in the enhancement area are categorized according to four broad water regimes: upland, forested, scrub–shrub, and emergent. The species included in each of these water regimes are listed in Appendix C.

This water regime system allows plant species to be chosen that take advantage of select but different hydrologic conditions, assuring a diversity of species and a successful project. Plant species and density of planting described in Appendix C will be followed.

All excavation, woody material placement, and planting of all wetland areas will be done **in the presence of a wetlands biologist familiar with the project according to the drawings and plan.** Soil quality will be one of the major determinants of the success of the project, therefore excavation may deviate slightly from the construction drawing at the discretion of the biologist.

Planting will take place in the late winter or early spring as indicated above (7.1, Goal 2, Section C, item B, **Methods for Performance Standard** (page 27) . Plant stock will primarily come from off–site sources for quantities sufficient for adequate cover. A contract will be made with a local nursery for plant materials. Appendix C indicates the condition (e.g. bare–root, balled–and–burlapped, cutting, seed) of the plant material for each species and the water regime it will be placed. Additional species noted at the bottom of Appendix C will likely be introduced by wind and waterfowl.

7.4 Habitat Features

Snags and downed logs will be added at a densities discussed above (7.1, Goal 2, pg. 26). Snags provide a variety of wildlife with food, habitat, and substrate. Cavity nesting species such as woodpeckers, chickadees, wrens, some owls, wood ducks, and hooded mergansers use snags for nesting sites. Insects inhabiting decaying wood in snags and downed logs provide food for a number of species including, woodpeckers, squirrels, rough skinned newts, northwestern salamander, and western red–backed salamander. Logs within the wetland provide pathways through the wetlands and substrate for wetland vegetation.

Inundated areas within the wetland increase the value of the wetland to wildlife by providing potential breeding and rearing areas for amphibian species such as western red–backed salamander, northwestern salamander, rough skinned newts, red–legged frogs, and Pacific chorus frogs. These species require a diversity of terrestrial and aquatic habitats that do not currently exist in this area.

No habitat features are suggested for the riparian corridor. Sufficient material occurs within the corridor and natural vegetation will continue to add to the number of downed woody material and snags over time. Significant damage to existing vegetation may occur from heavy equipment if additional woody material were to be added.

7.6 Erosion Control

In order to rapidly establish ground cover, bare ground within mitigation areas will be planted with a mix of the following species (*Lolium multiflorum, Alopecurus geniculatus, Agrostis stolonifera, Holcus lanatus, or Lotus corniculatus)* at a minimum rate of 50 lbs/acre. This will inhibit invasion by weedy exotic species, reduce erosion, and improve the quality of the soil.

8.0 MONITORING PLAN

Monitoring will occur on a seasonal basis for 10 years post construction/planting. However, monitoring reports written specifically for the regulatory agencies will be performed by a qualified wetland biologist at the peak of the growing season for 10 years (years 1, 3, 5, 7, 10) after the wetland construction and planting is completed. A quantitative analysis of biotic and abiotic conditions will be made in July/August during years 1, 3, 5, 7 and 10. The written report will summarize the findings and will be provided to the Army Corps of Engineers and other relevant agencies after each monitoring session. These reports will include an assessment of plant survival and percent cover, conditions of plants, natural plant recruitment, soil conditions, hydrology, invasion by exotic plant species and percent cover, observations of fauna, and an overall project description and suggested maintenance procedures.

Any changes that occur in this mitigation shall first be reviewed by a qualified wetlands biologist and if the change/s are/is considered significant, the U.S. Army Corps of Engineers will be contacted.

8.1 Vegetation

Permanent transects and photo points will be established for data collection. Percent cover of vegetation, survivorship of planted material, height of trees and shrubs, and total canopy cover will be tabulated at the peak of the growing season (July/August). Mitigation success will be staged as follows:

First year monitoring. Performance Standard: Native plant species will have a minimum cover of 15% after the first year.

Third year monitoring. Performance Standard: Native plant species will have a minimum cover of 25% after the third year.

Fifth year monitoring. Performance Standard: Native plant species will have a minimum cover of 50% after the fifth year.

Seventh year monitoring. Performance Standard: Native plant species will have a minimum cover of 75% after the seventh year.

Tenth year monitoring. Performance Standard: Native wetland forest vegetation will cover the mitigation site with 50% canopy cover, an 80% cover of native shrubs, and 25% cover of native herbaceous plants within ten years.

Planted and natural recruitment of plants will be noted and discussed. If a performance standard is not met within the time specified in the mitigation plan an analysis of the cause of failure will be determined, proposed corrective action will be made, and a time frame for implementing these actions will be presented. Minor corrective measures will be included in routine maintenance and will be identified in the subsequent monitoring report.

8.2 Water Regime

The water table will be measured during the beginning of the growing season (April) and once in the summer (August) for the entire monitoring period during the 1st, 3rd, 5th, 7th, and 10 year.

8.3 Development of Habitat Structure

Habitat variables of plant species present and percent cover (plus height for shrubs and trees), total canopy cover, density of dead wood, and vertical vegetation density will be measured along 3 permanent transects. Permanent photo points will be established along each transect and photographs will be taken at the peak of each growing season (July/August).

8.4 Fauna

Aquatic macro-invertebrates will be sampled by dip net in the spring and late summer during the monitoring years. Insects will be keyed to genus. Records of taxa observed will be kept.

Amphibians will be sampled by visual observation in the spring and fall of each monitoring year. Counts will be made of amphibian egg masses in the spring of each year. Records of observations will be maintained of species observed and egg masses.

Birds will be identified by call, song, pecking and drumming patterns, and visual sighting during 15 minute observations at two permanent census stations during April/May and December/January of the monitoring years.

9.0 SITE PROTECTION

9.1 Legal protection

The mitigation site, study site, and riparian buffer will be designated as a Native Growth Protection Area recorded on the property deed and will read as follows:

All land within the Native Growth Protection Area shall remain in a natural state. There shall be no clearing, vegetation removal, grading, filling, or construction of any kind within this area without the written approval of Whatcom County or responsible agency. The only exception to this requirement shall be in the case of emergencies for the protection of private property and public health, safety, and resources, such as for the removal of diseased or hazardous trees, or maintenance of existing roads, or installation of utilities, or transportation corridors that "may" be required to cross the seasonal stream, only. Any disturbance of vegetation that may occur through such emergency activities shall be repaired. For possible permanent damage to this area, a permit from the relevant agencies shall be obtained. The mitigation site, study site, and riparian buffer will be protected in perpetuity.

10.0 MAINTENANCE AND CONTINGENCY PLANS

10.1 Maintenance schedule

The following maintenance activities will be funded for this site for ten years after construction and planting: site inspection and reports, weed control, plant replacement, erosion control, and protection from herbivores.

Weed control will begin immediately after planting and will occur monthly if necessary during the growing season for the first two years and yearly after that. Plants will be replaced if a survival rate of less than 80 percent of a given species is observed and if natural recruitment has not occurred. Plants will be inspected during seasonal visits for significant damage from herbivores. Spot spraying of glyphosate for control of reed canarygrass will occur on the same regime. If predation of young plants becomes a

problem (reduction of greater than 50% of plantings), animal repellents such as METHOCARB® for geese or ROPEL® for deer may be used.

10.2 Contingency Plan

If a performance standard is not met within the time specified in the mitigation plan an analysis of the cause of failure will be determined, proposed corrective action will be made, and a time frame for implementing these actions will be presented. Minor corrective measures will be included in routine maintenance and will be identified in the subsequent monitoring report.

If significant reduction of reed canarygrass cannot be accomplished through herbicide application, plowing and planting with a competitive cover crop, flooding of the field will occur. Flooding can be accomplished by use of the installed weir. With the presence of the berm and weir most of the field can be flooded to depths of between three to six feet.

11.0 IMPLEMENTATION SCHEDULE

11.1 Construction Schedule

Initial spraying of glyphosate for control of reed canarygrass will occur in the early Spring, followed by plowing and disking (if practicable), and application of an erosion/competitive cover crop (Appendix C). An additional application of glyphosate will occur in 30 to 45 days following the initial spraying, if required, and the site will again be seeded with an annual cover crop. Excavation will be in the dryer summer months (July/August/September). **If practicable, all spraying and plowing will occur the first year prior to the construction of the terminal.**

11.2 Monitoring Schedule

An "as-built" report will be provided upon completion of construction and planting, and updated as both progress if extended over a one year period. This site will be monitored on a seasonal basis for 10 years following construction and planting. These seasonal site visits are intended to be qualitative and will give the assigned biologist the necessary information to understand the subtle changes (hydrological, flora, and faunal use) of the site. A more intensive monitoring will occur on the 1st, 3rd, 5th, 7th, and 10 year post planting. A report will be written as discussed in the above sections to be provided to the relevant agencies (U.S. Army Corps of Engineers, etc.)

12.0 PERFORMANCE BOND

A bond will be purchased before construction begins. A total construction bond of $509,620.00 based on $2.00 a square foot of wetland disturbed. The bond will be divided into three phases: construction, planting, and maintenance and monitoring. Two-thirds ($339,938.00) of the bond will be placed in the construction phase and will be released upon completion of construction and submittal of and approval of the as-built report, by U.S. Army Corps of Engineers. One-sixth ($84,857.00) will be held until planting has been completed and will be released with the submittal of the first year monitoring report with approval by the U.S. Army Corps of Engineers. The remaining one-sixth ($84,857.00) will be applied towards maintenance and monitoring and will be released at the end of the monitoring period (10 years research and monitoring for the creation, enhancement, and study sites).

The bond figures mentioned above are not the anticipated costs, but are for the assurance that the project will be completed. If at any time a portion of said work is completed, that relative portion of the bond will be released.

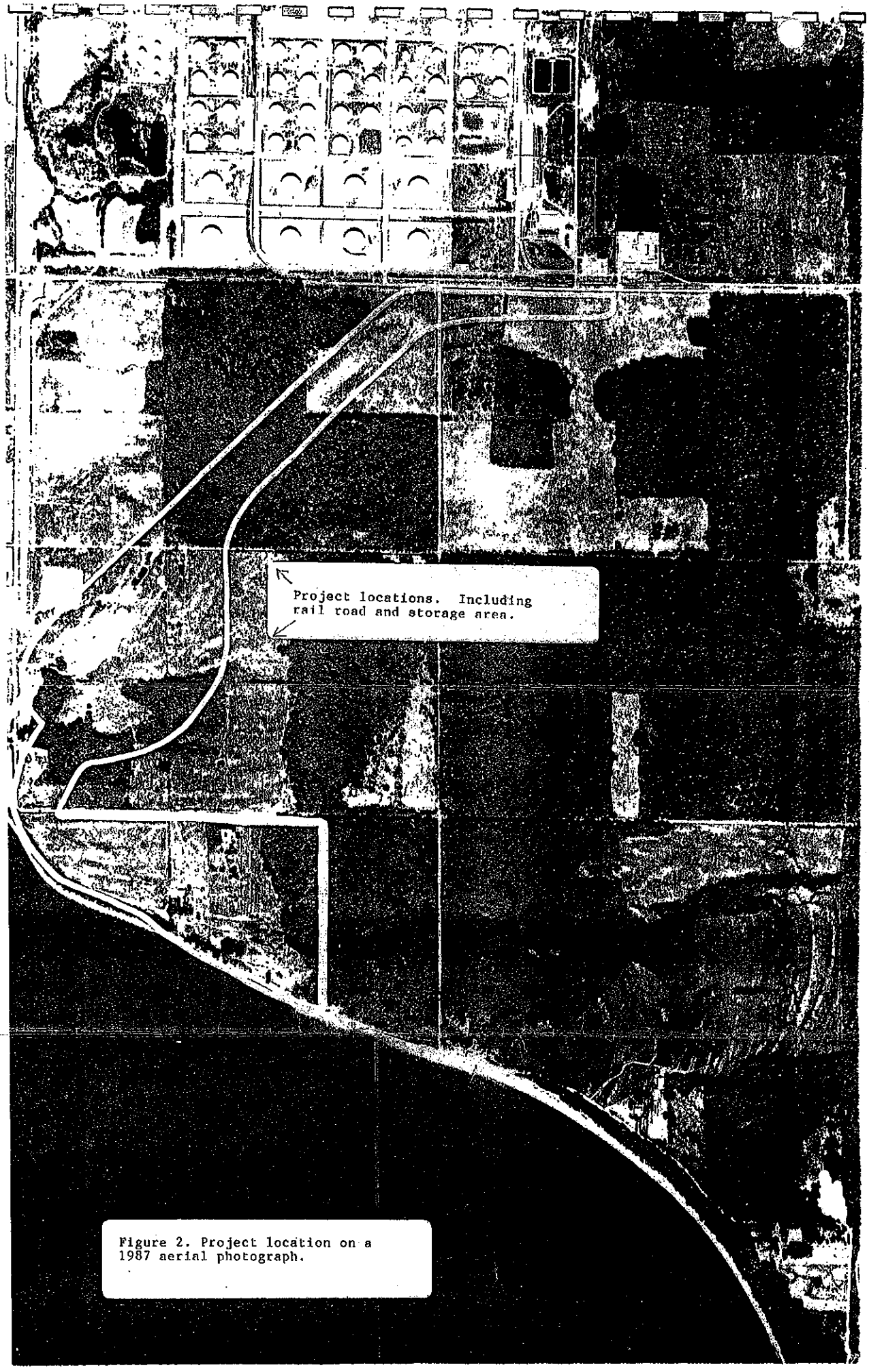


Figure 2. Project location on a 1987 aerial photograph.

Figure 4. Native Growth Protection areas. Including mitigation site and creek channel area.

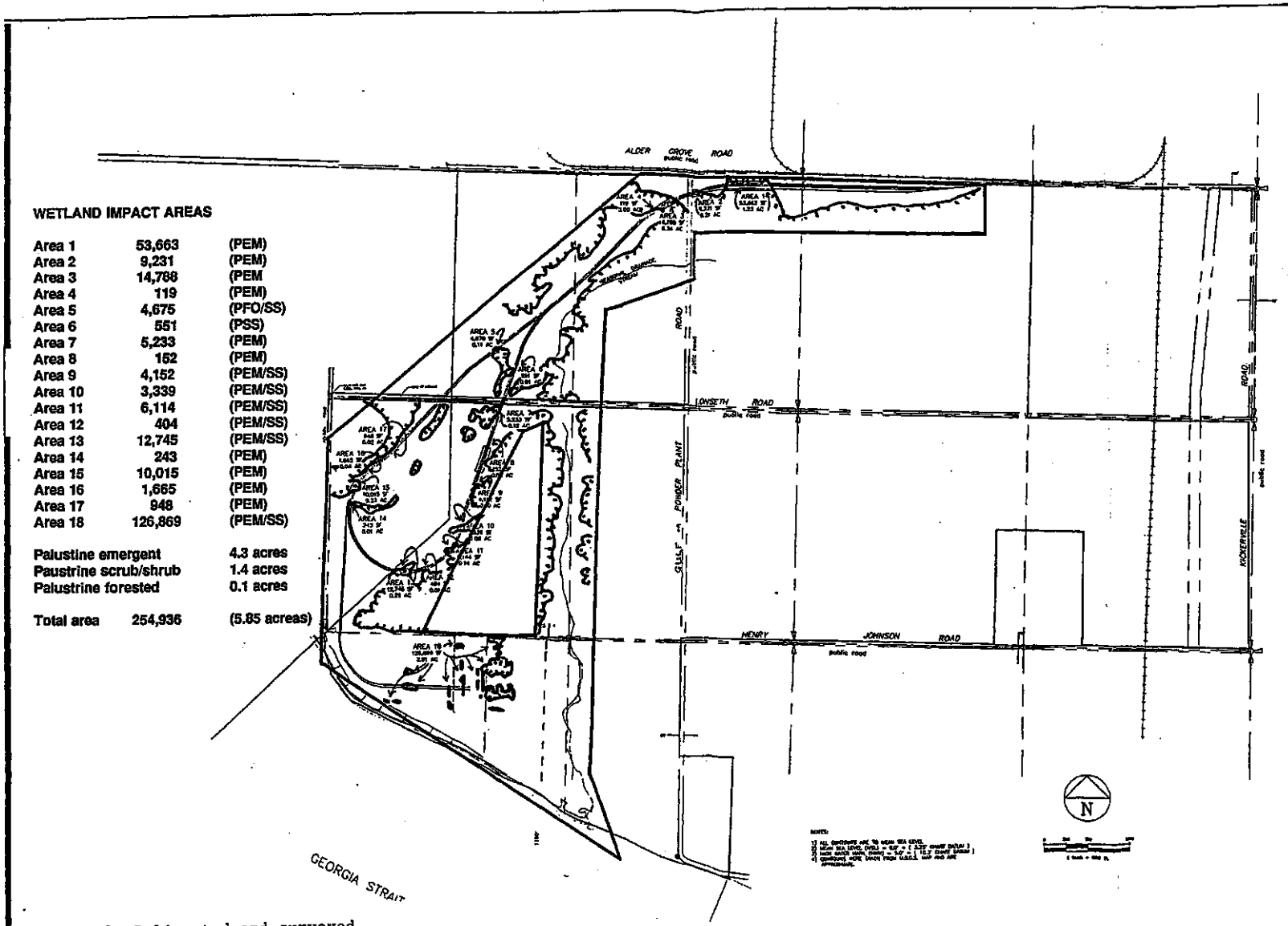


Figure 3. Delineated and surveyed wetlands, indicating fill areas. Total disturbance 5.85 acres.

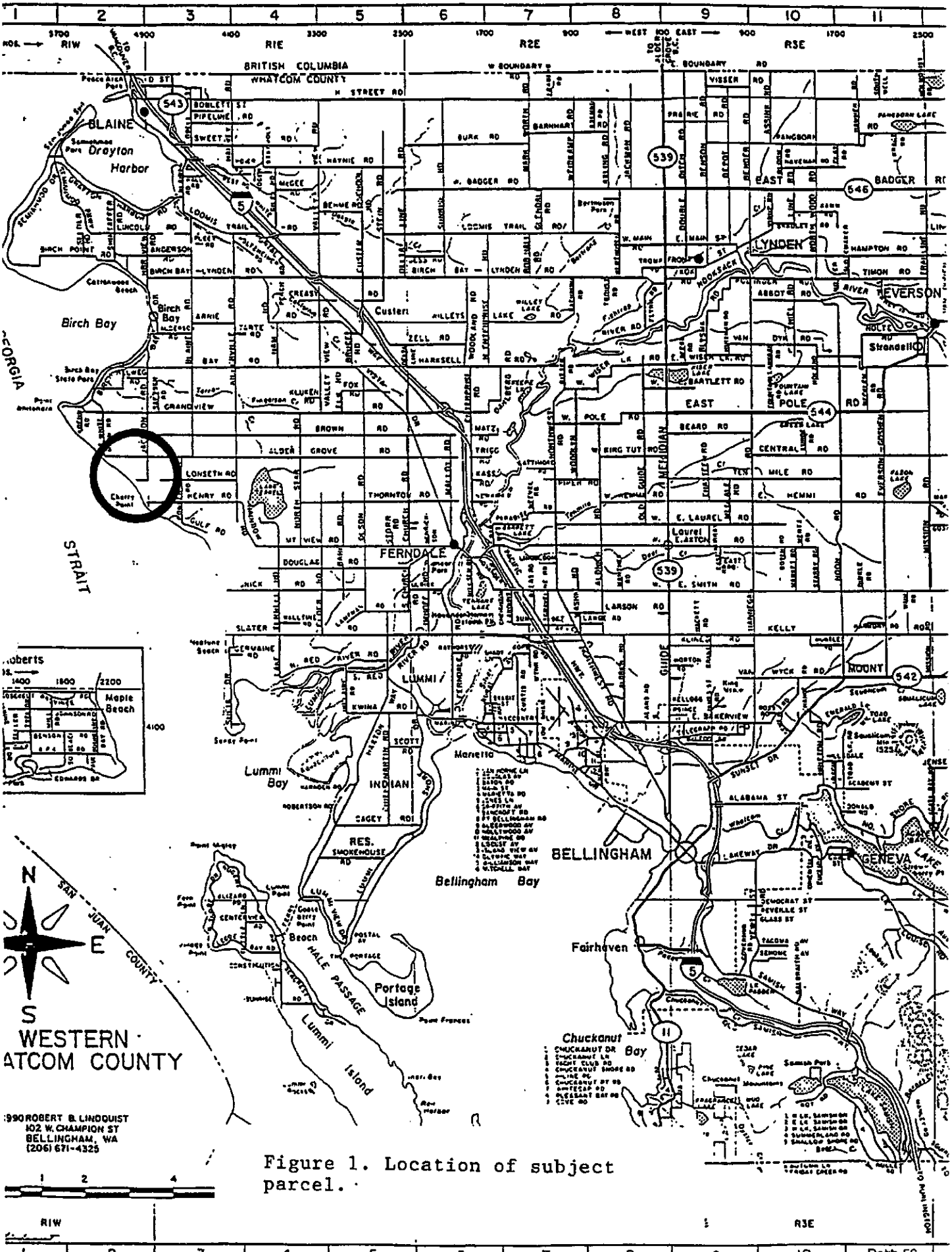
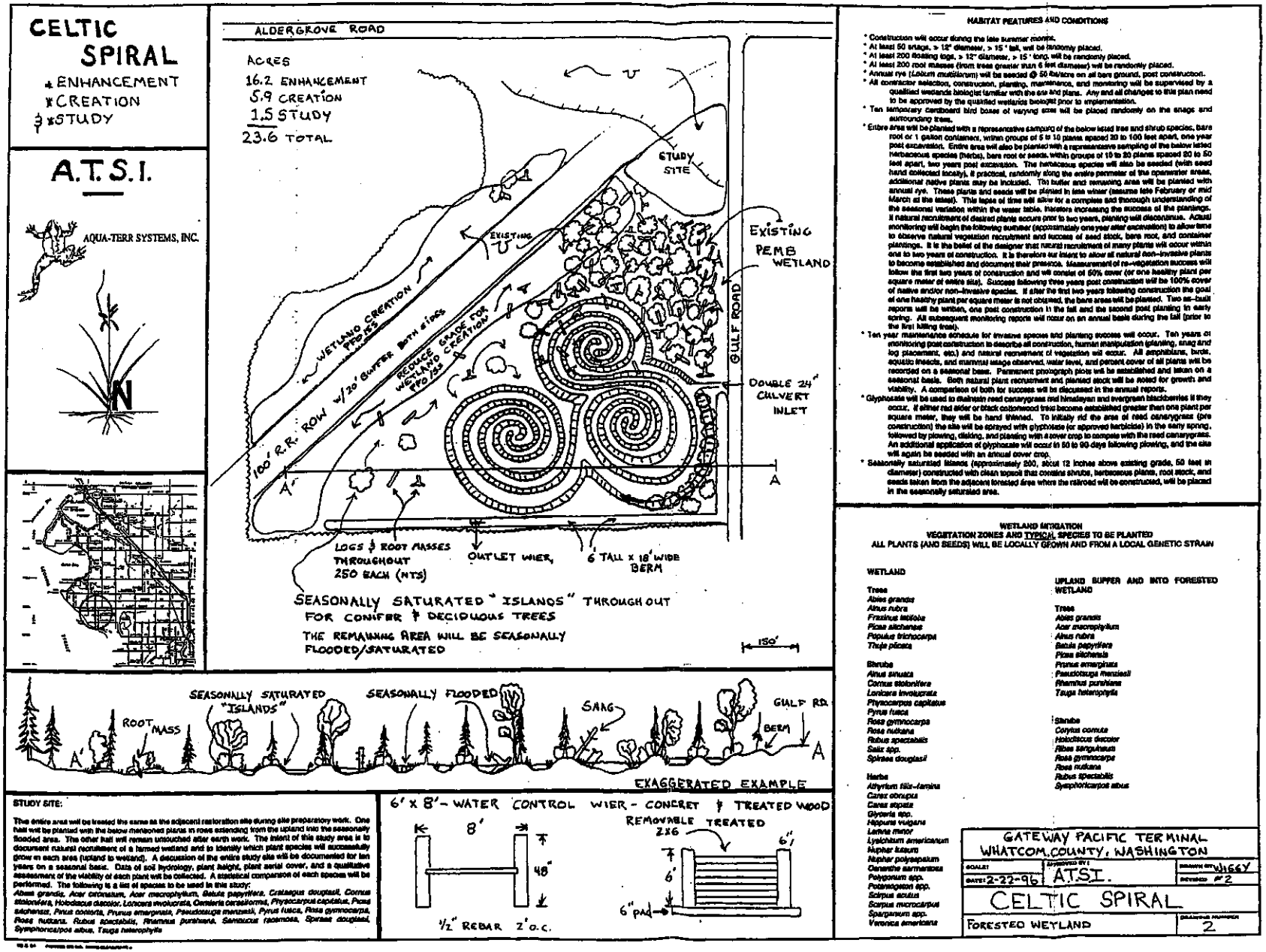


Figure 1. Location of subject parcel.

APPENDIX A



STUDY SITE:

The entire area will be treated the same as the adjacent restoration site during site preparatory work. One half will be planted with the below mentioned plants in rows extending from the upland into the seasonally flooded area. The other half will remain untouched after earth work. The intent of this study area is to document natural recruitment of a farmed wetland and to identify which plant species will successfully grow in each area (upland to wetland). A discussion of the entire study site will be documented for ten years on a seasonal basis. Data of soil hydrology, plant height, plant aerial cover, and a qualitative assessment of the viability of each plant will be collected. A statistical comparison of each species will be performed. The following is a list of species to be used in this study:

Abies grandis, Acer circinatum, Acer macrophylum, Betula papyrifera, Crataegus douglasii, Cornus stolonifera, Holodiscus discolor, Lonicera involucrata, Oenteria cerasiforms, Physocarpus capitatus, Picea sitchensis, Pinus contorta, Prunus emarginata, Pseudotsuga menzesii, Pyrus fusca, Rosa gymnocarpa, Rosa nutkana, Rubus spectabilis, Rhamnus purshiana, Sambucus racemosa, Spiraea douglasii, Symphoricarpos albus, Tsuga heterophylla

HABITAT FEATURES AND CONDITIONS

* Construction will occur during the late summer months.
* At least 50 snags, > 12" diameter, > 15 ' tall, will be randomly placed.
* At least 200 floating logs, > 12" diameter, > 15 ' long, will be randomly placed.
* At least 200 root masses (from trees greater than 6 feet diameter) will be randomly placed.
* Annual rye (*Lolium multiflorum*) will be seeded @ 50 lbs/acre on all bare ground, post construction.
* All contractor selection, construction, planting, maintenance, and monitoring will be supervised by a qualified wetlands biologist familiar with the area and plans. Any and all changes to this plan need to be approved by the qualified wetlands biologist prior to implementation.
* Ten temporary cardboard bird boxes of varying size will be placed randomly on the snags and surrounding trees.
* Entire area will be planted with a representative sampling of the below listed tree and shrub species, bare root or 1 gallon containers, written groups of 5 to 10 plants spaced 20 to 100 feet apart, one year post excavation. Entire area will also be planted with a representative sampling of the below listed herbaceous species (herbs), bare root or seeds, within groups of 10 to 20 plants spaced 20 to 50 feet apart, two years post excavation. The herbaceous species will also be seeded (with seed hand collected locally), if practical, randomly along the entire perimeter of the openwater areas, additional native plants may be included. Tidy butler and remaining area will be planted with annual rye. These plants and seeds will be planted in late winter (assume late February or mid March at the latest). The lapse of time will allow for a complete and thorough understanding of the seasonal variation within the water table, therefore increasing the success of the plantings. If natural recruitment of desired plants occurs prior to two years, planting will discontinue. Actual monitoring will begin the following summer (approximately one year after excavation) to allow time to observe natural vegetation recruitment and success of seed stock, bare root, and container plantings. It is the belief of the designer that natural recruitment of many plants will occur within one to two years of construction. It is therefore our intent to allow all natural non-invasive plants to become established and document their presence. Measurement of re-vegetation success will follow the first two years of construction and will consist of 80% cover (or one healthy plant per square meter of entire site). Success following three years post construction will be 100% cover of native and/or non-invasive species. If after the first two years following construction the goal of one healthy plant per square meter is not obtained, the bare areas will be planted. Two as-built reports will be written, one post construction in the fall and the second post planting in early spring. All subsequent monitoring reports will occur on an annual basis during the fall (prior to the first hitting frost).
* Ten year maintenance schedule for invasive species and planting success will occur. Ten years of monitoring post construction to describe all construction, human manipulation (planting, snag and log placement, etc.) and natural recruitment of vegetation will occur. All amphibians, birds, aquatic insects, and mammal usage observed, water level, and percent cover of all plants will be recorded on a seasonal basis. Permanent photograph plots will be established and taken on a seasonal basis. Both natural plant recruitment and planted stock will be rated for growth and viability. A comparison of both for success will be discussed in the annual reports.
* Glyphosate will be used to maintain reed canarygrass and himalayan and evergreen blackberries if they occur. If either red alder or black cottonwood trees become established greater than one plant per square meter, they will be hand thinned. To initially rid the area of reed canarygrass (pre construction) the site will be sprayed with glyphosate (or approved herbicide) in the early spring, followed by plowing, disking, and planting with a cover crop to compete with the reed canarygrass. An additional application of glyphosate will occur in 50 to 90 days following plowing, and the site will again be seeded with an annual cover crop.
* Seasonally saturated lenses (approximately 200, about 12 inches above existing grade, 50 feet in diameter) constructed with clean topsoil that contains shrubs, herbaceous plants, root stock, and seeds taken from the adjacent forested area where the railroad will be constructed, will be placed in the seasonally saturated area.

WETLAND MITIGATION
VEGETATION ZONES AND TYPICAL SPECIES TO BE PLANTED
ALL PLANTS (AND SEEDS) WILL BE LOCALLY GROWN AND FROM A LOCAL GENETIC STRAIN

WETLAND	UPLAND BUFFER AND INTO FORESTED WETLAND
Trees	Trees
Abies grandis	*Abies grandis*
Alnus rubra	*Acer macrophyllum*
Fraxinus latifolia	*Alnus rubra*
Picea sitchensis	*Betula papyrifera*
Populus trichocarpa	*Picea sitchensis*
Thuja plicata	*Prunus emarginata*
Shrubs	*Pseudotsuga menziesii*
Alnus sinuata	*Rhamnus purshiana*
Cornus stolonifera	*Tsuga heterophylla*
Lonicera involucrata	
Physocarpus capitatus	Shrubs
Pyrus fusca	*Corylus cornuta*
Rosa gymnocarpa	*Holodiscus discolor*
Rosa nutkana	*Ribes sanguineum*
Rubus spectabilis	*Rosa gymnocarpa*
Salix spp.	*Rosa nutkana*
Spiraea douglasii	*Rubus spectabilis*
	Symphoricarpos albus
Herbs	
Athyrium filix-femina	
Carex obnupta	
Carex stipata	
Glyceria spp.	
Hippuris vulgare	
Lemna minor	
Lysichitum americanum	
Nuphar luteum	
Nuphar polysepalum	
Oenanthe sarmentosa	
Polygonum spp.	
Potamogeton spp.	
Scirpus acutus	
Scirpus microcarpus	
Sparganium spp.	
Veronica americana	

GATEWAY PACIFIC TERMINAL
WHATCOM COUNTY, WASHINGTON

SCALE:	DESIGNED BY: ATSI.	DRAWN BY: WIGGY
DATE: 2-22-96		REVISED: #2

CELTIC SPIRAL

FORESTED WETLAND — DRAWING NUMBER 2

Figure 5. Mitigation drawing.

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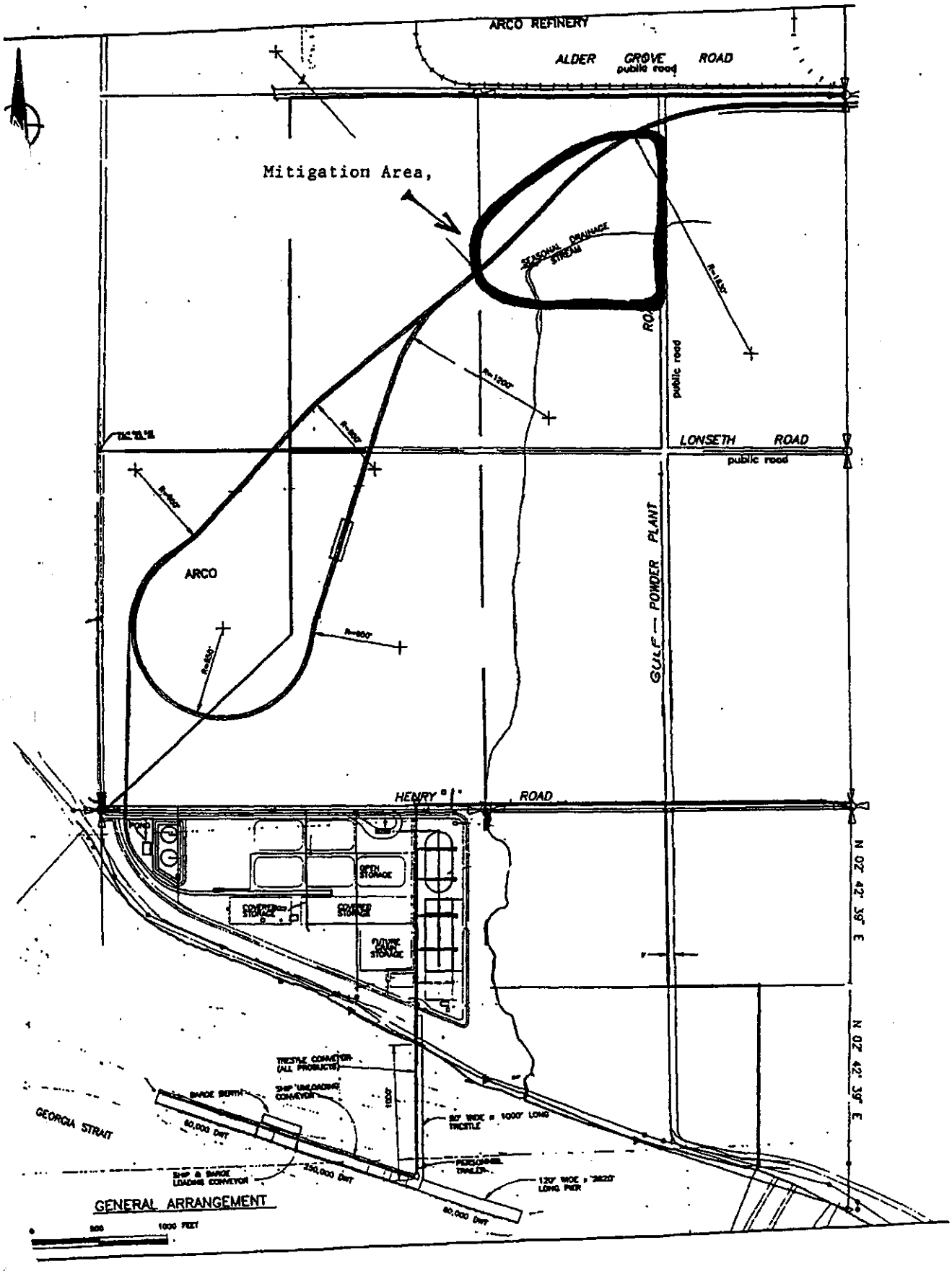

ARCO REFINERY
ALDER GROVE ROAD
public road
Mitigation Area,
SEASONAL DRAINAGE STREAM
public road
LONSETH ROAD
public road
ARCO
GULF — POWDER PLANT
HENRY ROAD
N 20° 42' 35" E
N 20° 42' 35" E
GEORGIA STRAIT
GENERAL ARRANGEMENT

APPENDIX C

Proposed planting schedule for wetland mitigation. This schedule includes plant species, condition (bare-root, balled-and-burlapped, container, sprig, rhizome, cutting, seed), plant spacing, water regime (PF-permanently flooded; SF-seasonally flooded; PS-permanently saturated; SS-seasonally saturated), and wildlife values (Washington Department of Ecology, 1993 and Martin et al., 1952).

TREES

Species	Condition	Spacing	Water Regime	Wildlife Values
Abies grandis, grand fir	bare-root or balled-and-burlapped	groups of 5, 100' o.c.	upland	Provides nesting, roosting, and winter cover for birds; food for grouse, passerine birds, and deer.
Picea sitchensis, Sitka spruce	bare-root or balled-and-burlapped	groups of 5, 100' o.c.	SF PS SS	Provides nesting, roosting, and winter cover for birds; food for grouse, passerine birds, and deer.
Pseudotsuga menziessii, Douglas fir	bare-root or balled-and-burlapped	groups of 5, 100' o.c.	upland	Provides nesting, roosting, and winter cover for birds; food for grouse, passerine birds, and deer.
Thuja plicata, western red cedar	bare-root or balled-and-burlapped	groups of 5, 100' o.c.	SF PS SS	Provides nesting, roosting, and winter cover for birds; food for grouse, passerine birds, and deer.

SHRUBS

Species	Condition	Spacing	Water Regime	Wildlife Values
Lonicera involucrata, black twinberry	bare-root or container	groups of 5, 50'o.c.	SF PS SS	Fruits eaten by passerine birds.
Physocarpus capitatus, Pacific ninebark	bare-root or container	groups of 5, 50'o.c.	PS SS	Not determined.
Pyrus fusca, western crabapple	bare-root or container	groups of 5, 50'o.c.	PS SS	Fruits and seeds eaten by birds and mammals.
Rubus spectabilis, salmonberry	bare-root or container	groups of 5, 50'o.c.	SF PS SS upland	Nectar an important food for hummingbirds and bees; fruits eaten by many bird and mammal species.
Salix lasiandra, Pacific willow	bare-root or cutting	groups of 5, 50'o.c.	SF PS SS	Provides food, cover, and nesting habitat to fish, insect, mammal, and bird species.
Salix sitchensis, Sitka willow	bare-root or cutting	groups of 5, 50'o.c.	PS SS	Provides food, cover, and nesting habitat to fish, insect, mammal, and bird species.

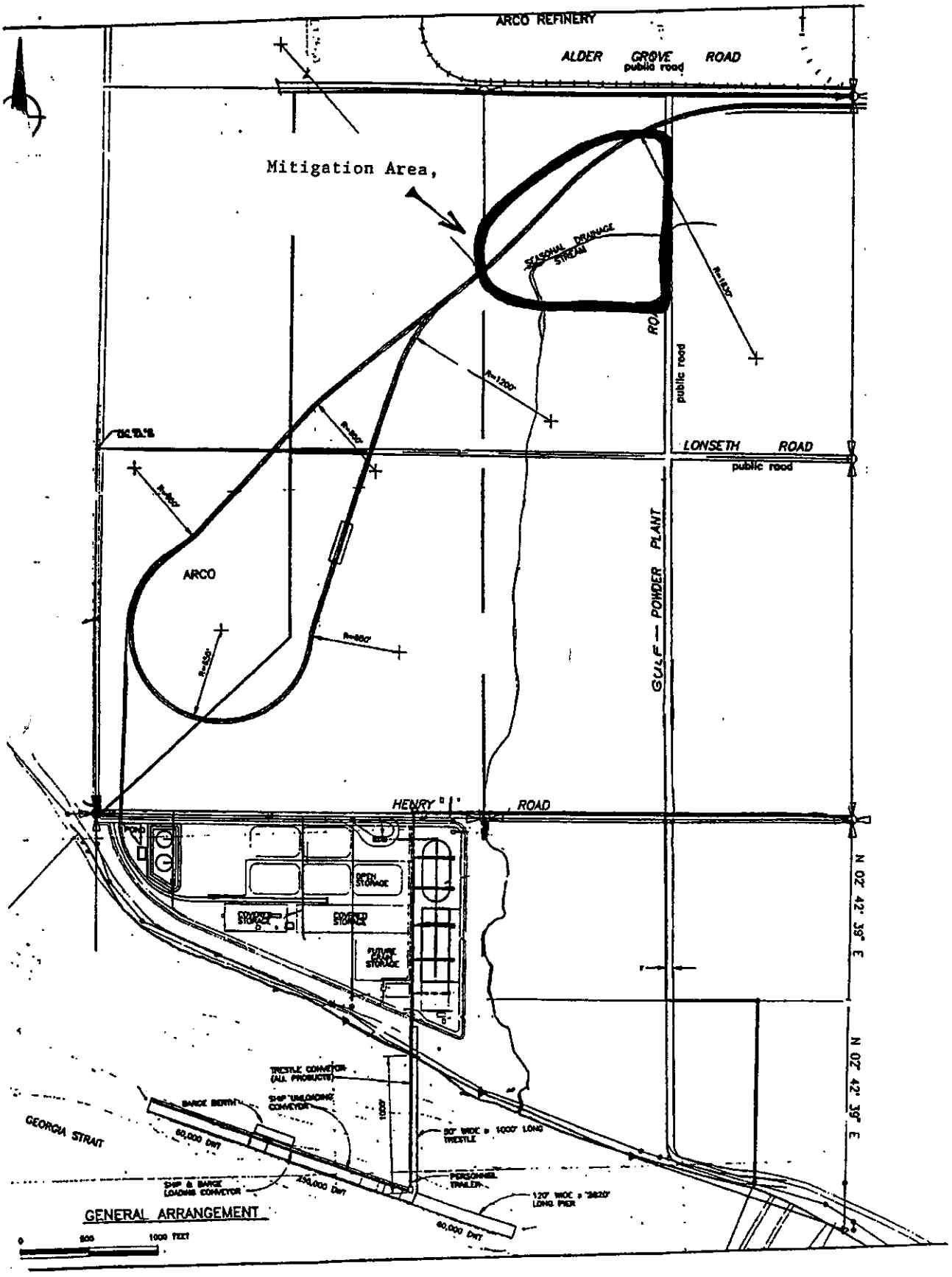
HERBS

Species	Condition	Spacing	Water Regime	Wildlife Values
Alisma plantago–aquatica, water plantain	sprig or rhizome	groups or 10, 20' o.c.	SF PS	Not determined.
Carex obnupta, slough sedge	sprigs and seed	groups of 20, 20' o.c.	SF PS	Seeds eaten by waterfowl, sora, snipe, grouse, junco, and sparrows.
Carex stipata, sawbeak sedge	sprigs and seed	groups of 20, 20' o.c.	SF PS	Seeds eaten by waterfowl, sora, snipe, grouse, junco, and sparrows.
Glyceria spp., manna grass	seed	scattered	PF SF PS	Shoots and seeds eaten by waterfowl, marshbirds, and shorebirds.
Hippuris vulgaris, common mare's tail	sprigs	groups of 20, 20' o.c.	PS PF	Not determined.
Polygonum spp., smartweed	seed	scattered	PF	Food for at least 32 western Wash. species (including waterfowl and passerine birds).
Scirpus acutus/validus, hardstem bulrush	rhizomes	groups of 20, 20' o.c.	PF	Seeds and rhizomes eaten by waterfowl, marshbirds, and shorebirds.
Scirpus microcarpus, small–fruited bulrush	seed	scattered	SF PS	Cover for small birds and small mammals; food for waterfowl.
Sparganium eurycarpum, broad–fruited burreed	rhizome	groups of 20, 20' o.c.	PF	Provides food and cover for waterfowl.

EXPECTED VOLUNTEER SPECIES

Species	Water Regime	Wildlife Values
Alnus rubra, red alder	SS upland	Provides food for grouse and small seed and insect eating passerine birds.
Juncus effusus, soft rush	PS SF SS	Not determined.
Juncus ensifolius, dagger–leaf rush	PS SF SS	Not determined.
Juncus tenuis, slender rush	PS SF SS	Not determined.
Populus balsamifera, black cottonwood	PS SS upland	Provides food for beaver and deer; harbors insects that are food for many bird species.
Spirea douglasii, hardhack	PS SF SS	Not determined.
Typha latifolia, common cattail	PS SF SS	Provides food for muskrat, beaver, and geese; nesting habitat for waterfowl and passerine birds.

* For erosion control and typical cover of bare ground, use annual rye (*Lolium multiflorum*) at 50 pounds per acre. Other grasses may be used as listed in the text or at the discretion of a wetlands biologist.


ARCO REFINERY
ALDER GROVE ROAD
public road
Mitigation Area,
SEASONAL DRAINAGE STREAM
R=1200'
public road
LONSETH ROAD
public road
ARCO
GULF — POWDER PLANT
HENRY ROAD
OPEN STORAGE
COVERED STORAGE
COVERED STORAGE
FUTURE GRAIN STORAGE
N 02° 42' 39" E
N 02° 42' 39" E
TRESTLE CONVEYOR (ALL PRODUCTS)
SHIP UNLOADING CONVEYOR
BARGE BERTH
GEORGIA STRAIT
60,000 DWT
50' WIDE x 1000' LONG TRESTLE
PERSONNEL TRAILER
SHIP & BARGE LOADING CONVEYOR
250,000 DWT
120' WIDE x 2820' LONG PIER
60,000 DWT
GENERAL ARRANGEMENT
0
500
1000 FEET

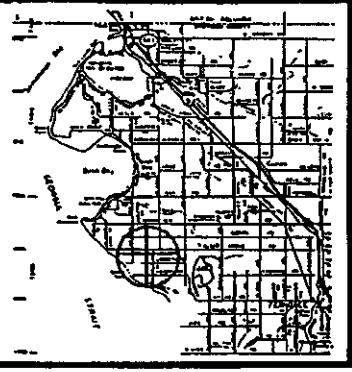
CELTIC SPIRAL

* ENHANCEMENT
* CREATION
* STUDY

A.T.S.I.

AQUA-TERR SYSTEMS, INC.

GATEWAY SITE



ALDERGROVE ROAD

ACRES
16.2 ENHANCEMENT
5.9 CREATION
1.5 STUDY
23.6 TOTAL

STUDY SITE

EXISTING

EXISTING PEMB WETLAND

WETLAND CREATION PFO/SS

100' R.R. ROW w/20' BUFFER BOTH SIDES

REDUCE GRADE FOR WETLAND CREATION PFO/SS

GULF ROAD

DOUBLE 24" CULVERT INLET

A'

A

LOGS & ROOT MASSES THROUGHOUT 250 EACH (NTS)

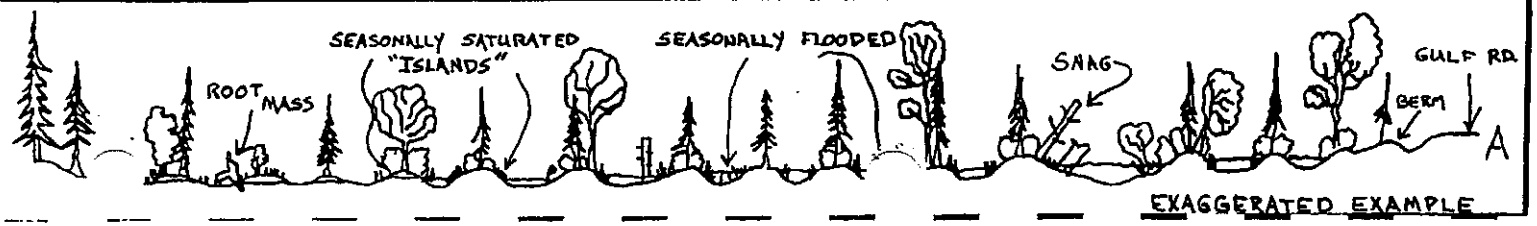
OUTLET WIER

6' TALL x 18' WIDE BERM

SEASONALLY SATURATED "ISLANDS" THROUGH OUT FOR CONIFER & DECIDUOUS TREES

THE REMAINING AREA WILL BE SEASONALLY FLOODED/SATURATED

150'



EXAGGERATED EXAMPLE

HABITAT FEATURES AND CONDITIONS

* Construction will occur during the late summer months.
* At least 50 snags, > 12" diameter, > 15 ' tall, will be randomly placed.
* At least 200 floating logs, > 12" diameter, > 15 ' long, will be randomly placed.
* At least 200 root masses (from trees greater than 6 feet diameter) will be randomly placed.
* Annual rye (*Lolium multiflorum*) will be seeded @ 50 lbs/acre on all bare ground, post construction.
* All contractor selection, construction, planting, maintenance, and monitoring will be supervised by a qualified wetlands biologist familiar with the site and plans. Any and all changes to this plan need to be approved by the qualified wetlands biologist prior to implementation.
* Ten temporary cardboard bird boxes of varying sizes will be placed randomly on the snags and surrounding trees.
* Entire area will be planted with a representative sampling of the below listed tree and shrub species, bare root or 1 gallon containers, within groups of 5 to 10 plants spaced 20 to 100 feet apart, one year post excavation. Entire area will also be planted with a representative sampling of the below listed herbaceous species (herbs), bare root or seeds, within groups of 10 to 20 plants spaced 20 to 50 feet apart, two years post excavation. The herbaceous species will also be seeded (with seed hand collected locally), if practical, randomly along the entire perimeter of the openwater areas, additional native plants may be included. The buffer and remaining area will be planted with annual rye. These plants and seeds will be planted in late winter (assume late February or mid March at the latest). This lapse of time will allow for a complete and thorough understanding of the seasonal variation within the water table, therefore increasing the success of the plantings. If natural recruitment of desired plants occurs prior to two years, planting will discontinue. Actual monitoring will begin the following summer (approximately one year after excavation) to allow time to observe natural vegetation recruitment and success of seed stock, bare root, and container plantings. It is the belief of the designer that natural recruitment of many plants will occur within one to two years of construction. It is therefore our intent to allow all natural non-invasive plants to become established and document their presence. Measurement of re-vegetation success will follow the first two years of construction and will consist of 50% cover (or one healthy plant per square meter of entire site). Success following three years post construction will be 100% cover of native and/or non-invasive species. If after the first two years following construction the goal of one healthy plant per square meter is not obtained, the bare areas will be planted. Two as-built reports will be written, one post construction in the fall and the second post planting in early spring. All subsequent monitoring reports will occur on an annual basis during the fall (prior to the first killing frost).
* Ten year maintenance schedule for invasive species and planting success will occur. Ten years of monitoring post construction to describe all construction, human manipulation (planting, snag and log placement, etc.) and natural recruitment of vegetation will occur. All amphibians, birds, aquatic insects, and mammal usage observed, water level, and percent cover of all plants will be recorded on a seasonal basis. Permanent photograph plots will be established and taken on a seasonal basis. Both natural plant recruitment and planted stock will be noted for growth and viability. A comparison of both for success will be discussed in the annual reports.
* Glyphosate will be used to maintain reed canarygrass and himalayan and evergreen blackberries if they occur. If either red alder or black cottonwood trees become established greater than one plant per square meter, they will be hand thinned. To initially rid the area of reed canarygrass (pre construction) the site will be sprayed with glyphosate (or approved herbicide) in the early spring, followed by plowing, disking, and planting with a cover crop to compete with the reed canarygrass. An additional application of glyphosate will occur in 60 to 90 days following plowing, and the site will again be seeded with an annual cover crop.
* Seasonally saturated islands (approximately 200, about 12 inches above existing grade, 50 feet in diameter) constructed with clean topsoil that contains shrubs, herbaceous plants, root stock, and seeds taken from the adjacent forested area where the railroad will be constructed, will be placed in the seasonally saturated area.

APPENDIX B: MACROALGAE MITIGATION PLAN

Mitigation Need

The majority of the Shade Model Group has acknowledged that changes to the macroalgae community as a result of altering the available light, coupled with non shade environmental factors, can not be predicted with certainty. To offset this uncertainty, the construction of a macroalgae mitigation site (Phase 1) shall be initiated prior to the commencement of pier construction. Construction of the mitigation site shall be completed before at least March 1 of the year in which construction of the pier is scheduled. Pier construction shall not be initiated until after June 15 following completion of construction of the mitigation site. This allows for a minimum of one macroalgae colonization cycle following the construction of the Phase 1 macroalgae Mitigation site. To the extent that Post-Project Monitoring identifies the need for additional mitigation, a Phase 2 mitigation site shall be provided.

Macroalgae colonization of the Phase 1 macroalgae Mitigation Site shall not be used as a criterion that limits or restricts commencement of pier construction.

Mitigation Goal and Objectives

PIT will construct a Phase 1 macroalgae mitigation site in the immediate vicinity of the proposed pier to offset anticipated impacts to the macroalgae community that may occur as a result of the construction and operation of the proposed pier structure, and to offset anticipated impacts to the epibenthic invertebrate community at the mitigation site associated with mitigation construction. In the event that post project monitoring demonstrates unexpected impacts that exceed the mitigation credit available at the Phase 1 Macroalgae Mitigation site, PIT shall construct a Phase 2 Mitigation Site.

The objectives of the mitigation will be to create an area of macroalgae community that is:

1. At least three times the macroalgae coverage area impacted by the project;
2. Similar in species composition to the impacted area; and
3. Compensates for existing epibenthic invertebrate production displaced by the mitigation site construction.

It is assumed that the mitigation sites will be constructed on an existing un-vegetated, soft substrate site, and it is anticipated that the mitigation construction will displace existing epibenthic invertebrate production. The Phase 1 macroalgae mitigation area required for pier related impacts will be increased by 25% to account for this loss and this mitigation area shall not be counted as mitigation credit available at the mitigation sites.

The macroalgae habitat mitigation sites shall be created by the placement of appropriate sized natural cobble substrate material within the immediate vicinity of the project site and at tidal elevations appropriate for macroalgae colonization.

The location and design for the macroalgae mitigation sites as well as the control sites shall be subject to state agencies' and WEC approval. The site locations will be surveyed by GPS or other suitable means to allow for future monitoring.

Implementation

The results of the Shade Model application suggests that an area up to 4,250 square feet of macroalgae could be affected in two ways by the proposed pier: (1) the relative species composition ratios could be changed; and (2) the amount of macroalgae biomass habitat could be reduced.

The Phase 1 Macroalgae Mitigation site shall be constructed with a minimum area of three times the maximum impact area predicted by the Shade Model (4,250 square feet) or 12,750 square feet, plus 25% (3,187 square feet) to offset epibenthic invertebrate production that will be displaced at the Phase 1 mitigation site. The Phase 1 mitigation site will include a minimum of 15,937 square feet.

Macroalgae control sites will be identified in the immediate vicinity of the proposed pier element. Control sites shall each equal the size of the pre-construction footprint vegetative zone of the proposed pier structure. One control site will be located at least 75 feet northwest of the pre-construction footprint of the proposed pier, and the other control site will be located at least 75 feet to the southeast of the proposed pier footprint. In addition, the control sites will have a macroalgae species composition and distribution similar to the macroalgae community within the pre-construction footprint of the proposed pier structure. The macroalgae composition and distribution similarity in the control sites shall be about 75% species overlap and within 25% of the average vegetative cover of the pre-construction project footprint. The control sites will be surveyed concurrently with the post construction surveys at the project site. The control site surveys will be used to calibrate the project site impacts for natural variation.

Impact Assessment

Pre-construction and post construction surveys of the macro algae distribution, species composition and percent cover at the pier site will be evaluated for pier structure, pier construction and pier operation related impacts. The macro algae distribution, species composition and percent cover will be surveyed at the control sites concurrently with the surveys at the project site. The control sites will serve as indicators of natural variation, and will be used to determine if natural variation "explains" variation in coverage seen at the project site (For example, if there is a 50% reduction in algae cover following construction, then this will be assessed against any declines or increased in cover at the control sites over the same period). The estimated net impact area and percent cover calibrated for natural variation and equivalent to 100% cover will be used to establish the area of mitigation that is required. (Example of 100% Equivalent: 100 square feet at 100% cover = 200 square feet at 50% cover)

Performance Criteria

The Phase 1 mitigation will be determined successful when the proponent provides an area of macro algae that is equivalent to 3 times the area impacted by the pier structure, pier construction and pier operation as determined by the year 3 post construction survey and calibrated for natural variation by the control site surveys equivalent to 100% macro algae coverage.

In addition, the area and % cover required for pier related impacts at a 3:1 mitigation ratio will be increased by 25% to account for the existing epibenthic invertebrate production that will be displaced at the mitigation site.

At the end of year 3 post construction, the macroalgae species composition at the mitigation sites will be similar to the same species composition present at the pre-construction project site as calibrated by natural annual changes to the macroalgae species composition observed at the control sites. The determination of species similarity will be made by applying the method noted in Thom and Widdowson (1978).

Contingencies

If the Phase 1 mitigation site does not provide sufficient mitigation to replace the macroalgae habitat impacted (performance criteria) as identified during year 3 post construction monitoring, then PIT will construct a Phase 2 mitigation site not later than one year following determination of a need for additional mitigation. The Phase 2 mitigation site will be of sufficient size to fully mitigate the macroalgae habitat impacts that are not mitigated by the Phase 1 mitigation site. The performance criteria noted above for phase 1 mitigation shall apply.

The project proponent will take reasonable and appropriate actions necessary to assure the mitigation site achieves the species composition performance criteria, and prevent the mitigation sites from being dominated by Sargassum. Such actions may include mechanical removal of Sargassum or anchoring kelp sporophylls onto the rocks to assure settlement of preferred species.

Mitigation credits available at the Phase 1 and Phase 2 mitigation sites shall only be available for impacts related to the GPT pier structure, pier construction, and pier operation.

Monitoring

The project site, the control site, and the mitigation sites shall be monitored as set forth below, during years 1,2,3,5,7, and 10 following construction of the pier.

Pre-Project Baseline Study:

Within 2 years prior to project construction, PIT shall submit for the State Agencies' review and approval a study describing and identifying the existing eelgrass and attachment macroalgae at the project site. The study shall provide baseline data for post-construction monitoring of the impacts of the project. The study shall also characterize the configuration and composition of the bed under and around the trestle and pier in a form usable for assessing impacts due to prop wash, which is further discussed below in the section labeled "Prop Wash Impacts".

Macroalgae:

The macroalgae in the immediate vicinity of the pier shall be monitored for impacts using methods employed during the 1996 baseline survey.

PIT will contract with a consultant approved by WDFW to conduct intensive level macroalgae surveys of the pier site and control sites between June 1 and 15 of each monitoring year according to protocols of the WDFW. The transects will begin at approximately 5.0 feet (1.5 meter (m)) MLLW and extend seaward parallel to the centerline of the proposed pier through the vegetated zone. Lead lines will be used to establish the subtidal transects. The seaward end of each lead line will be attached to an anchor with a float marking its location at the water surface. At the pier site, five transects will be established at 15-foot (4.6m) intervals along the beach, with the middle transect at the centerline of the proposed pier.

For the control sites, five transects will be established at 15-foot intervals along the beach, with the transect closest to the outside transect of the proposed pier survey site at least 75 feet (22.9 m) away. Transects will be surveyed by GPS or other means to assure continuity between monitoring years.

SCUBA divers will record data along each transect. Plant species will be identified as to genus, total vegetative cover of each species encountered within square meter quadrants centered at 20-foot (6.1m) intervals. Also recorded for each quadrant will be the elevation (recorded depth adjusted to MLLW) at the center of the quadrant and a description of the substrate. In addition, any eelgrass observed in the survey area will be identified as to location, size, and plant density. Plant density will be determined by counting eelgrass shoots within the square meter quadrant. Observations will be recorded to depths where macroalgae is no longer apparent and the substrate becomes consistently sand or mud.

PIT will contract with a consultant approved by WDFW to conduct intensive level macroalgae surveys of the mitigation site between June 1 and 15 of each monitoring year according to protocols of the WDFW. The number and orientation of the transects will be established after the location and configuration of each site has been chosen. Lead lines will be used to establish the transects in a pattern similar to that used at the pier and control sites. Transects will be surveyed by GPS or other means to assure continuity between monitoring years. Data will be recorded in a manner similar to that used in surveys of the project site and control sites.

Monitoring reports shall be submitted to the agencies and WEC during the same years that they are conducted.

Eelgrass:

Based on the last marine vegetation survey in 1996, no eelgrass was observed within 50 feet (15.2 m) of the centerline of the proposed trestle, and then, only to the northwest. Impacts to eelgrass in the vicinity are not expected. PIT shall monitor for unpredicted impacts to Zostera marina. Monitoring shall take place between June 1 and June 15, utilizing the same comparison protocols between the pier and control sites established for monitoring impacts to macroalgae. If monitoring reveals loss of Z. marina at the project site that is different than pre-construction abundance, as calibrated by the control site, PIT shall consult with WDFW and determine if a

study is necessary to determine a cause of additional loss. . The study shall employ consultants selected with the approval of the State Agencies. If the study reveals that the additional loss is due to the construction of the pier or activities at PIT's site or facilities, then additional mitigation shall be required as set forth in below in the section "Additional Mitigation Measures".

If the pre-project baseline study shows eelgrass (less than 100 shoots) within the footprint of the proposed trestle, PIT will transplant the eelgrass to a WDFW approved site adjacent to an existing eelgrass bed using state-of-the-art techniques. If the pre-project baseline study shows more than 100 shoots, PIT will develop jointly with WDFW an approved eelgrass mitigation plan. Implementation of the plan will involve state-of-the-art transplant techniques, monitoring, and success criteria.

Prop Wash Impacts:

During Construction: PIT will conduct construction such that tug prop wash will be directed offshore and to the south as much as practical. PIT will monitor the immediate areas of construction by using periodic diver surveys during construction operation. This will be intended to detect prop wash impacts early, and take measures to minimize additional damage to marine vegetation.

Post Construction: During the June macroalgae survey conducted immediately following construction of the pier, PIT's consultants shall conduct two additional dive transects to monitor impacts that may be associated with tugs and barges used during construction. One transect will be 50 feet (15.2 m) northwest of the edge of the footprint of the trestle and one will be 50 feet (15.2 m) southeast from the edge of the footprint of the trestle, or as adjusted by observations made during construction. Construction related impacts shall be determined during the year 1 post-construction survey. The survey shall be repeated during year 3, at which time impacted areas identified during the year 1 post-construction survey that have not recovered will be quantified. Mitigation (based on 100% vegetative cover equivalence) will be required for construction related impacts per the following criteria:

a. Area impacted and recovered by year 3 shall be mitigated at a 0.5:1 area ratio (to compensate for temporal losses between construction and year 3)
b. Area impacted and not recovered by year 3 shall be mitigated at a 3:1 area ratio.

The percent cover and species composition performance criteria noted for the Phase 1 mitigation shall apply.

The results of monitoring shall be reported at the same time as other monitoring reports.

Operational: In conjunction with the eelgrass and attachment macroalgae monitoring, PIT will monitor the aquatic land under and around the pier and trestle for prop wash scouring of the bed. The results of monitoring shall be reported at the same time as other monitoring reports.

If scour impacts are noted, PIT shall institute the following mitigation requirements as needed to eliminate the impacts:

1. Restrict the use of the pier for vessel maneuvering to periods of high tide.

2. Require the use of tug assistance for approaching or departing vessels.

Monitoring for prop wash impacts will continue for a period of 2 years following implementation of mitigation requirements 1 and 2 above. If at the end of the second year of survey following the implementation of mitigation requirements 1 and 2 above, operation prop scour impacts persist, the impacts will be quantified and mitigation required at a 3:1 area ratio. The percent cover and species composition performance criteria noted for the Phase 1 mitigation shall apply.

Herring Monitoring:

For a period of 5 years following the construction of the Phase 1 Macroalgae Mitigation Site, PIT will monitor the mitigation site for herring spawn during those years that WDFW surveys identify herring spawn south of the mitigation site. This monitoring will be coordinated with the herring spawning ground monitoring discussed in the Herring Monitoring Plan (Appendix C).

Additional Mitigation Measures

If post construction monitoring establishes that the project has created unanticipated impacts to macro algae or eelgrass, PIT shall institute the following requirements as may be required by the State Agencies to mitigate the impacts. Measures shall be considered by the State Agencies in the following order of preference:

1. Reasonable project modifications to avoid the impacts shall be instituted.

2. Reasonable project modifications to minimize the impacts that are unavoidable shall be instituted.

3. Replacement of lost habitat and natural resource values by PIT at a site approved by the state agencies.

4. If replacement and avoidance are not possible or do not succeed, payment of natural resource damages, as determined by the State Agencies, that are associated with the loss shall be made to the State Agencies, in addition to any minimization efforts that are instituted.

Additional mitigation shall be subject to the same monitoring and reporting requirements as the original mitigation.

Anticipated Time Line

The time line for design, permitting, construction, and monitoring is estimated as follows:

July 1999 - Settlement Agreement signed, and forwarded to SHB and Corps of Engineers.

August 1999 - Field and aerial photo study and decision on location of mitigation and control sites.

October 1999 - Preliminary design of mitigation site and next stage of design of facility.

November 15, 1999 - Lease commitment with DNR.

Summer 1999 - Obtain 404 permit from Corps; final negotiation of lease with DNR.

Fall 1999 - Next stage of design for facility.

December 1999 - Construction of mitigation site.

May 2000 Baseline macroalgae surveys of the pier site and control site.

Summer 2000 - All remaining local permits and approvals obtained.

September 1, 2000 - Begin construction of pier.

May 2001 - First post construction macroalgae surveys of the pier, control, and mitigation sites.

May 2002 - Second post construction macroalgae surveys of the pier, control, and mitigation sites.

May 2003 - Third post construction macroalgae surveys of the pier, control, and mitigation sites.

May 2005 - Fifth post construction macroalgae surveys of the pier, control, and mitigation sites.

May 2007 - Seventh post construction macroalgae surveys of the pier, control, and mitigation sites.

May 2010 - Tenth post construction macroalgae surveys of the pier, control, and mitigation sites.

Appendix C
Herring Monitoring Program

To Evaluate the Effects Of The Pacific International Terminal Trestle/Wharf Structure and Shipping Activity on the Behavior of Herring at Cherry Point

by
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and
Brian Williams, Norm Lemberg, Mark O'Toole, Jack Tagart
Washington Department of Fish and Wildlife

and
Mark Pedersen and Lorraine Read
Shapiro and Associates, Inc.

May 5, 1999

INTRODUCTION

The site proposed by Pacific International Terminal (PIT) for the Gateway Pacific Terminal (GPT) project is within the documented spawning habitat for the Cherry Point herring stock. The proposed trestle and wharf structures and/or the operation of the bulk terminal facility could disrupt the nearshore movement and spawning of the Cherry Point herring stock near the proposed GPT bulk terminal facility. The monitoring surveys proposed in this program are designed to study the interaction of the Cherry Point herring stock with the GPT bulk terminal facility and identify structural and operational contingencies in the event that significant disturbances are discovered.

Cherry Point is the spawning area for what was, until recently, the largest herring stock in Washington. The spawner biomass for this stock has been estimated as high as almost 15,000 tons (in 1973) but has declined considerably in recent years, averaging less than 6,000 tons in the 1980's, and less than 5,000 tons in the 1990s. Most recently, the spawning biomass has dropped to about 1,500 tons in 1998. Increasing adult herring mortality coupled with poor recruitment appears to be the primary reasons for the declining stock size. The dangerously low population level has resulted in the closure of the commercial herring fishery, and led to concerns about the future of this herring stock.

It is well documented that Pacific herring, among other schooling pelagic fish, are highly sensitive to noise and disturbance (Mitson, 1995; Schwartz and Greer, 1984). This sensitivity serves the herring well to help them detect and avoid predators, but it also causes them to avoid some disturbances caused by human activities. Pacific herring held in net pens have been documented to be sensitive to recorded sounds of some commercial fishing vessels (Canadian purse seiners) at a distance of up to one mile (Schwartz and Greer, 1984). On Annette Island, Alaska, ripe spawner herring have been observed leaving their usual spawning grounds before spawning. In addition to weather and other factors, it appears that exposure to activity by commercial gill-netters and seiners affected the movement of the herring (Leon, 1993; Leon, 1997 field observations).

The significance and duration of herring response to human activity, however, are not well understood. For example, herring regularly spawn on pilings and the bottoms of ships along the waterfront in downtown San Francisco (Watters, 1998), have spawned on the inside of the harbor breakwater in Sitka, Alaska (Gordon, 1998), and even on macroalgae attached to pilings of the Arco Pier at Cherry Point (O'Toole, 1998). These observations suggest that schools of herring may acclimate to human activity after a short behavioral response.

The Washington Department of Fish and Wildlife (WDFW) and the Washington Environmental Council (WEC) have concerns regarding development of the proposed trestle/wharf structures and/or the operation of the PIT bulk terminal facility. Operation of such a facility could disrupt the nearshore movement, schooling, and spawning of the Cherry Point herring stock in the immediate vicinity, and this may affect herring spawning and recruitment success. Although it is not always certain why herring select certain spawning grounds, the fact that most return to the same spawning grounds year after year (Hourston, 1982), reproduce more successfully in these locations than in other nearby locations (Robinson, 1988) and relocate to other places only under

duress (Leon, 1993) implies that these traditional spawning grounds are valuable, and perhaps necessary, for maintaining herring populations. Thus, any disturbance that can be shown to disrupt access to the spawning habitat or displace the spawning to a different location could be detrimental to the survival of the stock.

Although questions remain about the response of herring to noise and other disturbance in the water, the precarious status of the Cherry Point herring stock points toward a cautious approach to any development that might affect this population. The parties to this agreement have agreed on this monitoring program to document any potential adverse affects of the terminal and its operations on the herring, and have developed the contingency measures described in this document to mitigate those impacts.

MONITORING PROGRAM OBJECTIVES

This monitoring program is designed to study the potential impacts of the proposed GPT project on the Cherry Point herring stock and to answer the following questions:

1. Nearshore migration corridors/schooling areas:
   - 1.1 Are there preferred nearshore migration corridors/schooling areas at or near the GPT project site?
   - 1.2 Does the ship activity at the GPT site disrupt the use of a preferred nearshore migration corridor/schooling area?
2. Nearshore lateral migration: Does the trestle/wharf structure, ship activity, and bulk terminal operations at the GPT site disrupt the nearshore lateral migration and concentration of the herring?
3. Spawning behavior: Does the trestle and ship activity at the GPT site displace the herring from using the spawning habitat in the immediate vicinity of the trestle?

Objective 1.1: Determine whether there are preferred nearshore herring migration corridors/schooling areas at or near the GPT project site.

WDFW staff have observed that herring fishing activity is typically concentrated near a bathymetric trench located along the southern boundary of the GPT site suggesting that the fishers commonly find the highest concentrations of herring at that Cherry Point location.

Although the fishing observations suggest that the trench is a preferred nearshore migration corridor/schooling area, herring nearshore behavior has not been studied at the site. WDFW hydroacoustic surveys are focused on stock assessment rather than on monitoring herring behavior.

Survey Methods

A pre-project hydroacoustic survey was conducted in 1998 and another will be conducted during 2000 to determine the existence of a preferred nearshore herring migration corridor/schooling area near the proposed GPT project. Each survey will be conducted from a small research vessel in the nearshore area. The research vessel will survey two (2) northwest/southeast transects.

One transect will follow the 10-fathom (18.3 meter MLLW) depth contour. The second transect will parallel the 10-fathom contour approximately 500 meters seaward. Each of the transects will extend from one half mile north of Point Whitehorn to the south end of Sandy Point. The survey area will be divided into 28 segments, each 500 meters in length. The border between Segments 12 and 13 shall coincide with the midpoint of the proposed GPT wharf.

For the best coverage of the pre-spawning activity, surveys will be conducted from April 26 through May 17. The surveys will alternate between day and night sampling. Each survey will be conducted for a minimum of three hours. Day surveys will be conducted from 12 noon to 3:00 p.m. Night surveys will be conducted from 12 midnight to 3:00 am. For logistical reasons and to spread the surveys over different tidal phases, they will be conducted on Mondays, Wednesdays, and Fridays.

During each survey, the time, tidal stage, location, and relative size of pelagic fish schools will be recorded and plotted on a chart. School location will be determined from a differentially corrected global positioning system (DGPS) to within 1-10 meter.

An American Pioneer "Fishscanner Model 201" sonar system meeting these requirements was used during the 1998 monitoring program and will be used during the survey in 2000. This system operates at a frequency of 160 kHz, allowing relatively high target resolution. It incorporates a 6.5 degree nominal beamwidth transducer, which can be hydraulically aimed in the X (up-down) and Y (left-right) quadrants, allowing 90 degree sampling around the vessel, if desired. In "fast-scan" mode, the system automatically scans a repetitive sequential sweep over a user-defined area, allowing identification of individual fish targets and schools surrounding any part of the vessel. The acoustic signal is displayed on a 16-color video monitor for visual interpretation. Echo amplitudes, or signal strength, are shown on the video display as specific colors indicative of general target size or position in the acoustic beam. Small amplitude echoes appear as blue or green, medium echoes as yellow or red, and the largest amplitude echoes as purple or white. A detailed description of the operation and specifications of the "American Pioneer Fishscanner 201" is presented in the equipment manual (Roundy, 1988), available from American Pioneer and on file at HTI.

For the purposes of this study, the scanner will be operated in "fast-scan" mode repetitively sweeping a 180-degree swath centered on the bow of the vessel. System gain should be fixed (at +12) and total sampling range at 64 meters during the study period to maintain consistent system sensitivity and sampled volume between transects and surveys. Transects will be surveyed at a boat speed of approximately 5-6 knots.

The transducer is aimed at a slight vertical tilt angle toward the bottom. This allows sampling of the entire water column ahead of the boat, i.e. allows the bottom to be resolved at maximum sampling range. Based on the mean observed depth along each transect and the set 64 m maximum sampling range of the system, fixed tilt angles are chosen for each of the two transects. These should be 17 degrees (down from horizontal) for the inshore transect following the 10-fm contour (Transect 1) and 25 degrees for Transect 2 (500-m offshore of the 10 fm contour). With brief exceptions, these transducer aiming angles will be maintained for each of the transect locations over the study period. Once initially set, none of the selectable user parameters of the

sector-scanning sonar will be changed over the course of the study, such as gain, range, ping rate, etc.

To verify the stability and consistent response of the system, it is "calibrated" against a known target either before or after each survey. A 20-cm aluminum air-filled sphere is used as the acoustic reference target. The sphere is secured to a 20-m long rope at a distance of 5 m above a 25-lb lead downrigger ball, which serves as an anchor. This arrangement suspends the target sphere 5-m above the bottom when deployed. The rope and sphere are cast overboard in about 10 fm of water. The boat is positioned approximately 32-48 m away, and the scanner transducer is manually aimed at the float. The system gain is set to +12, as used during the surveys. The transducer aiming angle is then adjusted until maximum amplitude (peak color) is obtained.

In addition, an HTI Model 241 Portable Split-Beam System will be used for data collection and processing during 2000. This scientific echo sounder system will provide more accurate, quantifiable density estimates not available with the American Pioneer "Fishscanner Model 201" commercial sector-scanning sonar.

Data collected with the HTI Model 241 Portable Split-Beam System will be used to interpret the weighted values of school sizes determined from the data collected with the American Pioneer "Fishscanner Model 201" sector-scanning sonar as follows. Each year, the HTI system will be used to measure length, depth, and density of the schools. Simultaneously, the American Pioneer system will be used to measure the length, depth, density, and width of the schools. The final measurement for each school will be a function of length, width, depth, and density. The measurements from the HTI system will be compared with the measurements taken from the American Pioneer sonar each year, and the comparison may be used to adjust the data from the American Pioneer sonar in 1998

The HTI scientific system will be stable, reliable, calibrated, and will produce data comparable over time and range. The Model 241 System will use a down-looking 15 degree conical beam transducer to maximize sample coverage. The operation of the Model 241 System is described by HTI (1994a, 1994b), and detailed specification will be provided on request.

Absolute fish density estimated with the HTI Model 241 will be generated at 30-second intervals as fish/m^2. (Pings will occur at more than one per second.) At a boat speed of 4 knots, this equated to a density estimate approximately every 60 m. These individual density estimates will be combined within each of the 28 geographical areas of interest. Herring school data will be pooled by depth and day/night period for each of the twenty-eight sectors. Estimates of fish density (expressed in fish/m^2), associated variance, and 95% confidence intervals will be calculated for each of the 28 sectors.

All hydroacoustic data will be interpreted visually from the echo sounder video displays and entered into the electronic navigation and charting software program. The full video output of the sector-scanning sonar will be recorded to VHS videotape during all surveys. The taped data will provide a permanent record of the surveys for later review, if desired. Videotape fish school events will be recorded regularly to log sheets and the computer record during data collection to facilitate location of school events on tape at a later date.

Fish schools observed on the sector-scanning sonar will be classified into three qualitative "size" types, based on the intensity (color), area (number of pixels on the display), and duration (number of repetitive sampling sweeps over which the school is observed). These will be classified as Type 1 (small), Type 2 (medium) and Type 3 (large). Type 1 schools will be mainly blue, green and/or yellow in color, relatively small (6-25 pixels), and only observed during one sweep of the scanning transducer. Type 2 schools will be of higher amplitude, usually yellow, orange, red, purple or white in color, larger in area (15-80 pixels) and more persistent (observed over two sampling sweeps). Type 3 schools will be expected to be very large, long-lasting and of high echo amplitude. These schools will normally be red, purple, or white in intensity, observed over 3 or more sampling sweeps, and 80 to several hundred pixels in size. They should frequently obscure a large part of the video screen over an extended period. All counted schools will be required to be relatively compact and a minimum of 15 pixels in size. Small aggregations of dispersed fish and individual or paired targets will not be plotted, although their presence will be noted in the field logs.

The three recorded school size types will be indicated on the NOAA survey charts by specific marks or icons. School type 1's (small) will be designated with a green "X", type 2's (medium) with a red "X" and type 3's (large) with a large purple dot. The actual vessel survey track will also be plotted on each map.

Each school will be assigned a unique chart mark name describing the survey number, transect number, school type, and time position in the survey. For example, the first size 1 school in Transect 1 of Survey 7 will be designated as mark 7-1-1A and the last Survey 7 school, occurring in Transect 3 will be 7-3-1AZ. The naming convention will be *Survey # - Transect # - School Type – Sequential Alpha Character Designator*, where the sequential alpha character string flags the place of the school in the entire survey. (For example, 7-1-1D would be the 4th school in the survey and 7-3-1AZ the 52nd school.)

The charts with observed fish school data will be presented each year on a survey basis, plus a summary for all nine surveys as a whole (10 chart sets in total). Each survey map set includes three charts, one encompassing the entire survey area between Sandy Point and Point Whitehorn (1:32,000 scale) and two higher-resolution charts displaying the northern and southern halves of the area in greater detail (1:16,000 scale). These charts will be printed in color at 360 dots per inch (dpi) resolution.

The survey text logs will include all real-time observations from each survey, including a description of each observed school, environmental data, vessel traffic, and other ancillary information.

Changes in the above referenced survey methods will be subject to prior WDFW and WEC approval. WDFW and WEC representatives will be permitted access to the survey vessel upon request. Annual survey reports will be submitted to WDFW, WEC, and DOE by August 30 of the sampling year.

Analysis/Threshold Determination

A location will be considered a preferred nearshore migration corridor/schooling area if more of what are considered to be pre-spawning herring are observed for that particular site compared with other sites during either survey year.

For each transect during the surveys, the location and size of each school recorded with the American Pioneer "Fishscanner Model 201" sector-scanning sonar will be plotted on a chart. This information will be analyzed by examining data for each date and depth, data pooled for all daytime surveys, and data pooled for all nighttime surveys, and data pooled for all surveys day or night.

Since there is no concurrent net sampling on the hydroacoustic surveys, only the larger, denser fish schools that are most likely pre-spawner herring will be considered as such. The following school characteristics will be classified as spawner herring: amplitude high, primarily red, purple or white in color; screen size 20 pixels or greater; visible for at least two sweeps.

Each school that fits the above spawner herring criteria will be given a weighted score based on size and amplitude. For a given school, the number of pixels on the screen for a sweep will be counted and each pixel assigned a value. Red pixels will have a value of one, purple pixels a value of two, and white pixels a value of three. The score for that sweep will be summed. Each successive sweep for that school will be scored in the same manner. The scores from each sweep will then be summed to give a total weighted score for that school. This scoring method may be adjusted as agreed by technical staffs of WDFW, WEC, and PIT.

The assumptions implied in the analyses of data collected by the sector-scanning sonar are:

1. The combination of the number of pixels on the sonar screen and the number of sweeps in which a school is visible is a linear function of the volume of the school. For example, all other things being equal, a school visible in two sweeps is twice as large as a school visible in one sweep. And, all other things being equal, a school represented by 750 pixels is three times as large as a school represented by 250 pixels.
2. The pixel color of a school is linearly related to the density of the school and, therefore, to the strength of the signal returning to the sonar as described in the previous paragraph, subject to review by the Parties.
3. The abundance scores generated from this approach are not estimates of biomass.

A second set of charts with the abundance score data will be presented each year as a summary for all nine surveys as a whole. The survey map set will include three charts, one encompassing the entire survey area between Sandy Point and Point Whitehorn (1:32,000 scale), and two higher resolution charts displaying the northern and southern halves of the area in greater detail (1:16,000 scale). These charts will be printed in color at 360 dots per inch (dpi) resolution. The schools classified to be spawner herring will be indicated on the NOAA survey charts by specific marks or icons. Schools with scores below 250 will be designated with a green "X," schools with scores from 250 to 1,000 will be designated with a red "X," and schools with scores greater

than 1,000 will have a large purple dot. These scoring categories may be adjusted as agreed by technical staffs of WDFW, WEC, and PIT.

In addition, the densities recorded with the HTI Model 241 Portable Split-Beam System will be analyzed. The HTI Model 241 Portable Split-Beam System data will be used to check the data generated from the American Pioneer System, may be used to fine tune the weighted values of school size, and will be used in comparing data from the two post-construction surveys, if performed. Modifications to the weighting factors based on HTI Model 241 Portable Split-Beam System data analysis will be selected and approved by scientific representatives of WDFW, WEC and the proponent.

WDFW, WEC, and PIT technical staffs will examine the results visually (geographic analysis). Geographic analysis may clearly indicate existence of a preferred inshore migration corridor/schooling area, or it may indicate no particular pattern. After the results of the geographic analysis are known, if there is consensus among WDFW, WEC, and the proponent that no preferred nearshore migration corridor/schooling area exists, no additional analysis or surveys under Objective 1.1 and 1.2 will be required.

If there is consensus among WDFW, WEC, and the proponent that a preferred migration corridor/schooling area exists, then Contingencies 1, 2, and 3 will apply.

If there is no consensus regarding the existence or location of nearshore migration corridor/schooling areas, a statistical analysis of the data will be used. The fish school data will be assigned to one of 28 predetermined sectors. These sectors will be of equal length, spanning the 14-km shoreline within the herring spawning area. For each sector, the total weighted school scores described earlier will be summed over the survey period to produce a total abundance score for each sector. Any data comparisons and/or statistical analysis of the hypotheses for Objective 1 will use the abundance scores.

The abundance score data will be stratified according to year and period (day and night) and will be pooled across transects. The transects will be divided into 28 sectors, each of 0.5 km length, with the proposed GPT pier site as the dividing line between two adjacent sectors, (e.g., between Sectors 12 and 13). Observations taken on nine non-consecutive dates (alternating between day and night) constitute the replicates.

The residual and total degrees of freedom shown in Table 1 assume that there will be four and five replicates within each year, period, and sector.

Table 1: EXPECTED ANOVA TABLE FOR OBJECTIVE 1.1

Sources of Error	Degrees of Freedom
Main effects	
Year (1998, 1999) (Y)	1
Period (day/night) (P)	1
Sector (1 through 28) (S)	27
Interactions	

Year: Period	1
Year: Sector	27
Period: Sector	27
Year: Period: Sector	27
Residual	392
Total	503

All of the factors (year, period, and sector) are fixed and will be dealt with appropriately when calculating the error terms and the variance ratios in the generalized linear model (GLM). The abundance scores – which are essentially count data – are expected to follow a Poisson distribution, hence these data will be modeled using a Poisson error distribution and a log-link function. This is the most common model for count data (e.g., McCullagh and Nelder, 1989). Diagnostics on the residuals will be conducted to confirm the appropriateness of this model.

The model described in Table 1 will be used to test the following sets of hypotheses.

Hypothesis set 1.1:
Testing the null hypothesis:

The annual mean abundance scores in Sector 12 and Sector 13 are less than or equal to the annual abundance scores averaged across all the sectors that are not adjacent to the GPT site.

$$H_{01}: (\mu_{\text{Sector 12, 1998}} \leq \mu_{\text{Sectors 1-11 and 14-28, 1998}} \text{ and } \mu_{\text{Sector 12, 2000}} \leq \mu_{\text{Sectors 1-11 and 14-28 2000}})$$
$$H_{02}: (\mu_{\text{Sector 13, 1998}} \leq \mu_{\text{Sectors 1-11 and 14-28, 1998}} \text{ and } \mu_{\text{Sector 13, 2000}} \leq \mu_{\text{Sectors 1-11 and 14-28, 2000}})$$

versus the alternative hypothesis:

The annual mean abundance scores in either Sector 12 or Sector 13, in either 1998 or 2000, are greater than the annual abundance scores averaged across all the sectors that are not adjacent to the GPT site.

$$H_{a1}: (\mu_{\text{Sector 12, 1998}} > \mu_{\text{Sectors 1-11 and 14-28, 1998}} \text{ or } \mu_{\text{Sector 12, 2000}} > \mu_{\text{Sectors 1-11 and 14-28, 2000}})$$
$$H_{a2}: (\mu_{\text{Sector 13, 1998}} > \mu_{\text{Sectors 1-11 and 14-28, 1998}} \text{ or } \mu_{\text{Sector 13, 2000}} > \mu_{\text{Sectors 1-11 and 14-28, 2000}})$$

Where $\mu_{\text{Sector 12, 1998}}$ is the mean in 1998 for Sector 12 pooled across all transects and periods, and $\mu_{\text{Sectors 1-11 and 14-28, 1998}}$ is the grand mean in 1998 pooled across all sectors (except the two GPT-adjacent sectors), all transects and all periods. If Sector 12 or 13 has greater than average abundance scores in either year that sector will be interpreted to be among the preferred locations for herring migration/schooling, where preferred is interpreted as anything greater than average. If either of these sectors is found to be preferred by rejection of the null hypothesis, Contingencies 1, 2, and 3 will be implemented.

Statistical testing of this hypothesis set will be performed at a significance level (alpha) of 0.05. Failure to reject null hypothesis 1.1 indicates insufficient evidence to statistically show that the two GPT-adjacent sectors have greater abundance scores on average than the other sectors. (Note: The proposed design results in a test that should be relatively powerful. A powerful test is more likely to lead to rejection of the null hypothesis.) A power analysis will be performed to determine the level of sensitivity of this test. If it is found that the test has sufficient power (>80%) to detect an *a priori* stated effect size and the null hypothesis is not rejected, then it will have been effectively shown that the GPT site is not a preferred corridor and Contingencies 1, 2, and 3 will not be implemented. If the null hypotheses is rejected, then Contingencies 1, 2, and 3 will be implemented.

If there is insufficient power and the test fails to reject the null hypothesis, then the results are statistically inconclusive. Statistically inconclusive results will lead to modification of the sampling design to improve the power in subsequent sampling events (i.e., for Objective 1.2). In the event that the results from Objective 1.1 are inconclusive, Contingencies 1, 2, and 3 will be implemented.

Objective 1.2. Assess whether the ship activity at the GPT site disrupts the use of preferred nearshore migration corridors/schooling areas.

Post-construction hydroacoustic surveys of the study area will be required only if results of pre-construction surveys described above in Objective 1.1 conclude that there are preferred nearshore migration corridors/schooling areas within 500 meters of the footprint of the project (Sectors 12 or 13).

The question of whether vessel operations will affect pre-spawner herring use of preferred nearshore migration corridors/schooling areas will be assessed by repeating the survey methods outlined above in Objective 1.1 for a period of at least two operational years immediately following trestle/wharf construction and the initiation of bulk terminal operations. Post-construction surveys will be analyzed in relation to pre-construction survey results for measurable changes in pre-spawner herring presence in the preferred nearshore migration corridors/schooling areas.

Survey Methods

Same methodology outlined above in Objective 1.1.

Analysis/Threshold Determination

For each survey date, the location and size of each school will be plotted on a NOAA chart. The charts will analyze data for each date and depth, data pooled for all daytime surveys, data pooled for all nighttime surveys, and data pooled for all surveys day or night. Geographic analysis may clearly indicate a change of occurrence in a preferred inshore migration corridor/schooling area or it may clearly show no change.

If there is no consensus regarding a change in herring use of the nearshore migration corridor/schooling areas, then a statistical analysis will be used. The analysis will be similar to that used in testing Objective 1.1, except that the herring abundance scores (including the 1998 and 2000 data) will be transformed to proportions that account for annual differences in inshore survey area pre-spawner herring abundance. The proportions will be calculated as the abundance score in each category (year, sector, and period) divided by the total annual survey area abundance-score (where the total is calculated by summing school scores across all sectors, transects and periods within a year). The data will be analyzed using an ANOVA to determine the significance of year (comparing pre- vs. post-construction years) on the proportion, with the ANOVA accounting for the effects of sector and period separately.

A model similar to that outlined for Objective 1.1 will be used. All data treatment and evaluation of the model assumptions will be identical to that described for Objective 1.1. The ANOVA table for this objective (Table 2) will be similar to that detailed for Objective 1.1, but there are now four years of observations. Replication occurs on different dates throughout each year. For example, if there are four day and five night observations in 1998 and five day and four night observations in 2000, then there are nine replicates within each period and sector for the two years of the pre-construction phase. This same distribution of day and night observations in the post-construction years will be used to ensure a balanced design with nine replicates in each sector and year, with equal representation of day and night observations. The residual and total degrees of freedom shown in Table 2 assume four and five replicates for the two periods within each sector and year. Including data from all sectors in this model will provide a better estimate of the residual error, as well as the ability to define additional hypotheses regarding the sectors neighboring the GPT-adjacent sectors.

The model described in Table 2 will be used to test the following hypothesis, which is presented as one interpretation of the narrative Objective 1.2. Only the preferred corridor will be the focus of study for this objective, although this corridor might encompass more than one sector.

Hypothesis Set 1.2:

Testing of the null hypothesis: (Vessel traffic does not disrupt herring)

The mean proportional abundance score observed in the preferred corridor during the pre-construction phase (1998 and 2000) is less than or equal to the mean score observed in the preferred corridor during the post-construction phase (2001 and 2002).

$$H_0: \mu_{\text{Preferred corridor, pre-construction}} \leq \mu_{\text{Preferred corridor, post-construction}}$$

The alternative hypothesis: (Vessel traffic disrupts herring)

The mean proportional abundance score observed in the preferred corridor during the pre-construction phase (1998 and 2000) exceeds the mean score observed in the preferred corridor during the post-construction phase (2001 and 2002).

$$H_a: \mu_{\text{Preferred corridor, pre-construction}} > \mu_{\text{Preferred corridor, post-construction}}$$

Where $\mu_{\text{Preferred corridor, pre-construction}}$ is the mean proportion of the total annual survey area herring abundance score using the preferred sectors for the years 1998 and 2000, and $\mu_{\text{Preferred corridor, post-}}$

$_{construction}$ is the mean proportion of the total annual survey area herring abundance score using the preferred sectors for the years 2001 and 2002. Regardless of whether the ANOVA indicates a significant year effect, all hypotheses will average results for the years 1998 and 2000 to describe the pre-construction phase and the years 2001 and 2002 to describe the post-construction phase.

Table 2: EXPECTED ANOVA TABLE FOR OBJECTIVE 1.2

Sources of Error	Degrees of Freedom
Main effects	
Year (1998, 2000, 2001, 2002)	3
Period (day /night)	1
Sector (1 through 28)	27
Interactions	
Year:Period	3
Year:Sector	81
Period:Sector	27
Year:Period:Sector	81
Residual	784
Total	1007

Statistical testing of null Hypothesis Set 1.2 will be performed at a significance level (alpha) of 0.05. If the null hypothesis is rejected, Contingency 4 will be implemented. If the null hypothesis is not rejected, a power analysis will be performed to determine the level of sensitivity of this test. If it is found that the test has sufficient power (>80%) to detect an *a priori* stated effect size, and the null hypothesis is not rejected, then it will have been effectively shown that the ship activity at the GPT site does not disrupt the use of the preferred corridor, and Contingency 4 will not be implemented.

If there is insufficient power and the statistical tests fail to reject the null hypothesis, then the results are statistically inconclusive. In that event (low statistical power and there is failure to reject the null hypothesis), Contingency 4 will be implemented if the proportional abundance scores for the corridor (Sectors 12 and 13) decrease 10% or greater from the pre-construction phase to the post-construction phase.

The *Period* effect will be evaluated to determine if Contingency 4 needs to be implemented only during the day or night periods. Contingency 4 will be implemented as written or may be modified to account for the *Period* effect based on the results of the period effect analysis. Modification of Contingency 4 based on *Period* effect analysis will be subject to WDFW and WEC approval. Contingency 4 will be implemented during the appropriate day-time or night-time period.

Objective 2: Assess whether the trestle/wharf structure, ship activity, and/or bulk terminal operations disrupt the lateral nearshore migration and concentration of herring.

The question of whether the trestle/wharf structures, ship activity, and the bulk terminal operations will affect the lateral nearshore migration and/or concentration of herring will be explored through hydrophone and hydroacoustic monitoring. This monitoring will be conducted during the time of peak herring spawning activity (April 26 through May 17) for a period of two years when the terminal is in operation.

Because this monitoring involves methods and technologies that have not been used in this context, a pilot study will be conducted first to provide information on the feasibility of measuring herring behavior using fixed hydroacoustic transducers. This pilot study and the subsequent monitoring will have two parts. In the first part, hydrophone surveys will be "passive" surveys, using devices similar to underwater microphones to listen to the sounds in the water. The second part will consist of active hydroacoustic herring surveys using transducers that "ping" into the water and record the return signal from the ping.

As details of the pilot study are finalized, questions to be addressed regarding the hydrophones will include:

1) How much variability is there in the observable noise levels at different locations on the pier/trestle? 2) How many hydrophones does it take to adequately sample for the variability? 3) How can the noise readings from multiple hydrophones be integrated into a single sample interval datum? 4) What noise characteristic (frequency, amplitude, or both) provokes the observable herring response?

The following similar sets of questions will be evaluated for deployment of the hydroacoustic transducers. 1) Can a fixed transducer, facing outward from its stationary position, observe discrete schools of herring? 2) What is the range of detectability for the fixed transducer? 3) How many transducers will be necessary to effectively monitor herring near the pier and trestle? 4) How will the size of observed herring schools be determined? 5) How will observations of herring behavior be recorded and/or integrated into appropriate data for the sample interval? 6) What should be the duration of the sample interval?

Proposed Pilot Study Field Work Approach:

Hydrophone Monitoring

The project site will be surveyed using a broadband hydrophone, which is capable of picking up multiple frequencies. The signal from the hydrophone will be recorded and digitized for later analysis.

To begin the pilot study, two hydrophones will be fixed to the GPT trestle. One hydrophone will be fixed near the wharf and the second hydrophone will be fixed at approximately the location along the trestle where the bottom depth is 8.0 feet MLLW tide elevation (MLLW = 0.0). The exact placement of the hydrophones will be subject to WDFW and WEC consultation and approval. Hydrophone data will be collected during two consecutive years immediately following project construction. Hydrophone data will be collected during the April 26 to May 17

time period and when there is vessel activity at the wharf. The dates and times of vessel activity at the wharf will also be logged. As a control, data will be collected every sixth hour during one day each week when there is no activity.

The data collected with the hydrophones will document the frequency range associated with vessel activities and wharf operations, and provide a basis for comparison with the ambient sound conditions in the Cherry Point area. The analysis will also compare the frequencies and amplitudes of sound in the water at the project facility, with those frequencies that have been documented in the literature (e.g. Schwartz and Greer, 1984) as disturbing herring. In addition, the analysis will compare the frequencies and amplitudes from the wharf and at the 8 feet MLLW station. Annual reports will be submitted to WDFW, WEC, and Washington Department of Ecology (Ecology) by August 30 of each sampling year.

Hydroacoustic Monitoring

Because the monitoring is intended to determine if vessel traffic, the trestle/wharf structure, and facility operations affect herring behavior, the monitoring should not be conducted from a moving vessel, which itself makes noise and might disturb the herring. Instead, fixed location multi-beam transducers will be mounted on the pier to minimize disturbance to the fish from the monitoring activity. To begin the pilot study, two transducers will be fixed to the GPT trestle.

Hydroacoustic data will be collected during two consecutive years immediately following project construction. For the best coverage of the herring activity, hydroacoustic data will be collected on Mondays, Wednesdays, and Fridays from April 26 through May 17. Data collection will alternate between day and night sampling. During each sampling event, data will be collected for a minimum of six hours. For each sampling event, hydroacoustic data will be collected during the last half of the flood tide and the first half of the ebb tide. Two hydroacoustic transducers will be fixed to the trestle structure. The exact location and direction of the hydroacoustic transducers during each sampling year will be determined based on analysis of the Objective 1.1 and/or Objective 1.2 monitoring data and through consultation with WDFW and WEC technical representatives. The final placement of the hydroacoustic transducers will be subject to WDFW and WEC approval.

The hydroacoustic transducer arrays will record the abundance (relative backscattering or sv), location, and direction of movement of herring schools near the trestle. Hydroacoustic data should include periods of vessel activity at the wharf during the data collection period. The dates and times of vessel operations at the wharf and wharf activities including commencement and termination of lighting, loading and unloading, will also be logged. Based on historical WDFW hydroacoustic surveys and commercial fisher observations, it is assumed that any large fish schools in the area at this time are likely to be herring. Changes in the above referenced survey methods will be subject to prior WDFW and WEC approval. Annual reports will be submitted to WDFW, WEC, and Ecology by August 30 of each sampling year.

Exploratory and graphical data analysis will be used to investigate the relationship between herring behavior and concentration and noise. A description of the specific statistical tests that

could be used in this analysis will be provided after sample data from the pilot study are available and have been evaluated for their usefulness by participating scientists.

A complete experimental design to address Objective 2 will be forthcoming when the pilot study is completed.

Analysis/Threshold Determination

If results of the statistical analysis demonstrate there is a clear association between the onset of vessel or operation noise and an instantaneous change in herring migration direction, then one or more of Contingencies 2 and 5 through 8 will be implemented, depending on which type of noise or activity is shown to cause the disturbance.

Objective 3. Assess whether ship activity and bulk terminal operations displace herring from using the spawning habitat in the immediate vicinity of the trestle.

While it has been documented that Pacific herring are highly sensitive to noise and disturbance at a considerable distance (Mitson, 1995; Schwartz and Greer, 1984), they are also known to spawn in areas of concentrated human activity in the marine environment (San Francisco and Sitka). The effect of vessel and port bulk terminal operations at Cherry Point in relation to herring use of the spawning habitat near the dock structures has not been studied. The survey methods that follow are designed to evaluate the relationship between vessel activity/port bulk terminal operations and herring use of spawning habitat in the immediate vicinity of the trestle structures.

The spatial distribution of spawn for the Cherry Point herring stock has been highly variable over the past 28 years, during which the WDFW has conducted its grappling rake surveys in the herring spawning grounds. It is expected that the presence of spawn in a particular location is determined, in part, by the habitat quality in that location, but also by the total spawning stock size. When stock sizes are large, the herring will expand their spawning into areas that might not be used during periods of low spawning biomass. To assess whether the spawning preference for the GPT site has changed because of the presence of the trestle and its associated activities, a relatively long data series with sufficient contrast in spawning biomass levels both before and after construction is needed. The 28-year data series from the WDFW grappling rake surveys, conducted from 1972 through 1999, will be used to construct a model describing the use of the GPT site as a function of biomass. One or more environmental variables (e.g., water temperature) also may be considered. Observations taken at the GPT site following construction will be compared with predictions from the regression model based on the historical data for the site.

A survey, conducted by SCUBA divers, is proposed to validate that the WDFW estimates are providing a reasonably accurate representation of the spatial distribution of herring spawn and to quantify the error associated with the rake sample density estimates.

Survey Methods

Five locations determined to contain herring spawn will be selected for sampling by both the grappling rake and SCUBA methods. A WDFW sampling team will conduct grappling rake surveys at these locations using the same methods that have been used historically by WDFW. At the same five locations, SCUBA divers will collect egg spawn for estimating the error associated with the single rake sample estimates. If WDFW sampling indicates spawning at the GPT site, then it will be one of the experimental sites. The rake sampling and SCUBA sampling at each location will occur on the same day. The SCUBA survey will sample from an area approximately 100 meters in length (parallel to the shore) by the width of vegetated zone, with the rake sample estimate taken from one point in the center of the SCUBA sampling area. A systematic random sampling scheme will be used by the divers to record their observations along each transect. Transects will be placed perpendicular to the shore with one transect line intersecting the location where the rake sample was taken, and the other two placed approximately 50 meters north and south of the first transect line. The bounds of the vegetated zone will be identified for each transect line. The first interval on each transect will be randomly placed by the divers within the first five meters of visible vegetation. All subsequent 5-meter intervals will be measured from this first random start. Observations along the transect will be made at each 5-meter interval within the vegetated zone and within the width of the quadrat sampler (31.6 cm).

The divers will start at the shoreward end of the transect and will record their observations, including estimated spawn intensity (as egg layers), spawning substrate, percent cover, and water depth, at the 5-meter intervals within the vegetated zone. These observations will provide a general map of the spawn intensity and substrate along each transect and will identify all intervals at which spawn was present. Those intervals with no apparent herring spawn will be assigned an egg density of zero. Using a random number table, five intervals containing spawn will be randomly selected for quadrat sampling. Egg deposition within quadrats will be collected using square quadrat samplers with sides of 31.6 cm, for a total sampling area of 0.1 m^2. The position of the quadrat sampler relative to each station marker will be consistently applied (e.g., if the diver is facing away from shore, the bottom left corner of the quadrat sampler will be placed on the interval marker). All vegetation and eggs within the quadrat area will be removed for enumeration in the laboratory. The process will be repeated for each transect.

Eggs per *Sample*

In the laboratory, the samples taken by the SCUBA divers will be processed as follows. The samples will be soaked in water overnight, then eggs will be removed from the vegetation by soaking for 45 to 90 minutes in a 1N solution of potassium hydroxide (KOH). The eggs will then be gently separated from the vegetation by hand. Next, the size and shape of the eggs will be standardized by soaking for at least 24 hours in a 1N saline solution with 10% formalin, buffered with sodium bicarbonate to a pH of 6.5. Finally, the eggs will be enumerated using volumetric displacement techniques. Because the thoroughness of egg removal may vary with different vegetation types, separate standards will be used for the displacement of 1,000 eggs from each major vegetation type sampled (e.g., foliose red, filamentous red, eelgrass, etc.). Egg numbers in the samples will be estimated using the following formula:

$$E_{ij} = 1000\,(D_{ij}/V_j)$$

where:

E_{ij} = Estimate of total eggs in sample *i* in vegetation type *j*

D_{ij} = Volumetric displacement of eggs in sample *i*, vegetation type *j*

V_j = Volumetric displacement of 1,000 eggs, standard for vegetation type *j* (taken as the mean of at least three samples)

The total egg count per sample will be the egg count per vegetation type summed across all vegetation types present in the sample. Total egg count divided by 0.1 m^2 (the size of the quadrant sampler) will estimate egg density per sample – these density estimates will be converted to eggs per in^2 for the regression comparison to the rake sample estimates. The potential will also be examined for adjusting egg numbers to account for losses due to predation, storm damage or during the sampling procedures. Mean density for each transect will be computed using the following formula:

$$\bar{d}_{ij} = \frac{n-x}{n}\left(\frac{1}{k}\sum_{k} d_{ijk}\right)$$

Where:

$\bar{d}_{ij}$ = the mean density for transect *j* at site *i*

d_{ijk} = the density of eggs in the kth random sample interval (k = 1, ..., 5)

n = the number of 5-meter intervals within the vegetated zone

x = the number of intervals without visible spawn.

The mean of the three transect density estimates for each site will provide an estimate of the total mean density for the site.

Analysis/Threshold Determination

The decision based on this analysis should reflect both the effects of the project and the natural variability in herring spawn deposition. Herring spawning biomass on any spawning ground varies a great deal from year to year, even under undisturbed and unfished conditions. Therefore, it is necessary to evaluate the post-construction use of the GPT site in light of the long-term average use of the site prior to construction and to condition the expectation of site use on estimates of spawning stock biomass (and possibly on other influential environmental variables). The GPT site is the sector of primary interest, but it may be necessary to expand the target site for this analysis to encompass several rake sampling locations for each year. The width of the GPT site will be one km in length, centered around the proposed trestle.

The WDFW historical data series will be reviewed and the data summarized to provide a measure of herring spawn deposition in the target sector in each year. The spawn deposition intensity categories will first be converted to the median number of eggs per square inch in that intensity category (Table 3).

At each sampling site, these values will be summed over all observations within the target site for that season, to produce an estimate of total spawn deposition at that site. For example, if the rake sampling provided three observations for an area which were Light, Medium, and Heavy, then there is an estimated total of (125 + 350 + 750) = 1,225 eggs per square inch in the area for that season.

Table 3: HERRING SPAWN DEPOSITION INTENSITY SCALE USED BY WDFW

	Very Light	Light	Medium	Heavy	Very Heavy
Eggs per square inch	1-50	50-200	200-500	500-1,000	>1,000
Factor applied to intensity category to estimate spawn density for regression analysis	25	125	350	750	1,000

Two regressions will be used, the first to predict the estimation error associated with the rake sample estimates and the second to predict the expected spawn intensity at the site. The first regression analysis relates the two estimates of egg density within each area (i.e., the point estimate from the single rake sample and the mean of the SCUBA samples from each sampling area). The emphasis in this analysis is on the relationship between our respective "best estimates" from the two sampling methods. For this reason, the mean of the SCUBA samples will be used rather than each individual SCUBA sample result. Using all of the individual results would inflate the error estimate to include the small-scale spatial variability (i.e., the variability among samples within each sampling area). While this spatial variability could be quite interesting to investigate, it is of secondary importance in the primary regression relationship addressed through equation [2].

The first regression model will use the five pairs of observations from the synoptic sampling using rake and SCUBA sampling techniques (equation [1]).

$$Y_i = \beta_0 + \beta_1 \overline{X}_i + \varepsilon_y \qquad [1]$$

Where:

Y_i = single rake estimate of spawn density from site i (i = 1 to 5)

$\overline{X}_i$ = mean of the SCUBA sample estimates of spawn density from site i (i = 1 to 5)

ε_y = residual error for the regression, this will be used as the estimation error for the rake observations

β_0 and β_1 = intercept and slope to be estimated from the regression analysis

The second regression model will be used to investigate the relationship between the total density of herring spawn in the target sector and the total spawning biomass estimate for that year, and possibly other factors important to herring spawn for which information is available (e.g., water temperature). The suggested regression model is shown in equation [2].

$$Y_i = \beta_0 + \beta_1 \text{Biomass}_i + \beta_2 \text{Temperature}_i + \beta_3 \text{Biomass}_i\text{:Temperature}_i + \varepsilon_i \quad [2]$$

Where:

Y_i	= estimate of total spawn density from all rake samples within the site for year i (i = 1 to 28)
Biomass_i	= annual WDFW spawn deposition estimate of total spawning biomass at Cherry Point (Point Whitehorn to Sandy Point)
Temperature_i	= water temperature at the site during spawning season
$\text{Biomass}_i\text{:Temperature}_i$	= term expressing the interaction between biomass and temperature
ε_i	= random process error
β_0, β_1, β_2, and β_3	= the parameters to be estimated by the regression analysis

In the years immediately following construction, this historical regression relationship will be used to generate prediction intervals around the level of herring spawn expected at the target site for the biomass and temperature values observed in that year. The prediction interval will incorporate the prediction error from the regression model (equation [2]) plus the estimation error associated with the rake samples (ε_i from equation [1]). If the observed herring spawn density is within the prediction intervals, then it could be inferred that the presence of the pier has not adversely affected the herring preference for the site. Details regarding this model and the decision criteria (e.g., confidence level for the prediction intervals and number of years following construction in which comparisons will be made) will be provided following discussions with WDFW and review of the WDFW historical data series.

For Contingency 9 to be implemented, a significant effect must be detected from the above tests and the results of Objective 2.

CONTINGENCIES

The following contingency measures may be necessary to mitigate disturbances to herring nearshore migration, schooling, and/or spawning as identified by the results of the monitoring surveys described above in Objectives 1, 2, and 3.

1. If the results of Objective 1.1 monitoring demonstrate that the proposed wharf element will overlap with a preferred nearshore migration corridor/schooling area, the project proponent will develop and implement an operational plan, subject to WDFW and WEC review and approval. The plan would provide specific pilot berthing instructions that avoid activity and disturbance to the area of concern from April 10 through May 20.

inside of pier?

2. If the results of Objective 1.1 monitoring demonstrate that the proposed wharf element will overlap with a preferred nearshore migration corridor/schooling area, the berthing activity will be prohibited from one hour after the beginning of flood tide to one hour after the beginning of the ebb tide during the herring spawning period (April 10 through May 20).

3. If the results of Objective 1.1 monitoring demonstrate that the proposed wharf element will overlap with a preferred nearshore migration corridor/schooling area, then Objective 1.2 monitoring/sampling will be implemented.

4. If the results of Objective 1.2 monitoring and analysis demonstrate that PIT vessel movements to and from the wharf disrupt the use of the nearshore herring migration corridor or schooling area identified through Objective 1.1 analysis, the following procedures will be implemented. For those time periods during which berthing activities are not specifically prohibited under Contingency 2, PIT will implement the following Vessel Movement-Herring Interaction (VMHI) protocol. The VHMI protocol will be implemented for those years that, during the previous year, the WDFW Cherry Point spawning biomass estimate is less than 3,200 tons. If the Cherry Point herring stock declines to a cumulative spawning biomass of less than 100 tons in three consecutive years, the parties will discuss whether the continuation of the VMHI protocol is appropriate..

The VMHI protocol shall include the following actions:

PIT shall contract with a charter vessel that will be approved by WDFW and WEC. The charter vessel shall be equipped with the American Pioneer Fishscanner 201system capability to detect and record herring schools in the project area. The charter vessel will be on 24-hour call from April 26 through May17. PIT, WDFW, and WEC observers will be allowed on board, given reasonable notice to the contractor. The contractor will maintain all electronic data and paper chart records of the surveys. PIT will maintain all corresponding PIT vessel's pilothouse logs. WDFW and WEC will be provided access in order to compare the two sets of records so that they can clearly determine compliance with the VMHI protocol.

The charter vessel will survey a corridor, for presence of pre-spawner herring schools. The corridor is defined as the rectangular area (two thousand meters by one thousand meters) in front of the GPT Wharf. The northerly two thousand meter side is parallel to the waterward edge of the wharf, and centered at the midpoint of the wharf. Presence of pre-spawner herring shall be based on the criteria for pre-spawner herring schools under Objective 1.1 (Amplitude high; primarily red, purple, and white colored pixels; a minimum of 20 pixels; and two sweeps of the American Pioneer system). The charter operator shall use a plastic grid overlay on the scanner display to estimate if the criteria for pre-spawner herring schools have been met. WDFW and WEC will approve this procedure.

The survey shall be on a zigzag pattern at 90 degree angles (or other pattern approved by

WDFW and WEC) covering the corridor to be described above.

If pre-spawner herring are detected, the vessel shall wait, until chartered vessel makes another survey. The protocol will be repeated until herring have not been detected in the corridor. When the corridor is clear of pre-spawner herring, the vessel may approach or depart the wharf. The only exception will be in emergency situations authorized verbally or in writing in advance by Department of Ecology. This will avoid potential catastrophic spills due to vessel grounding or collision.

The parties will meet annually to review the results of this protocol and to evaluate its effectiveness. This protocol will be subject to further modification by the parties prior to its implementation and following each annual review. Further implementation of this protocol will be subject to approval by WDFW and WEC.

5. If the results of Objective 2 monitoring indicate that the trestle and/or wharf lighting adversely disrupts the onshore and/or lateral nearshore migration or concentration of herring, the trestle and/or wharf lighting shall be modified to minimize the light cast onto the water surface during the herring spawning period (April 10 through May 20).

6. If the results of Objective 2 monitoring indicate that the loading and off loading operations of the trestle and/or wharf adversely disrupt the onshore and/or lateral nearshore migration of herring, the project proponent shall minimize loading activities during the herring spawning period (April 10 through May 20).

7. If the results of Objective 2 monitoring indicate that the noise of loading and off loading operations of the trestle and/or wharf adversely disrupt the onshore and/or lateral nearshore migration of herring, the project proponent shall restrict loading and off loading operations to eight-hour periods during the herring spawning period (April 10 through May 20) followed by eight-hour periods when no loading and off loading activities occur. (Changing the schedule to minimize impacts due to union labor work shift agreements must be approved by WDFW and WEC.)

8. If the results of Objective 2 monitoring indicate that the vessel noise adversely disrupts the onshore and/or lateral nearshore migration of herring, the project proponent shall require that all non critical mechanical equipment on the vessel is turned off while moored at the wharf during the herring spawning period (April 10 through May 20).

9. If the results of the surveys and analysis in Objective 3 (with inferences from Objective 2) show a significant impact on herring spawn deposition, then hydroacoustic monitoring will be continued for up to two additional years to determine which aspect of vessel or bulk terminal operations (vessel noise, conveyor noise, lighting, prop-wash, etc.) are affecting the spawn deposition. In addition, Contingencies 2 and 5 through 8 will be implemented during that period to allow the study team time to determine from the monitoring what is disturbing the herring and causing them to avoid the spawning habitat at the GPT site. Herring biologists from California and Alaska will be consulted regarding their most recent research of herring spawning at harbors and marinas.

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APPENDIX D

Gateway Pacific Terminal Ballast Water Exchange Requirements

This memo serves to outline the approach, objectives and requirements regarding ballast water for the Gateway Pacific Terminal project at Cherry Point west of Ferndale, Washington. The agreed upon objectives are as follows:

1) **Non-indigenous Species**

To the greatest extent practicable, prevent the introduction of non-indigenous species into the waters of the state, including through the pathways of ballast water exchange and/or contained within related sediments, and the physical transport of organisms within cargo holds or attached to vessels. All vessels and barges using the terminal shall comply with the intent and requirements of these provisions.

2) **Mandatory Ballast Water Testing**

Salinity - All vessels shall be tested for ballast water salinity prior to being allowed to transfer materials at the terminal in accordance with the following Ballast Water Testing Protocol. Said testing may occur upon entering the Strait of Juan de Fuca, at anchorage, or docked at the terminal.

In instances where a vessel fails the initial salinity test, said vessel shall be escorted by tug, at the shipper's expense, to the state-designated ocean discharge area to flush all ballast tanks of their contents until meeting the monitoring requirements referenced herein.

Waiver Request - Upon failure of a salinity test, the vessel's captain may request of Ecology, or its designee, a one-time waiver of the open ocean discharge requirement provided further testing may be required and alternative treatment of specified ballast tanks completed, all at the shipper's expense. Ships previously taking on ballast at ports determined by Ecology to contain significant biological risk i.e. hot spots and/or Captains having been identified with a prior violation of this settlement requirement may at Ecology's discretion be ordered to meet the ocean discharge requirement without the benefit of the above one-time waiver provision.

Biological Indicators - Vessels which pass the salinity test shall be sampled for planktonic indicators of estuarine water and open ocean water. If estuarine indicators are determined to be present at significant levels as established by the state agencies, the subject vessel will be required to purge it's ballast tanks at the state-designated ocean discharge area.

Accredited Testing - Physical and biological sampling shall be accomplished in accordance with the following Ballast Water Testing Protocol by an Ecology-approved laboratory or entity, and as unanimously amended by the parties hereafter.

Notice - GPT shall include these provisions in the terminal's "Regulations and Notice to Ships and General Information" to be sent to all future clients in advance of engaging in business with them. Said "Regulations and Notice to Ships and General Information" shall be approved by Ecology prior to distribution.

Amendments - Amendments or revisions to these ballast water exchange provisions may be proposed by any party to the settlement and evaluated by an ad hoc ballast water committee ("Committee") appointed by Ecology. Membership on the Committee will be open to at least one representative from each of the parties to this settlement agreement as well as other interested parties selected by Ecology.

Ballast Water Testing Protocol

PIT shall follow the procedure and key outlined on the attached and as amended by Ecology. The required sampling gear includes the following:

✓ Well purging pump (12 volt, 1.5 inch o.d., intended to go down ballast tank sounding tube) with attached 0.5 inch i.d. plastic tubing, powered by a small 12 volt, 7 amp-hour battery
✓ Small plankton net
✓ Microscope for viewing the sample
✓ Buffered formalin, various jars and pipets for sample collection and handling
Refractometer reading in salinity, 0 to100 ppt

The sampling crew will test for salinity first. Anything below 31 ppt will be assumed to be estuarine water and will fail. Ballast waters with higher salinities will require plankton sampling. On the understanding that calanoids are by far the most common blue water copapods, followed by cyclopoid and then by a very few harpacticoid copepods, samples containing cyclopoid and especially harpacticoid copepods will also be assumed to be estuarine and will fail the test. These samples will be preserved and retained for future reference. Estuarine waters will not be permitted to be discharged within State of Washington jurisdiction. Ships who have failed a ballast water test and who do not subsequently follow the prescribed discharge procedure may be fined or otherwise penalized, including total prohibition of use of PIT facilities.

Gateway Pacific Terminal Port Corporation
Harbor Master Department Standing Order

1) Topic
Ballast Water Exchange Program

2) Statement
All vessels destined to arrive at the PIT in ballast water condition will be required to carry out a mid–ocean ballast water exchange prior to arriving in U.S. waters. The purpose of this exchange is to limit the possibility of transferring non-indigenous species into U.S. waters

3) Procedures
3.1 All vessels shall be boarded by Harbor Master's representatives to conduct ballast water inspections which will require examination of one or more of the following:

1) log book entry (in English)
2) abstract of the log book entry
3) company or other administration form

The examination must provide details of the mid-ocean exchange of ballast water including, at a minimum, the following information:

Position of exchange (latitude and longitude)
Place where ballast water was originally taken
Amount of ballast water
Ballast tanks which have had water exchanged
Details if ballast not exchanged

A copy of the above may be faxed to the Harbor Master's office.

3.2 In the event that the vessel is unable to supply the above information in the prescribed manner, then no ballast water will be allowed to be discharged until the following procedures have been completed.

1) Samples of ballast water will be drawn and analyzed by a Harbor Master representative
2) Failure of a ballast water test will require the vessel to depart the vicinity and exchange ballast water in the outgoing current of the designated state ballast discharge area.

All charges for the movement and delay of the vessel will be accrued to the vessel's account.

3.3 Vessels which do not contain ballast water from other foreign ports and which are arriving from ports on the west coast of the United States of America (North of Cape Mendocino) , British Columbia, and Alaska wishing to discharge ballast water may be determined by the Harbor Master's representative to be exempt from these regulations if the ballast water to be discharged is documented to originate from these west coast waters and free of non-indigenous biota. The Harbor Master's representative conducting the ballast inspection will require to see a log book entry showing where the ballast water originated and related documentation.

3.4 Upon approval by the committee, these regulations will not be applied to vessels wishing to discharge less than 1000 tons of ballast water, provided, a Harbor Master representative must confirm the origin and characteristics (salinity, qualitative observation) of the ballast water and be in attendance prior to and during the discharge.

3.5 The following circumstances may be considered by the committee as a basis for a variance from these regulations, on case by case basis, for a vessel not performing the required mid-ocean ballast water exchange:

1) documented extremes of weather resulting in unsafe conditions

2) stability or hull stress concerns – safety is paramount and the Master will only be required to carry out the exchange if it is safe to proceed. Vessels receiving a variance under this provision shall be required to demonstrate the safety concern and may not be allowed to use the GPT facilities in the future.

Wenger, Barry

From: Adolphson, Peter
Sent: Thursday, August 13, 1998 10:02 AM
To: Wenger, Barry
Cc: Turvey, Martha
Subject: Sediment Parameters for baseline testing in vicinity of Smelter and Petroleum processors

http://www.wa.gov/ecology/sea/smu/sapa/ch2.doc

TABLE 1. NUMERICAL CRITERIA FOR PUGET SOUND MARINE SEDIMENTS

Chemical Parameter / Analysis Program	Sediment Management Standards			Puget Sound Dredged Disposal	
	SQS	SIZ_{max}, CSL, MCUL	SL	ML	
Metals	(mg/kg dry weight, ppm)			(mg/kg dry weight, ppm)	
	Antimony	--	--	20	200
	Arsenic	57	93	57	700
	Cadmium	5.1	6.7	0.96	9.6
	Chromium	260	270	--	--
	Copper	390	390	81	810
	Lead	450	530	66	660
	Mercury	0.41	0.59	0.21	2.1
	Nickel	--	--	140	--
	Silver	6.1	6.1	1.2	6.1
	Zinc	410	960	160	1,600
Nonionizable Organic Compounds	(mg/kg organic carbon[a], ppm OC)		(µg/kg dry weight, ppb)		
	Aromatic Hydrocarbons				
	Total LPAH[b]	370	780	610	6,100
	Naphthalene	99	170	210	2,100
	Acenaphthylene	66	66	64	640
	Acenaphthene	16	57	63	630
	Fluorene	23	79	64	640
	Phenanthrene	100	480	320	3,200
	Anthracene	220	1,200	130	1,300
	2-Methylnaphthalene	38	64	67	670
	Total HPAH[c]	960	5,300	1,800	51,000
	Fluoranthene	160	1,200	630	6,300
	Pyrene	1,000	1,400	430	7,300
	Benz[a]anthracene	110	270	450	4,500
	Chrysene	110	460	670	6,700
	Total benzofluoranthenes[d]	230	450	800	8,000
	Benzo[a]pyrene	99	210	660	6,600
	Indeno[1,2,3-cd]pyrene	34	88	69	5,200
	Dibenz[a,h]anthracene	12	33	120	1,200
	Benzo[ghi]perylene	31	78	540	5,400
	Chlorinated Benzenes				
	1,2-Dichlorobenzene	2.3	2.3	19	350
	1,3-Dichlorbenzene	--	--	170	--
	1,4-Dichlorobenzene	3.1	9	26	260
	1,2,4-Trichlorobenzene	0.81	1.8	13	64
	Hexachlorobenzene	0.38	2.3	23	230
Nonionizable Organics (cont.)	(mg/kg organic carbon[a], ppm OC)		(µg/kg dry weight, ppb)		
	Phthalate Esters				
	Dimethyl phthalate	53	53	160	--
	Diethyl phthalate	61	110	97	--
	Di-n-butyl phthalate	220	1,700	1,400	--
	Butyl benzyl phthalate	4.9	64	470	--

		Bis(2-ethylhexyl)phthalate	47		78		3,100	--
		Di-n-octyl phthalate	58	4,500			6,200	--
	Miscellaneous							
		Dibenzofuran	15	58			54	540
		Hexachlorobutadiene	3.9	6.2			29	290
		Hexachloroethane	--	--			1,400	14,000
		N-nitrosodiphenylamine		11	11		28	220
	Total PCBs	12		65	130		2,500	
	Chlorinated Pesticides*							
		Total DDT	--	--			6.9	69
		Aldrin	--	--			10	--
		Chlordane	--	--			10	--
		Dieldrin	--	--			10	--
		Heptachlor	--	--			10	--
		Lindane	--	--			10	--
	Volatile Organic Compounds*							
		Ethylbenzene	--	--			10	50
		Tetrachloroethene	--	--			14	210
		Total xylene	--	--			12	160
		Trichloroethene	--	--			160	1,600
Ionizable Organic Compounds	(µg/kg dry weight, ppb)			(µg/kg dry weight, ppb)				
	Phenol	420		1,200			120	1,200
	2-Methylphenol	63		63		20	72	
	4-Methylphenol	670		670		120	1,200	
	2,4-Dimethylphenol	29		29		29	50	
	Pentachlorophenol	360		690		100	690	
	Benzyl alcohol	57		73		25	73	
	Benzoic acid	650		650		400	690	

Notes on next page. * Denotes not initially included in sampling unless indicated through results of other testing

Note:
- -- - no numerical criterion of this type for this chemical
- AET - apparent effects threshold
- CSL - cleanup screening level
- HPAH - high molecular weight polycyclic aromatic hydrocarbon
- LPAH - low molecular weight polycyclic aromatic hydrocarbon
- MCUL - minimum cleanup level
- ML - maximum level
- PCB - polychlorinated biphenyl
- SIZ_{max} - Sediment Impact Zone maximum allowable contamination level (WAC 173-204-420)
- SL - screening level
- SMS - Sediment Management Standards (WAC 173-204)
- SQS - Sediment Quality Standards (WAC 173-204-320)

Where laboratory analysis indicates a chemical is not detected in a sediment sample, the detection limit should be reported. Where chemical criteria in this table represent the sums of individual compounds (e.g., total LPAHs and total HPAHs), isomers (e.g., total benzofluoranthenes), or groups of congeners (e.g., total PCBs), and a chemical analysis identifies an undetected value for one or more individual compounds, isomers, or groups of congeners, the SMS require that the detection limit should be used for calculat-ing the sum of the respective compounds or groups of isomers or congeners. However, under the PSDDA program, only the highest individual chemical detection limit in a group is reported when all chemicals in that group are undetected; when any chemicals in a group are detected, only the detected concentrations are included in the sum. Consideration is being given to adopting the PSDDA summation method under the SMS [Contact: Rachel Friedman-Thomas, (360) 407-6909].

Both the SMS and PSDDA numerical criteria are based on Puget Sound apparent effects threshold (AET) values (Barrick et al. 1988). Conceptually, the SMS and PSDDA numerical criteria each provide two regulatory levels for the evaluation of sediment contaminant concentrations. The SQS under the SMS and the SL under the PSDDA program represent concentrations below which adverse biological effects are considered to be unlikely. The SIZ_{max}, CSL, and MCUL under the SMS and the ML under the PSDDA program represent concentrations above which adverse biological effects are considered to be significant. The derivation of these numerical criteria from the AET values is somewhat different because of the different regulatory uses of these criteria in the two applications. In addition, the fact that the concentrations of nonionizable organic compounds are expressed on a TOC-normalized basis under the SMS but on a dry-weight basis under the PSDDA program means that direct comparison of these two sets of numerical criteria is not possible.

[a] The listed values represent concentrations in parts per million "normalized" on a total organic carbon basis. To normalize to total organic carbon, the dry-weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

[b] The total LPAH criteria are to be compared to the sum of the concentrations of the following LPAH compounds: naphthalene, acenaphthylene, acenaph-thene, fluorene, phenanthrene, and anthracene. 2-Methylnaphthalene is not included in the LPAH definition under the SMS, but is included in the LPAH definition under the PSDDA program. Consideration is being given to including 2-methyl-

naphthalene in the LPAH definition under the SMS [Contact: Rachel Friedman Thomas, (360) 407-6909]. The total LPAH criteria are not the sums of the cor-responding criteria listed for the individual LPAH com-pounds.

[c] The total HPAH criteria are to be compared to the sum of the concentrations of the following HPAH com-pounds: fluoranthene, pyrene, benz[a]-anthracene, chrysene, total benzo-fluoranthenes, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene, and benzo-[ghi]-perylene. The total HPAH criteria are not the sums of the correspond-ing criteria listed for the individual HPAH com-pounds.

[d] The total benzofluoranthenes criteria are to be compared to the sums of the concentrations of the b, j, and k isomers of benzofluoranthene.

APPENDIX F

Stormwater

This memo serves to outline the stormwater requirements and objectives regarding the Gateway Pacific Terminal property at Cherry Point west of Ferndale, Washington as described in letters dated 9/26/97 and 10/29/97 from David Evans & Associates, Inc. to Ecology. The agreed upon objectives are as follows:

1) The conceptual stormwater management plan as described in the above letters shall address the entire 1,100 acre site and shall provide two independent systems - one for industrial stormwater, and one for uncontaminated stormwater, hereafter referred to as natural stormwater. Industrial process wastewater shall not enter either system and shall be recycled and/or discharged to an approved treatment facility. Requirements cited below make reference to the Stormwater Management Manual for the Puget Sound Basin (The Technical Manual), Ecology Publication 91-75, February 1992, hereafter referred to as the "Stormwater Manual".

2) All process wastewater generators shall comply with the permitting requirements of WACs 173-216 & 173-220 and with the engineering and design requirements of WAC 173-240. All industries subject to Title 40 of the Code of Federal Regulations Effluent Guidelines (e.g. electroplating, organic chemical manufacturers, etc.) shall be prohibited from tenancy at this facility unless specifically authorized and permitted by Department of Ecology. General Industrial Stormwater NPDES permits and associated Stormwater Pollution Prevention Plans shall be required for all industrial facilities within the 1,100 acre site (Vol. IV Urban Land Use BMPs - Stormwater Manual). General Construction Stormwater NPDES permits and associated Sediment and Erosion Control Plans shall be required for construction sites five acres and larger. Ecology reserves the right to require additional pollutant parameter targets for the aforementioned NPDES permits through Administrative Order on a case-by-case basis. All project proponents, regardless of the project size, shall develop and implement a Sediment and Erosion Control Plan prior to construction which is in strict conformity to the Stormwater Manual Vol II - Erosion and Sediment Control. For all projects less than five acres, the project proponent shall develop and implement a Sediment and Erosion Control Plan which shall be reviewed and coordinated with Ecology and approved by Whatcom County prior to construction.

3) All industrial stormwater shall be stored, monitored, and adequately treated to Ecology's standards (Vol. IV Urban Land Use BMPs - Stormwater Manual) prior to discharge through the pier diffuser unit. Pre-treated industrial stormwater may be authorized by Ecology on a case-by-case basis for direct discharge to the natural stormwater system during storm events (bypassing the pier diffuser) provided the bypass occurs outside the herring spawning season and other critical habitat periods and is thoroughly monitored. Determination by Ecology of whether perimeter, roadside and related drainage is considered industrial or natural stormwater shall be made on a case-by-case basis and incorporated into the stormwater plan for the 1,100 acre site.

4) Unless otherwise permitted, all natural stormwater shall be pretreated (Stormwater Manual Vol III - Runoff Control), if necessary, and routed to the existing natural drainageways, such as the seasonal streams, on the property and shall to the greatest extent practical be used to enhance wetland and riparian features and functions. The preliminary stormwater plan shall identify all wetland and connecting riparian corridors to be included in the natural stormwater system and shall include design parameters to maintain the quantity and quality of wetland and riparian features.

5) Areas of the facility which present the potential for contamination to stormwater, key locations at the facility for spill control and containment, and storage areas of solid, liquid or gaseous products or

waste that have a potential for accidental spill or release shall be designed for handling all contingencies, including all necessary ongoing and contingency monitoring efforts (Stormwater Manual Vol III - Runoff Control). The railroad loop and spur is an area which will need additional detention and treatment capability based on the potential for discharges exceeding water quality standards. Other areas may be identified as the conceptual plan evolves into a more definitive stormwater plan. All recovered material from spills and releases and any associated contaminated soils on the pier or uplands shall be immediately contained, captured, cleaned-up and disposed of in accordance to local, state and federal regulations.

6) The 180 acre terminal facility shall prevent the discharge of direct or indirect industrial stormwater to the marine waters during herring spawning season (approx. March 15-June 15) and other critical habitat periods, unless otherwise authorized by the Department of Ecology. Stormwater detention facilities shall be designed and constructed at the east edge of the facility to provide all sufficient storage and necessary treatment for all potential spills or releases within the facility or from the upland 1,100 acres. A sampling and monitoring program shall be implemented to determine a baseline, operation parameters, and if further treatment is necessary. No bilge water from visiting vessels will be accepted or handled except for treatment at an approved upland facility.

7) As the conceptual stormwater plan is refined and updated, all upland property development within the 1,100 acre site shall be undertaken in a manner which complies with the intent, objectives and provisions of the plan and shall obtain written approval by Ecology prior to construction. Prior to occupancy, all future tenants shall be evaluated by Ecology for baseline stormwater permit requirements and all revisions or changes shall be approved. The above stormwater plan conditions shall run with the land in perpetuity.

September 26, 1997

DAVID EVANS AND ASSOCIATES, INC.

119 Grand Avenue
Suite D
Bellingham,
Washington 98225
Tel: 360.647.7151
Fax: 360.647.7160

Mr. Barry Wenger
Shorelands Planner
Washington Department of Ecology
1616 Cornwall Ave., Suite 201
Bellingham, WA 98225

RE: Conceptual Stormwater Management Systems
Proposed Gateway Pacific Terminal

Dear Mr. Wenger:

Per your request, a site map of the proposed Gateway Pacific Terminal with **conceptual** stormwater management systems has been prepared to further address the Department of Ecology (DOE) questions related to stormwater management. This drawing is attached for your review, dated September 19, 1997. As you are aware, all stormwater management systems are conceptual and have not been engineered to manage stormwater from any specific rainfall event. It is still not possible at this time to engineer the stormwater management systems as no preliminary site plans have been developed.

PROCESS IMPACTED STORMWATER

Process impacted stormwater will be conveyed through catch basins and a pipe network to the pond within the GPT 180 acre facility labeled process stormwater treatment pond on the site map. A sampling program will be implemented to determine the appropriate treatment methods (if shown to be required) for the process impacted stormwater. The treated process impacted stormwater will be discharged via an engineered diffuser (if necessary) located at the face of the pier.

NON-PROCESS STORMWATER RUNOFF

Where possible, non-process stormwater from roof tops and other non-process areas within the GPT 180 acre facility will be conveyed by catch basin and pipe networks to the perimeter ditch displayed in the site map. This catch basin and pipe network will be independent from the process impacted stormwater catch basin and pipe network. The GPT 180 acre facility perimeter ditch will also serve to prevent run-on water from entering the facility. Non-process stormwater from the upland 1100 acres will be allowed to continue its current runoff patterns. If needed, benches and/or swales may be constructed on the upland 1100 acres to decrease runoff velocities and maximize infiltration rates. Construction of benches and swales will need to be coordinated with the management practices of existing wetlands and swales and proposed constructed wetlands. This drainage work will take place only as development occurs.

RAILROAD LOOP AND SPUR STORMWATER RUNOFF

The railroad spur and loop will be paralleled on both sides with drainage swales. The inside swale will convey water toward the stormwater detention pond located near the southern end of the railroad loop. The swale lining the outside of the railroad loop will convey water toward the stormwater detention pond just to the south of the railroad loop (pond locations may change upon final site plan development). A drainage swale will direct water from the stormwater detention pond to the season stream. A sampling program will be implemented to determine if treatment of the stormwater within the ponds is required prior to discharge. Both detention ponds may serve as an emergency storage area in the event of a spill along the railroad loop.

HERRING SPAWNING SEASON

In order to minimize the discharge of process impacted stormwater to the bay during the herring spawning season of March through June, a stormwater detention pond may be placed to the east of the GPT 180 acre facility and the seasonal stream. A detention pond located near the outfall of the seasonal stream will allow additional storage, and a system to slowly meter water back to the diffuser at the end of the pier. This would also provide a possible storage area in the event of a spill within the facility or the upland 1100 acres. A sampling program will be implemented to determine if treatment of the stormwater within the pond is required prior to discharge.

SUMMARY

Our main goals with regard to managing stormwater on the GPT facility are:

1) To surround the rail spur and loop with a series of swales that will serve to capture and filter stormwater runoff from sidings and loading and unloading areas. The use of detention ponds will provide the detention times necessary to store and treat contaminated water in the event of a spill.

2) To collect all process stormwater from the 180 acre facility that would be most likely contaminated by oil and grease from paved areas and/or spill and releases as a result of commodity storage. All process stormwater will be stored, monitored, and treated (as necessary) prior to discharge through the diffuser. A monitoring and treatment plan for process stormwater will be submitted to DOE as part of the SWPPP.

3) To provide, if possible, final stormwater detention capabilities prior to discharge to the bay. For contaminated non-process runoff during lesser storm events, the stormwater

detention pond east of the 180 facility would allow a tertiary means of treating stormwater as well as the ability to slowly meter stormwater into the bay.

Again, we must stress that this proposed stormwater management system remains conceptual at this time. We look at the preparation of any final DOE approved SWPPP to involve many on-going discussions with you and your Department as well as a coordinated effort with GPT, the facility designers, wetland specialists, biologists, and other entities that will have input to the project.

It is our understanding that the submittal of this site map and information completes the information you have requested. We would appreciate a written acknowledgment of this at this time.

Please contact our office with any questions you may have.

Sincerely,
DAVID EVANS AND ASSOCIATES, INC.

Craig R. Parkinson, P.E.
Senior Associate / Office Manager

attachment

cc: Mr. Jeff Kaspar, Pacific International Terminals
Mr. George Holroyd, David Evans and Associates, Inc.

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DAVID EVANS AND ASSOCIATES, INC.

119 Grand Avenue
Suite D
Bellingham,
Washington 98225
Tel: 360.647.7151
Fax: 360.647.7160

October 29, 1997

Mr. Barry Wenger
Shorelands Planner
Washington Department of Ecology
1616 Cornwall Ave., Suite 201
Bellingham, WA 98225

RE: Conceptual Stormwater Management Systems
Proposed Gateway Pacific Terminal

Dear Mr. Wenger:

Please find attached a revised copy of the site map of the proposed Gateway Pacific Terminal with conceptual stormwater management system. Review of the original version shown the southeastern most detention pond lying east of the existing drainage way. This revised copy has been changed to show the pond on the west side of the drainage.

Please replace that copy transmitted to you with our letter dated September 26, 1997. Also, within our previous letter we had stated that it is our understanding that the submittal of the information to date completes the information you have requested. We would appreciate a written acknowledgment of this, and as such request that you initial in the space provided below and mail or fax back your initialed copy. This will allow us to close our files for this phase of the work.

Please contact our office with any questions you may have.

Sincerely,
DAVID EVANS AND ASSOCIATES, INC.

Craig R. Parkinson, P.E.
Vice President / Office Manager

ACKNOWLEDGED

_____ _____
Mr. Barry Wenger Date

attachment

cc: Mr. Jeff Kaspar, Pacific International Terminals
Mr. George Holroyd, David Evans and Associates, Inc.

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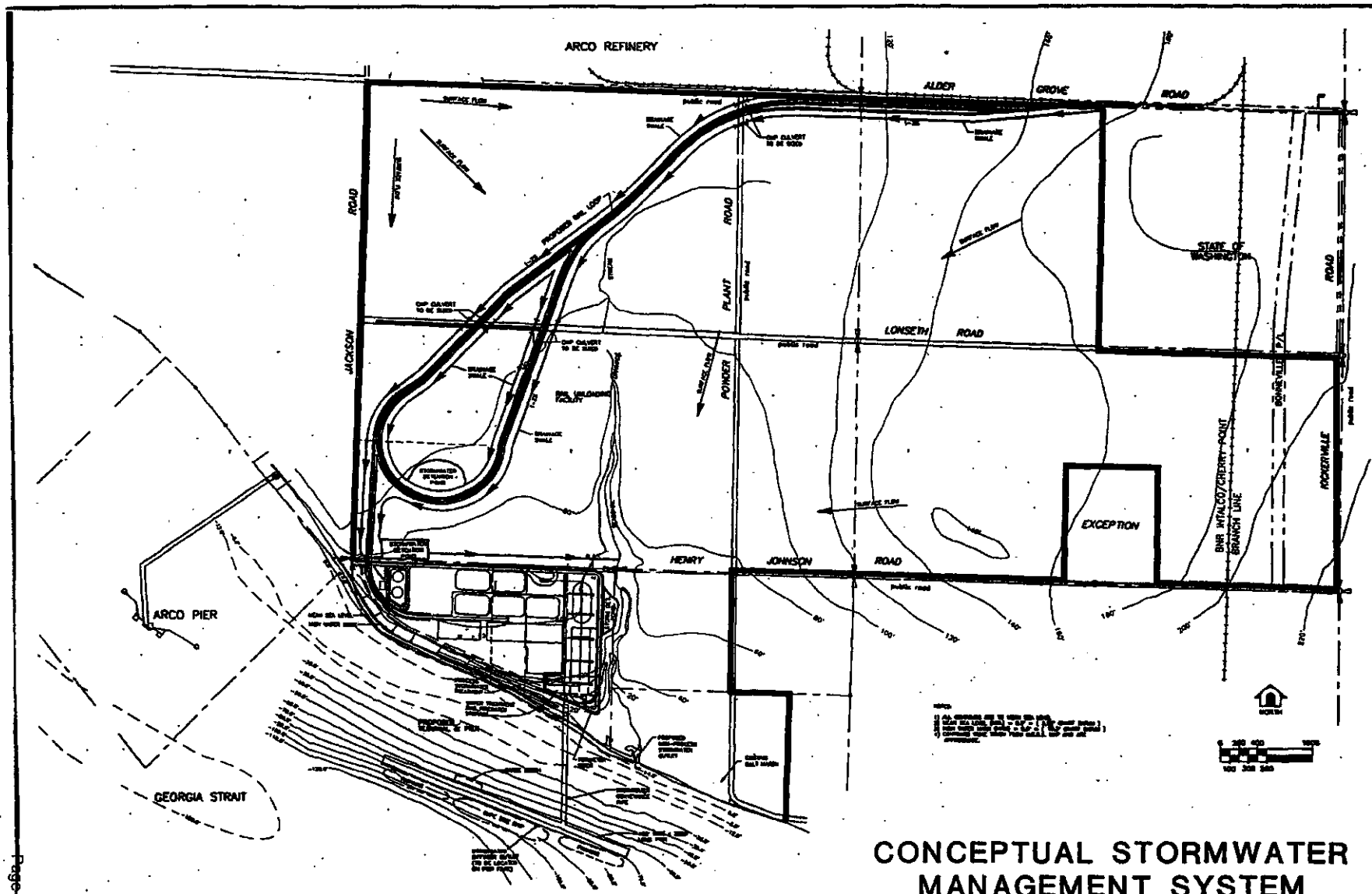


CONCEPTUAL STORMWATER MANAGEMENT SYSTEM

GATEWAY PACIFIC TERMINAL
Conceptual Stormwater Management System

DAVID EVANS AND ASSOCIATES, INC.

Appendix G

PROPOSED ANALYSIS OF SELECTED VESSEL SAFETY AND ENVIRONMENTAL IMPACTS OF THE GATEWAY PACIFIC TERNIINAL*

Submitted by

John R. Harrald, Ph.D.
Decisions Support Associates, L.L.C.
3124 Sleepy Hollow Road Falls Church, VA 22042 tel: (703) 237-8428 fax: (703) 237-8554

and

James R. Townley
Performance Improvement Enterprises, L.L.C.
14720 NW Forestel Loop
Beaverton, OR 97006
tel: (503) 645-4743 fax: (503) 614 9109

February 20, 1998

Changes from draft proposal in text indicated by italics.

INTRODUCTION

The purpose of this proposal is to identify work required to resolve the issues identified in the Harrald/Townley August 17, 1997 review of the Gateway Pacific Terminal impact documentation. The report identified unanswered questions in five areas: the analysis of the safety impacts of increased vessel traffic, the analysis of the impact on vessel traffic management, the analysis of spill risk, the potential for bunkering- operations, and the analysis of hazards at the facility. This proposal address all areas of concern in the maritime environment. It does not address the questions raised in the 17 August report about facility hazards or the impact on land side transportation.

The increased deep draft traffic in and around Rosario Strait was identified as the factor having the greatest potential impact on maritime safety and the environment. A second area of significant concern is the probable seasonal concentration of the large multi-cargo vessels calling

at the GPT terminal, the resulting increase in peak deep draft traffic congestion, traffic management problems, and the related increase in vessel support activities (bunkering-, launch service, etc.) in anchorage areas as vessel wait for berth openings at the facility. The potential for oil spills during bunkering and cargo transfer operations was also identified as an area requiring additional analysis. The specific questions raised in the report, and the proposed methods of answering these questions are described below.

TRAFFIC SAFETY AND TRAFFIC MANAGEMENT ANALYSIS

The questions raised in the report about vessel traffic safety and vessel traffic management are considered together since traffic management is a system intervention to ensure vessel safety.

Questions raised about vessel safety:

- How will GPT affect the density of deep draft traffic in Rosario Strait and other sensitive, constrained waterways?
- What is the volume and type of conflicting shallow draft traffic which could impede and interfere with the navigation and maneuvering of these deep draft vessels?
- What are the anticipated peak traffic levels in critical waterways, anchorage approaches, and turning points9
- How will the traffic densities and patterns generated by the GPT facility affect the expected incidence of collisions, powered Groundings and drift groundings in Georgia Strait, Rosario Strait, and Haro Strait?
- How will these potential accident frequencies be affected by the traffic densities and patterns generated by the GPT facility?

Questions raised about vessel traffic and anchorage management:

- What existing pressure will be put on existing anchorage areas for handling bulk vessels waiting for, or shifting to and from berth?
- What impact will the increased traffic density in Rosario Strait have on the flow of traffic through the regulated navigation area, and will laden vessels be required to wait or anchor, increasing their risk exposure in the system?
- What additional or revised U.S. Coast Guard vessel traffic management protocols will be required to minimize the risk of collisions or groundings during peak traffic periods? Should these protocols be independent of cargoes or should they be cargo specific?
- Would changes to existing anchorage regulations or the creation of new anchorage areas contribute substantially to reducing the risk of groundings or collisions?
- Would the implementation of new vessel traffic management or vessel anchorage protocols create significant land side traffic management problems? [not addressed in this proposal]
- Is there significant land side transportation capacity to handle peak demand associated with feed grain shipments? [not addressed in this proposal]
- What are the prevailing seasonal winds and tidal current patterns in the vicinity of the GPT? What special navigational cargo loading, or anchorage management problems will be created by stronger than normal currents or winds (particularly during strong North Westerly winds produced by winter storms)?

- What are the holding characteristics of existing anchorage grounds and what has been the past vessel experience on these ground under different weather conditions?
- Will special anchorage rules or procedures be instituted to minimize risk of drift groundings or collisions in and around the anchorages? If not, why not? If yes, what will those measures be?

Proposed work. The response to these questions will require the completion of three tasks.

Task 1: Build a traffic simulation

The calculation of changes in vessel traffic patterns and density in this well defined system will be determined through the creation and application of a relatively simple traffic simulation. The traffic simulation program is a computer based implementation of the traffic arrivals, traffic departures, traffic rules, and selected weather conditions (e.g., visibility). Maritime traffic in the following area will be simulated: the deep draft waterways around the San Juan Islands south of 49 degree and north of (and including) the traffic convergence zone around buoy "RA" and including the Strait of Georgia, Boundary Pass, Haro Strait, and Rosario Strait, and the approaches to the proposed GPT terminal (see attached chart), and all anchorage areas. The simulation will include commercial passenger vessel and fishing vessel traffic, but will not include recreational vessels. The traffic simulation will include projected traffic to the proposed GPT terminal and projected traffic increases at existing Cherry Point terminals.

Task 2: Simulate present and proposed conditions.

The output of the simulation calculation will show the change in occurrence of situations of relatively higher risk (e.g. traffic congestion, traffic in constrained waterways during periods of reduced visibility). The simulation will calculate the frequency of occurrence of these situations for both the current traffic levels and for the traffic levels projected post introduction of the GPT. The incremental relative risk produced by the introduction of the terminal will be identified. Risk will be computed relative to the base (existing) case. No attempt will be made to calculate absolute risk in order to compare the level of risk in the area under study with the level of risk in other ports or to the risk due to other hazards.

Task 3.- Analyze anchorage traffic and procedures.

The current and potential anchorage zones, anchorage conditions, and practices will be documented and the output of the simulation will be used to determine the changes in demand for anchorages. Pilots and other appropriate members of industry will be interviewed to collect past vessel anchorage experience for anchorage areas used and weather conditions experienced. Trends and patterns of weather at anchorage areas and accident and incident data for vessels at Puget Sound anchorages will be reviewed for trends and patterns. Using estimates of potential increases in anchorage utilization. an estimate will be made of the chan-e in relative risk or drift groundings and collisions involving vessels in anchorages. Alternative anchorage management procedures will be identified.

Task 4: Analyze traffic management and "save" alternatives.

The simulation program will be used to test alternative vessel traffic management rules and procedures that will minimize the occurrence of relatively high risk traffic situations. The simulation will also analyze the "save" potential for disabled vessels in the area of interest. The traffic simulation program is a project deliverable and may be re-used to analyze currently unanticipated changes in vessel traffic or vessel traffic management procedures.

The building of the simulation model is simplified by three factors. First, a significant amount of the data required to populate the model has been collected and is the public domain. Second, team members have extensive experience in port simulation. Merrick and Harrald have constructed similar traffic simulations for the Port of New Orleans and Prince William Sound, and Captain Townley helped construct traffic simulations of the Port of New, York, Baltimore, and Wilmington. Finally, answers to these questions only require the estimation of relative risk, not absolute risk. The goal is to maintain the level of safety in the system, not to precisely measure that level of safety .

Traffic data for all vessel types is collected by the Coast Guard and the State of Washington and the Volpe Transportation Systems Center reconciled this data for its recent Hazards Analysis study. Projections of GPT vessel traffic will be obtained from existing documentation and interviews with GPT officials. Coast Guard vessel traffic rules and industry practices (e.g. typical speeds, reduced visibility operations) will be verified. Visibility and weather projections will be adapted from the NOAA data used in the Volpe study. All portions of the transits of interest are in well defined waterways, greatly simplifying the modeling process.

Note that this proposal does not address the two question raised concerning the land side transportation impacts of vessel traffic changes.

BUNKERING OPERATIONS

Question raised:

- Will vessels waiting to berth at GPT bunker elsewhere in Puget Sound or the Strait of Juan de Fuca? If yes, what is the anticipated increase in bunker volume and frequency?

Proposed work: Adequate answers to these questions may be developed through projections based on local expertise and existing documentation. The following task is proposed:

Task 5: Develop and analyze bunkering scenarios.

Probable bunkering scenarios for vessels calling at the OPT terminal will be developed using the results of the vessel traffic analysis, documentation available from the GTP and interviews with industry personnel. These bunkering scenarios will be based on a review of current bunkering practices, frequency, and location. and will include an estimation of the number of vessels that will require bunkering in Washington State waters, the location of these bunkering operations. Although vessels are not anticipated to bunker at the GPT terminal, this analysis is intended to identify the proportion of vessels calling at GPT that will bunker in Washington State waters.

SPILL RISK ANALYSIS

Questions raised:

- The probability and impact of transfer related spills during bunkering or cargo transfer operations should be estimated.
- The probability and impact of spills caused by collisions, allisions, and/or Groundings should be assessed.

Proposed work: A determination of probability and impact of accident related spills implies a comprehensive risk analysis that is beyond the scope of this proposal. However, the results of the
prior task can be used to provide a more comprehensive and useful estimate than that contained in the GPT impact documents. The following specific tasks are proposed:

Task 6: Estimate operational (bunker) spill potential

Using the results of the estimates in changes in bunkering operations determined above, estimate the potential bunkering spill frequency based on USCG and State of Washington spill data specific to bunkering operations. Liquid bulk car-o transfer related operational spills at GPT will be considered if the GPT is projected to handle petrochemical cargoes.

Task 7: Estimate potential change in accident related spills.

Using, the results of the vessel traffic model, estimate the change in relative risk of accident related spills both with and without recommended traffic management interventions and procedures. Provide recommendations for mitigating the increase in relative risk determined to be due to the introduction of the GPT terminal.

F]INAL REPORT PREPARATION

Task 8: Prepare and deliver final report

A draft final report will be delivered and presented. Comments and corrections \ received will be incorporated in the final report.

PROJECT TEAM QUALIFICATI[ONS

The project team consists of principles from two small businesses: Dr. John R. Harrald and Dr. Jason Merrick are members of Decision Support Associates, a limited liability company organized in the State of Virginia. Captain James Townley is a member of Performance Improvement Enterprises, a limited liability company organized in the state of Oregon. As shown below, the team provides significant expertise in maritime operations safety and risk assessment.

John R. Harraid, Ph.D.

Dr. Harrald is the Director of the Institute for Crisis, Disaster, and Risk Management and a Professor of Engineering Management at The George Washington University, He is also the Associate Director of the Louisiana State University of the George Washington University Ports and Waterways Institute. During his prior career in the U.S. Coast Guard he served in marine safety, environmental protection, and Captain of the Port positions and attained the rank of Captain. He was the lead scientist in a National Research Council study of the Exxon Valdez - rounding and oil spill. He was the principal investigator in the project that developed vessel screening and risk management tools for the Washington Office of Marine Safety, and for risk assessment studies of the Port of New Orleans, and Prince William Sound. He is a founding member and officer of The International Emergency Management Society (TIEMS). He received his B.S. in Engineering from the U.S. Coast Guard Academy, a M.S. from M.I.T., where he was a Sloan Management Fellow, and his MBA and Ph.D. from Rensselaer Polytechnic Institute.

James Townley

Captain James Townley is the Executive Director of the Columbia River Steamship Operators Association (CRSOA) and President of PIE. L.L.C. Captain Townley's company developed the apprentice pilot selection, training, and qualification program used by the State of Oregon as adopted by the Oregon Board of Maritime Pilots. As Executive Director to CRSOA, Captain Townley has directed several government/industry task forces addressing anchorage practices, vessel navigation, and piloting procedures, and commercial asset coordination during major emergencies for vessels calling at Columbia River, Willamette River, and Oregon coastal ports. As USCG Captain of the Port ,he served as a member of the Northwest Area Committee responsible for developing the Northwest Area Contingency Plan and as a member of the State of Washington Advisory Groups that developed Best Achievable Protection Standards for Tank Vessels and Cargo and Passenger Vessel Standards. He received his B.S. in Engineering from the U.S. Coast Guard Academy, and MBA from New York University. and a M.S. in Ocean Transportation Systems from MIT.

Jason, Merrick, D.Sc.

Dr. Merrick received his B.A. and M.A. from Oxford University, Oxford, U..K. and his Doctor of Science in Operations Research from The George Washington University and is currently a Senior Research Scientist with The George Washington University Institute for Crisis, Disaster, and Risk Management. He worked as a systems analyst and systems programmer for a major U.K. consulting firm. He has developed graphical simulation models to support the assessment of risk in dynamic transportation systems and has developed forecasting and reliability tools to support risk management. He was a Senior Analyst on the recent Prince William Sound Risk Assessment project. He is a principal in DSA.

PROJECT BUDGET AND SCHEDULE

The project budget and schedule assumes that two trips will be made to the Seattle area by Dr. Harrald and Capt. Townley (one at the start of the project, and one to present preliminary results), and that the project will start in January or February of 1998 and will be completed in approximately 12 weeks. A draft report will be available 10 weeks after project start. The

budget below presents fully burdened personnel costs; including all overhead and miscellaneous costs except for travel.

PERSONNEL	
John R. Harrald 85 hours @ $ 90/hour	$ 7,650
James Townley 85 hours @ $ 90/hour	$ 7,650
Jason Merrick 200 hours C& $60/hour	$ 12,000
TRAVEL (2 trips to Seattle at $ 1,000 per trip--Harrald) (2 trips to Seattle at $300 per trip--Townley)	$ 2,600
PROJECT TOTAL	$29,900

APPENDIX H: AGREEMENT FOR GIFT CONVEYANCE AND PUBLIC ACCESS

COME NOW Pacific International Terminals ("PIT") and Whatcom County ("County") and by way of this Agreement for Gift Conveyance and Public Access ("Agreement") set out the terms for conveying certain property and access rights for public use. This Agreement is entered into under the following agreed facts:

A. PIT owns or has the rights to acquire that property legally described in Exhibit A ("The Property"), attached hereto and incorporated by reference, which is located at Cherry Point, Whatcom County, Washington. PIT proposes to construct a deep water pier and related upland facilities on the Property. Towards this end, PIT has obtained, or is in the process of obtaining, approval from local, state, federal, and other jurisdictions for construction of such a deep water pier and related upland development.

B. The County has, as part of its Comprehensive Park and Recreation Open Space Plan ("Plan"), proposed to establish public access and facilities in the Cherry Point area. Such opportunity for public access has been proposed in this Plan on portions of The Property.

C. Pursuant to this Agreement, the parties intend to define the areas, terms, and conditions for gifting portions of The Property in fee, and access rights and conservation protection through an easement or license, when PIT secures all approvals for construction of a deep water pier and upland development and following PIT's acquisition of all the property necessary to construct the project.

NOW, for valuable consideration, receipt of which is acknowledged herein, the parties agree as follows:

1. Conveyance of Certain Portions of The Property

Upon securing all local, state, and federal permits and for the construction of deepwater pier approvals, including, but not limited to, all building permits, and a lease agreement with the Department of Natural Resources for aquatic lands and tidelands, and following PIT's acquisition of all the property necessary to construct the project, but before commencement of any clearing or

construction, PIT shall convey to the County, by way of a statutory warranty deed, the saltwater marsh and adjacent uplands located on the southwest corner of The Property, all of which are generally shown in Exhibit B, which is attached hereto and incorporated by reference. The County shall pay all costs associated with such conveyance, including all excise taxes, closing costs, and attorneys' fees for preparation of necessary documents. The particular terms and conditions of the closing and conveyance shall be mutually agreed upon by the parties at such time that PIT notifies the County that it has secured all necessary permits, approvals, and leases and construction is to begin.

2. Easements or Licenses for Public Access

In addition to conveying that portion of The Property shown in Exhibit B, upon securing all local, state, and federal permits and approvals, including, but not limited to, all building permits, and following PIT's acquisition of all the property necessary to construct the project, and a lease agreement with the Department of Natural Resources for the aquatic lands and tidelands, but before commencement of any clearing or construction of the deepwater pier development, PIT shall grant, by way of an easement or license, public access to the following portion of the Property

> That beach area south of Gulf Road, including tidelands, from the eastern boundary of The Property south approximately 600 feet to the west, and which is generally shown in Exhibit C, attached hereto and incorporated by reference.

3. Parameters, Use and Conservation Protection

The scope and terms for public access and/or conservation protection to areas conveyed and over which an easement or license is granted shall be particularly determined and defined following a joint planning process between the County and PIT. At the very least, such shall include, the following particulars:

a. Above all else, the goal of the parties shall be to provide public access opportunities, while at the same time preventing any interference with PIT's use of The Property or operation of a deep water pier and upland

development, or any harm to the natural values of the property conveyed to the County.

b. The County shall pay, or otherwise obtain funding for, any and all improvements or other work to accommodate public access or conservation protection undertaken on those portions of The Property that are conveyed or upon which an easement or license is granted, unless the parties otherwise agree. This would include any and all costs for creating, cleaning, and maintaining a parking facility in that area shown in Exhibit B. Further, the County shall be responsible to maintain, police, and clean those areas conveyed or upon which an easement or license is granted. Notwithstanding the above, the County shall not be monetarily obligated, in any way, for any costs imposed upon PIT for reclamation, conservation, or environmental mitigation requirements which may be imposed by any federal, state, or local government as a condition precedent to the issuance of any permits, approvals, including, but not limited to, all building permits for improvements on property other than those conveyed herein, or the lease agreement with the Department of Natural Resources for aquatic lands and tidelands, needed for the construction of the deep water pier and upland development.

c. All improvements shall be located, sized, and constructed, and all public access and use opportunities limited, so as to avoid any conflict or interference with PIT's use of The Property, construction and operation of a deep water pier and upland development or any harm to the natural values of the property conveyed to the County.

d. A minimum of three public access signs approved by Whatcom County Planning and Development Services shall be posted adjacent to the public access areas. The locations of these signs shall be approved by Whatcom County Planning and Development Services.

e. At such time that the County determines that those areas upon which an easement or license is granted are no longer needed for public access or conservation, then the County shall convey its easement back to PIT at no cost, except no public access required by SHS 92-0020 may be relinquished unless said permit has been terminated.

f. Any easement granted by PIT for public access and conservation protection shall run with the land.

4. All Transfers Are a Gift

Notwithstanding any condition within any permit, approval, or lease that has been issued or will be issued, the conveyance by PIT of land in fee, easements and licenses as set forth in this Agreement shall be a gift from PIT. The County need not pay any consideration in exchange for such property, easements or license.

5. Severability

Should any provision of this Agreement be found to be void or otherwise unenforceable, all other provisions shall remain enforceable and binding.

6. Attorneys' Fees and Costs

In any proceeding brought to enforce this Agreement or to determine the rights of the parties under this Agreement, the prevailing party shall be entitled to collect damages, together with accrued interest, and in addition to any judgment awarded by a court, all attorneys' fees, costs, and expenses incurred in connection with such proceeding, including those incurred in any litigation, arbitration, mediation, and appeal. For purposes of this Agreement, the prevailing party shall be that party in whose favor final judgment or determination is rendered or who the court or decision maker determines substantially prevails, if both parties are awarded judgment. The term "proceeding" shall mean and include, but is not limited to, arbitration, administrative, bankruptcy, mediation, judicial proceedings, and appeals.

AGREEMENT FOR GIFT CONVEYANCE AND PUBLIC ACCESS

7. Notices

All notices to be given to any of the parties hereto shall be addressed to the respective party at the applicable address as follows:

Pacific International Terminals

Wayne Schwandt
Harbor Center Building, Suite 156
1801 Roeder Avenue
Bellingham, WA 98226

Whatcom County

8. Representations and Warranties

The parties represent that the person signing on behalf of each has full power and authority to execute this Agreement and perform the obligations hereunder.

EXECUTED this 2 day of SEPTEMBER, 1999.

PACIFIC INTERNATIONAL TERMINALS

By: _____
Its: PRESIDENT

WHATCOM COUNTY

By: Pete Kremen
Whatcom County Executive

APPROVED AS TO FORM:

David Grant, WSBA #15770
Whatcom County Assistant Civil Prosecuting Attorney

Post-it® Fax Note 7671 | Date 9/2 | # of pages ▶ 3.
To John Owen | From Wayne Schwandt
Co./Dept. | Co.
Phone # | Phone # Page 121

AGREEMENT FOR GIFT CONVEYANCE AND PUBLIC ACCESS

STATE OF WASHINGTON)
) ss.
County of Whatcom)

On this day personally appeared before me C. Roger Sahlin, to me known to be the President [Title] of PACIFIC INTERNATIONAL TERMINALS, the joint venture that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said joint venture, for the uses and purposes therein mentioned, and on oath stated that he/she was authorized to execute the said instrument.

GIVEN under my hand and official seal this 2nd day of September, 1999.

SHARON K. YOCUM NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 11-12-99

Sharon K. Yocum
NOTARY PUBLIC in and for the state of Washington, residing at Bellingham My commission expires: 11/12/99

STATE OF WASHINGTON)
) ss.
County of Whatcom)

On this day personally appeared before me PETE KREMEN, to me known to be the Executive of WHATCOM COUNTY, the municipal entity that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal entity, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument.

GIVEN under my hand and official seal this ____ day of _____, 1999.

_____
NOTARY PUBLIC in and for the state of Washington, residing at _____ My commission expires: _____

AGREEMENT FOR GIFT CONVEYANCE AND PUBLIC ACCESS

STATE OF WASHINGTON)
) ss.
County of Whatcom)

On this day personally appeared before me _____, to me known to be the _____ [Title] of PACIFIC INTERNATIONAL TERMINALS, the joint venture that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said joint venture, for the uses and purposes therein mentioned, and on oath stated that he/she was authorized to execute the said instrument.

GIVEN under my hand and official seal this ____ day of _____, 1999.

_____
NOTARY PUBLIC in and for the state of Washington, residing at _____ My commission expires:_____

STATE OF WASHINGTON)
) ss.
County of Whatcom)

On this day personally appeared before me PETE KREMEN, to me known to be the Executive of WHATCOM COUNTY, the municipal entity that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal entity, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument.

GIVEN under my hand and official seal this ____ day of _____, 1999.

_____
NOTARY PUBLIC in and for the state of Washington, residing at _____ My commission expires:_____

Legal Description:

PARCEL A

THE EAST 1/3 OF THE WEST HALF OF GOVERNMENT LOT 4, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST OF W.M., WHATCOM COUNTY, WASHINGTON, TOGETHER WITH THE SECOND CLASS TIDELANDS ABUTTING THEREON. EXCEPT COUNTY ROAD #340 (GULF ROAD) AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY QUIT CLAIM DEED RECORDED UNDER AUDITOR'S FILE NOS. 510264 AND 510394.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL B

A TRACT OF LAND LOCATED IN THE WEST 2/3 OF THE WEST HALF OF GOVERNMENT LOT 4, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST OF W.M., WHATCOM COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE EAST LINE OF THE SAID WEST 2/3 OF THE WEST HALF OF GOVERNMENT LOT 4 AFORESAID AND THE SOUTHERLY LINE OF COUNTY ROAD NO. 340; THENCE NORTHWESTERLY ALONG THE SOUTHERLY LINE OF COUNTY ROAD NO. 340, A DISTANCE OF 138 FEET SIX INCHES; THENCE NORTHEASTERLY A DISTANCE OF 234 FEET ON A BEARING SO THAT THE NORTHERLY END OF SAID 234 FEET IS A POINT EXACTLY 67 FEET WEST OF THE EAST LINE OF THE WEST 2/3 OF THE WEST HALF OF SAID GOVERNMENT LOT AFORESAID; THENCE SOUTHEASTERLY TO A POINT ON SAID EAST LINE 246 FEET NORTH OF THE POINT OF BEGINNING; THENCE SOUTH ALONG SAID EAST LINE AFORESAID 246 FEET TO THE POINT OF BEGINNING. EXCEPT COUNTY ROAD #340 (GULF ROAD) AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY QUIT CLAIM DEED RECORDED UNDER AUDITOR'S FILE NO. 510394.

ALSO ALL UPLANDS LYING SOUTHERLY OF SAID COUNTY ROAD 340 AND WITHIN THE EAST AND WESTERLY LINES OF THE ABOVE DESCRIBED TRACT PROJECTED SOUTHERLY.

TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING UPON THE UPLANDS LAST HEREIN DESCRIBED SOUTHERLY OF SAID COUNTY ROAD NO. 340.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL C

THE WEST TWO-THIRDS OF THE WEST HALF OF GOVERNMENT LOT 4, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO. EXCEPT COUNTY ROAD NO. 573 (POWDER PLANT ROAD) ON THE WEST SIDE THEREOF AND EXCEPT COUNTY ROAD NO. 340 (GULF ROAD), AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEEDS RECORDED UNDER AUDITOR'S FILE NOS. 510394 AND 194273.

EXCEPT BEGINNING AT A POINT ON THE CENTER LINE OF WHATCOM COUNTY ROAD NO. 573, TWO THOUSAND THIRTY-SIX FEET SOUTH OF THE NORTHWEST CORNER OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 19, THENCE SOUTH ALONG THE CENTER LINE OF ROAD NO. 573, ONE HUNDRED FIFTY FEET; THENCE EAST 175 FEET; THENE NORTH 150 FEET; THENCE WEST 175 FEET TO THE POINT OF BEGINNING.

AND EXCEPT BEGINNING AT THE INTERSECTION OF THE EAST LINE OF SAID WEST 2/3 OF THE WEST HALF OF GOVERNMENT LOT 4 AFORESAID AND THE SOUTHERLY LINE OF COUNTY ROAD NO. 340; THENCE NORTHWESTERLY ALONG THE SOUTHERLY LINE OF COUNTY ROAD NO. 340 A DISTANCE OF 138 FEET 6 INCHES; THENCE NORTHEASTERLY A DISTANCE OF 234 FEET ON A BEARING SO THAT THE NORTHERLY END OF SAID 234 FEET IS A POINT EXACTLY 67 FEET WEST OF THE EAST LINE OF THE WEST 2/3 OF THE WEST HALF OF SAID GOVERNMENT LOT 4 AFORESAID; THENCE SOUTHEASTERLY TO A POINT ON SAID EAST LINE 246 FEET NORTH OF THE POINT OF BEGINNING; THENCE SOUTH ALONG THE SAID EAST LINE AFORESAID 246 FEET TO THE POINT OF BEGINNING. ALSO ALL UPLANDS LYING SOUTHERLY OF SAID COUNTY ROAD NO. 340 AND WITHIN THE EAST AND WESTERLY LINES OF THE

ABOVE DESCRIBED TRACT PROJECTED SOUTHERLY, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL D

A TRACT OF LAND IN GOVERNMENT LOT 4, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS, TO-WIT:

BEGINNING AT A POINT ON THE CENTER LINE OF WHATCOM COUNTY ROAD NO. 573, TWO THOUSAND THIRTY-SIX FEET SOUTH ON THE NORTHWEST CORNER OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 19; THENCE SOUTH ALONG CENTER LINE OF ROAD NO. 573, ONE HUNDRED FIFTY FEET; THENCE EAST 175 FEET; THENCE NORTH 150 FEET; THENCE WEST 175 FEET TO THE POINT OF BEGINNING. EXCEPT COUNTY ROAD 573 (POWDER PLANT ROAD) ON THE WEST SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEED RECORDED UNDER AUDITOR'S FILE NO. 194273.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL E

THE EAST 32 RODS OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND OF GOVERNMENT LOT 3, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO. EXCEPT COUNTY ROAD NO. 573 (POWDER PLANT ROAD) ON THE EAST SIDE THEREOF AND COUNTY ROAD NO. 495 (HENRY ROAD) OF THE NORTH SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEEDS RECORDED UNDER AUDITOR'S FILE NOS. 147105 AND 194272.

PARCEL F

THE WEST 14 RODS OF THE EAST 46 RODS OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND OF GOVERNMENT LOT 3, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO. EXCEPT COUNTRY ROAD NO. 495 (HENRY ROAD) OFF THE NORTH SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEED RECORDED UNDER AUDITOR'S FILE NO. 147105.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL G

THE WEST 14 RODS OF THE EAST 60 RODS OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND OF GOVERNMENT LOT 3, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, Q.M., WHATCOM COUNTY, WASHINGTON, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO. EXCEPT COUNTY ROAD NO. 495 (HENRY ROAD) OFF THE NORTH SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEED RECORDED UNDER AUDITOR'S FILE NO. 147105.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL H

THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND GOVERNMENT LOT 3, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, EXCEPT THE EAST 60 RODS AND EXCEPT COUNTY ROAD NO. 495 (HENRY ROAD) OFF THE NORTH SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEED RECORDED UNDER AUDITOR'S FILE NO. 147105, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL I

GOVERNMENT LOT 2, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON, EXCEPT THE WEST 700 FEET THEREOF, TOGETHER WITH ALL TIDELANDS OF THE SECOND CLASS ABUTTING THERETO. EXCEPT COUNTY ROAD NO. 495 (HENRY ROAD) OFF THE NORTH SIDE THEREOF, AS CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEEDS RECORDED UNDER AUDITOR'S FILE NOS. 147111 AND 430524.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

PARCEL J

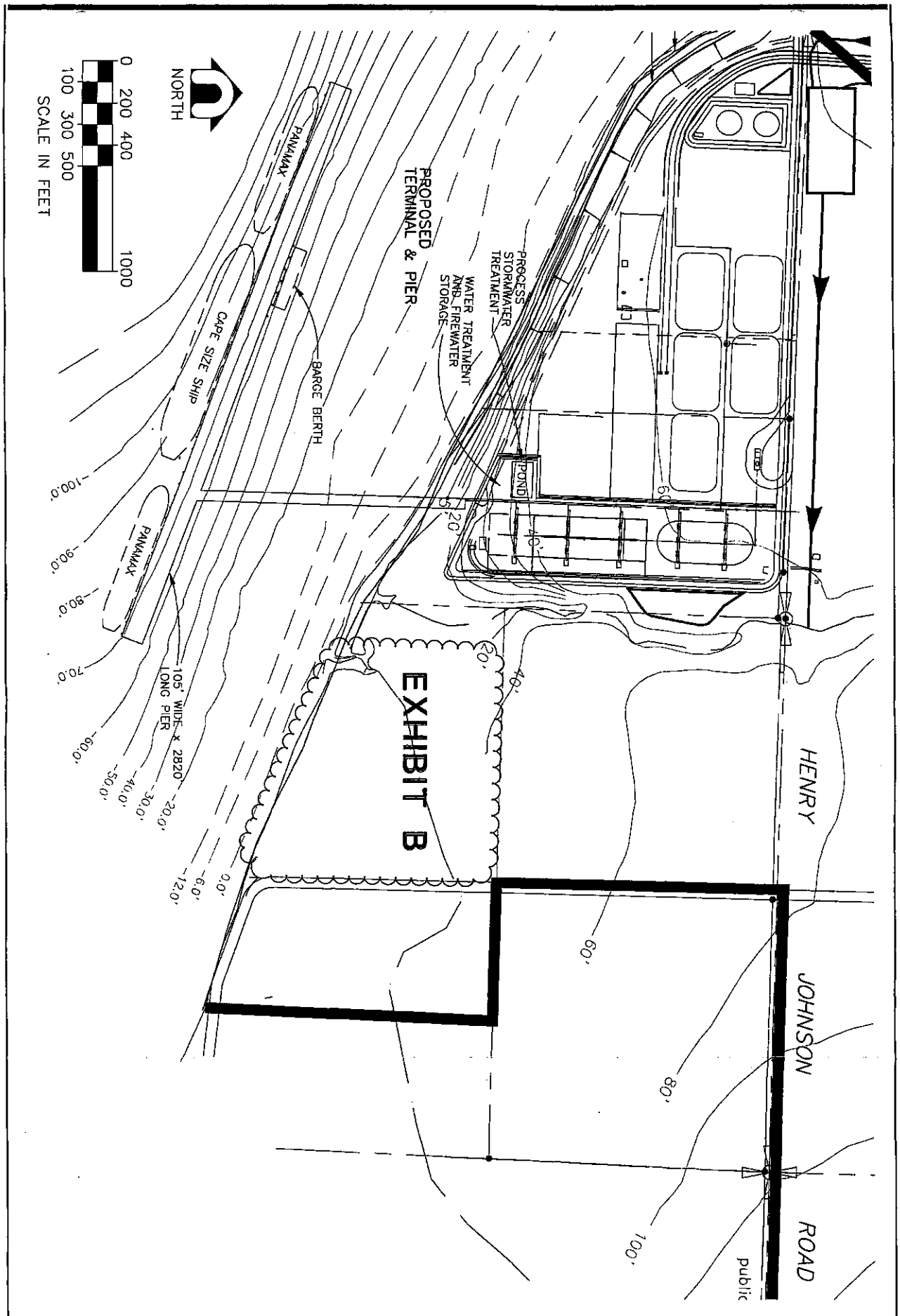
THE EAST 325 FEET OF THE WEST 700 FEET OF GOVERNMENT LOT 2, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST OF W.M., WHATCOM COUNTY, WASHINGTON, EXCEPT COUNTY RAOD NO. 495 (HENRY ROAD) OFF THE NORTH SIDE THEREOF, CONVEYED TO WHATCOM COUNTY FOR ROAD PURPOSES BY DEED RECORDED UNDER AUDITOR'S FILE NO. 147111.

SITUATE IN WHATCOM COUNTY, WASHINGTON,

PARCEL K

ALL SECOND CLASS TIDELANDS ABUTTING THE EAST 325 FEET OF THE WEST 700 FEET OF GOVERNMENT LOT 2, SECTION 19, TOWNSHIP 39 NORTH, RANGE 1 EAST, W.M., WHATCOM COUNTY, WASHINGTON.

SITUATE IN WHATCOM COUNTY, WASHINGTON.



1 OF 1 SHEETS

SCALE: AS SHOWN DESIGN:

DATE: 7-8-09 DRAWN: DWJA

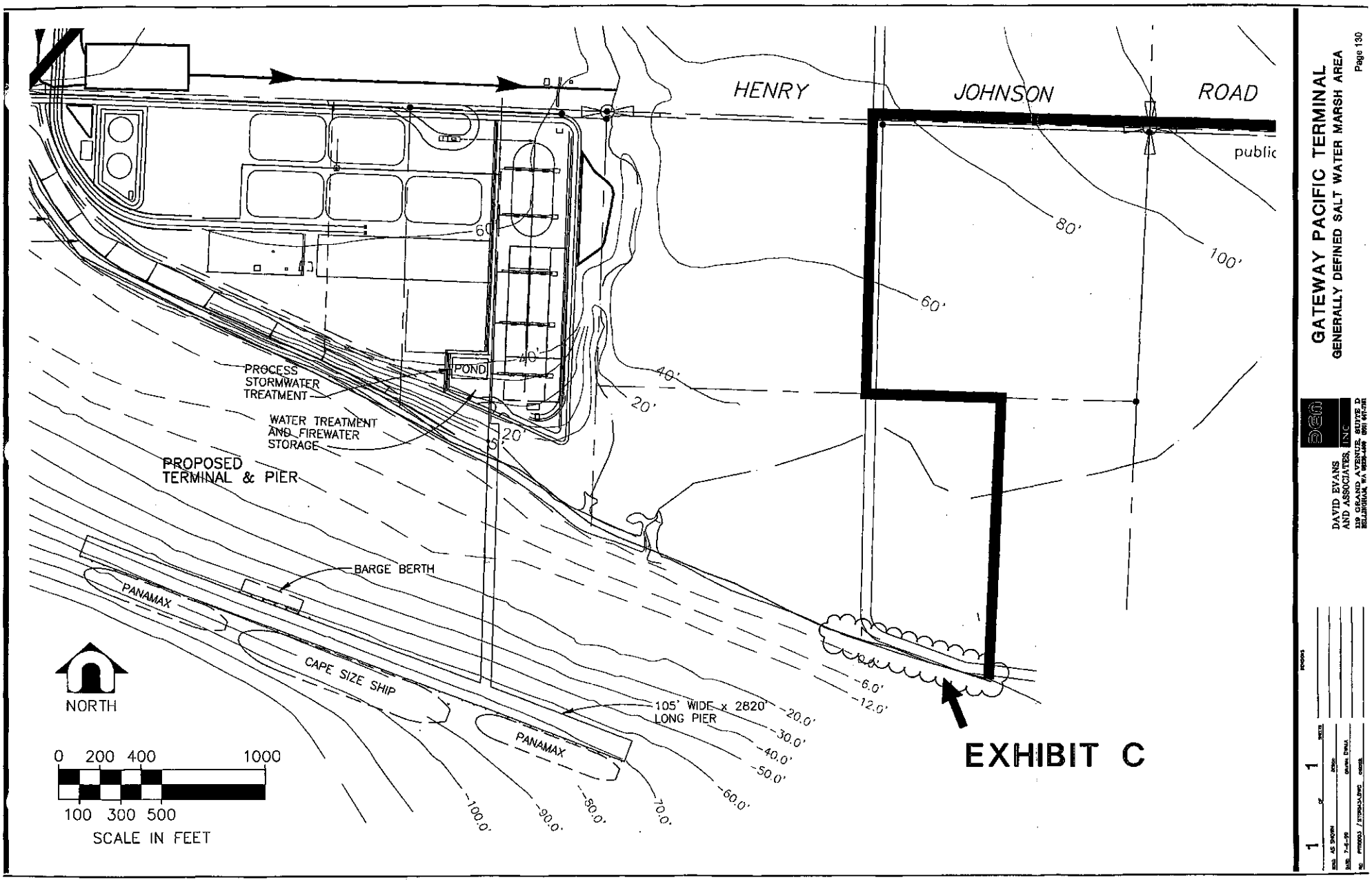
FILE: PIT0003 / STORM3A.DWG CHECKED:

Revisions

DAVID EVANS AND ASSOCIATES, INC.
119 GRAND AVENUE, SUITE D
BELLINGHAM, WA 98225-4409 (360) 647-7161

GATEWAY PACIFIC TERMINAL

GENERALLY DEFINED SALT WATER MARSH AREA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JOHNSON
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POND
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TREATMENT
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BARGE BERTH
PANAMAX
CAPE SIZE SHIP
PANAMAX
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EXHIBIT C
GATEWAY PACIFIC TERMINAL
GENERALLY DEFINED SALT WATER MARSH AREA
Page 130
DAVID EVANS
AND ASSOCIATES, INC
119 GRAND AVENUE, SUITE D
BELLINGHAM, WA 98225-4400 (360) 647-7301
1 OF 1
AS SHOWN
7-6-99
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Appendix I

PROPOSED AMENDMENTS TO SHORELINE PROGRAM

23.100.210.21 Port Development

(a) Development of a limited number of piers on piling and floating public and private marine cargo transfer terminal facilities is encouraged as the preferred use in the Cherry Point Management Unit. Port development that requires dredge and fill not associated with the construction and operation of the preferred uses has not been permitted in Cherry Point Management Unit due to its potentially adverse effects on the natural environment, including fish and shellfish habitat and geo-hydraulic processes. ~~Further,~~ However, Washington State natural resource agencies and Whatcom County have identified certain portions of the Cherry Point Management Unit as a herring spawning bed and have prohibited dredge and fill activities therein due to their potentially adverse effects on the natural environment, including fish and shellfish habitat and geo-hydraulic processes. Moreover, the State of Washington Department of Natural Resources has indicated that it will not consider issuance of more than one aquatic lands lease for port development in the Cherry Point Management Unit in addition to the three piers already in operation as of January 1, 1998.

(b) Consequently, it is the policy of Whatcom County that port facilities which require dredge and fill not associated with the construction and operation of the preferred uses should be prohibited until such time that it can be demonstrated that the impact of such development will avoid adverse effects to the shoreline environment.

(c) Consequently, it is the policy of Whatcom County to limit the number of piers at Cherry Point by establishing a development moratorium. The goal of the moratorium is to ensure that only one pier in addition to those in operation as of January 1, 1998, is constructed at the Cherry Point Management Unit. Notwithstanding the above, this moratorium shall not affect, nor otherwise apply to, any proposed pier that Whatcom County approved under its Shoreline Management Program prior to adoption of the moratorium.

23.100.210.31 Permitted Development

The following listed uses and activities are permitted within the Cherry Point Management Unit subject to the development standards contained in Section 23.100.213.

(a) Port development and shore-dependent or shore-related industrial development together with any or all of the following components and restrictions:

1. There is hereby established a moratorium precluding issuance of any shoreline permit allowing development of new pile supported or floating piers, except that this moratorium shall not have any application to those that have obtained shoreline approval from Whatcom County prior to adoption of this moratorium. If all of the unexercised shoreline approvals in existence at the time of imposition of this moratorium expire or are abandoned, a single exception to the moratorium may be granted and shoreline approval may be given for one additional pile, supported or floating pier.

2. Expansion of existing piers.

3. Landfill or excavation necessary to the access and construction of any pile supported or floating pier permitted following expiration or abandonment of the unexercised permits.

4. Dredging for maintenance or expansion of operations at existing piers.

5. Dredging necessary for the construction of new pile supported or floating piers.

6. Roads and railways.

7. Utilities.

8. Shore defense works: revetments, bulkheads, floating breakwaters and seawalls only.

9. Over-water structures and buildings that are intrinsic to the operation of the primary development, provided that they are elevated on pilings or on floating structures.

(b) Recreational development for public or quasi-public shoreline access.

(c) Archaeological excavation.

(d) Fish and wildlife habitat research and/or enhancement.

.32 Conditionally Permitted Development:

Port development and shore-dependent or shore-related industrial development which includes the following components may be considered under the Shoreline Conditional Use Permit process defined in WAC 173-14, except to the extent restricted in Section 23.100.210.31, and except where prohibited along the accretion shoreform and natural wetland areas described in Section 23.100.210.27(g) and Appendix E.

(a) Landfill or excavation associated with pier or floating structures which does not meet the development standards for such activities.

(b) Dredging for purposes associated with pier or floating structures which does not meet the development standards for such activities.

(c) Shore defense works, floating breakwaters and seawalls which do not meet the development standards for these structures.

Appendix J

PROPOSED AMENDMENTS TO WHATCOM COUNTY COMPREHENSIVE PLAN

1. The following paragraph should be inserted after the second paragraph on page 2-50:

   The Cherry Point shoreline also has great importance to the fisheries and ecology of Northern Puget Sound because it provides essential spawning habitat for the largest herring stock in Washington State. This herring stock has supported important commercial fisheries and provides forage for salmonids and other important marine resources.

2. Policy 2AA-10 should be amended to read:

   Consequently, it is the policy of Whatcom County to limit the number of piers at Cherry Point by establishing a development moratorium. Notwithstanding the above, this moratorium shall not affect, nor otherwise apply to, any proposed pier that Whatcom County approved under its Shoreline Management Program prior to adoption of the moratorium.

APPENDIX K TIMELINE FOR PROPOSED AMENDMENTS TO WHATCOM COUNTY SHORELINE PROGRAM AND COMPREHENSIVE PLAN

The County has currently scheduled a public hearing to review the proposed Comprehensive Plan and Shoreline Master Program amendments for May 27, 1999. The County plans to have the Shoreline Master Program amendment presented to the County Council by July 1999, subject to public participation and notice requirements and scheduling limitations. The County plans to have the Comprehensive Plan amendments to the County Council by November 1999, subject to public participation and notice requirements and scheduling limitations.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

July 7, 1998

Mr. Jeff F. Kaspar
Pacific International Terminals
1801 Roeder Avenue, Suite 156
Bellingham WA 98225

Dear Mr. Kaspar:

This letter is to advise you that we would like to initiate further discussions with you regarding certain environmental issues that are not fully addressed in the proposed settlement agreement for the Shoreline Substantial Development Permit appeal (SHB Nos. 97-22 and 97-23). While it might be argued that the settlement agreement might meet Shoreline Master Plan requirements, we think the settlement does not yet fully address the intent of shoreline or aquatic resources protection. Specifically, the current draft proposal for settlement does not commit to avoid long-term cumulative impacts as they relate to the Cherry Point herring stock on a region-wide perspective.

In addition, because the state also has proprietary responsibility for state-owned aquatic lands our concern for natural resources amplify the regulatory concerns that have been in discussions in the negotiations. The regulatory and proprietary obligations of the state must be addressed in a complementary way in order to further an authentic and complete resolution of the permit appeal. For example, we propose some revisions to the draft settlement agreement to fully address resource concerns on state-owned aquatic lands.

We want to quickly commence and conclude these negotiations with you so that the settlement is complete and so that so we can ensure an integrated settlement package.

To this end, we offer the following to facilitate this process. The September hearing dates should be released and conclusion of the settlement put on hold while PIT participates in studies, assessments, and planning as outlined herein. In return, PIT can expect conclusion of the permit and related lease issues in one package, should risk assessment results demonstrate no unacceptable risks. This will help assure that there will not be a liability for "takings" under the Endangered Species Act (ESA). It also assures PIT that all conditions for the settlement, any anticipated future lease, and permits are complete and are consistent.

We have attached our request for involvement in the list of herring studies and regional risk analysis, as well as detailed information to substantiate the cost and the scope of that work. (See attachment A). We can send you a list of specific provisions in the current proposed settlement agreement that will need to be further discussed.

We look forward to working with you. Please contact me at (360) 902-1010 at your earliest convenience.

Sincerely,

Paul Silver
Deputy Supervisor
Resource Management

Attachment A

Outlined below are the issues which remain unresolved.

Preliminary, basic biological thresholds for describing a healthy herring stock, and long-term average and maximum measures for the herring stock have been developed. In developing these goals, it was realized that defining a threshold for a healthy population was necessary. Currently, the Cherry Point population does not meet these basic thresholds. The biological thresholds for Cherry Point herring are:

1. Biomass: 5,000 (tons) spawners which translates into 25% of average unfinished biomass; and/or the amount of shoreline utilized to spawn will double the amount used in 1996 & 1997.

2. Recruitment: At least 75% of long-term average recruitment.
   Note: The mean 20 yr recruitment is 2,200 tons.

3. Adult survival: Annual survival of adult herring to exceed 50% of total biomass.
   Note: The current annual adult herring survival is 30% of the biomass. The worldwide average survival is 60%.

An examination of Cherry Point herring issues must be made on a region wide basis in collaboration with federal agencies, and Cherry Point stakeholders, including Pacific International Terminals (PIT), in anticipation of the proposed listing of Chinook Salmon throughout Puget Sound under the federal Endangered Species Act.

To accomplish this, we have identified three separate components critical to the protection of Cherry Point herring: 1) initiate studies, as well as collect and analyze existing studies, to determine what stressors are influencing the herring decline; 2) develop a regional ecological risk assessment to determine what effect individual stressors have on herring/salmon for all of the existing stressors that may be influencing the herring stocks at Cherry Point; and 3) prepare an aquatic management landscape (aquascape) plan to address the proprietary decisions that need to be made by DNR, to ensure adequate protection/mitigation measures are taken for herring.

We seek PIT's participation in the studies, risk analysis and landscape efforts at Cherry Point, as further outlined below. PIT's contribution can take the form of a financial contribution and/or in-kind services toward the efforts identified.

Attached is a map that identifies the boundaries for the Cherry Point herring studies, aquatic management landscape plan, and regional ecological risk assessment.

1. Studies

Phase 1 — Literature searches to be accomplished during the period of June 1998 - June 1999.

Studies	Costs	Timeline	Study Areas
Literature search and annotated bibliography on disease, predation, food supply, larval and egg sensitivity to oil	$44,000	1 year	NA
Historical spawning distribution and changes	$20,000	1 year	2
Nearshore habitat changes since early 1950's	$75,000	1 year	1

139,000

Phase 2 — Herring related studies to be accomplished during the period of June 1998 - June 1999.

Studies	Costs	Timeline	Study Areas
Herring Embryo/Larval Viability Evaluation	$45,000	6 months to 1 year	3
Cherry Point Caged Mussel Study	$48,000	6 months to 1 year	1
Regional study of herring population behavior	$350,000	2 years	2
Chemical contamination in adult herring	$22,000	6 months to 1 year	3
Improvement of biomass estimation methodologies	$60,000	1 year	2
Wave dampening and longshore drift	$20,000	1 year	1

545,000 → #684,000

Phase 3 — Herring related studies as might be requested by the Department of Ecology/Office of Marine Safety, approximately during the period of April 1999 - April 2000.

Studies	Costs	Timeline	Study Areas
Oil Spill and stormwater effluent bioassays for Larval Herring	$120,000	1 year	1
Oil Spill and stormwater effluent bioassays for Juvenile Herring	$80,000	1 year	1
Participate in and assist in funding of a North Puget Sound vessel traffic safety study	To be determined	1 year	Outside of 3

200,000 → 884,000

2. Regional Ecological Risk Assessment.

We also ask that PIT participate in and contribute to a regional ecological risk assessment (ERA) to determine the risk that structures and operations pose to herring and salmon at Cherry Point, in the context of existing and proposed facilities.

Regional ecological risk assessment is a defined process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors. We intend to use this analysis in assessing whether proposed construction and operation activities will pose an acceptable or unacceptable risk to the Cherry Point herring stock. A regional ecological risk assessment can accomplish four goals towards the purpose of analyzing decisions which might impact the Cherry Point herring stock:

1. It involves risk managers, risk assessors, and stakeholders;
2. It creates an agreed-upon set of endpoints, management goals, and understanding of the ecosystem and its interactions;
3. It addresses concerns about cumulative impacts; and
4. Risk to the herring resource can be communicated to the risk managers for decisions.

The risk assessment process does not make management decisions. The proposed short- term studies are important in the risk assessment process. The topics proposed for study have been identified as areas of high concern or lacking information. It is important to understand that results from the studies will not be used separately, but will be used to assess the overall risk to the resource on a regional ecosystem context.

The process will also allow identification of high risk activities and then devise appropriate adaptive management to minimize risk. It will also allow for examining various "what if" trade-off scenarios between different activities.

At a minimum, the following stressors to herring will be examined: 1) oil spill and vessel traffic safety; 2) sediment quality; 3) water quality; 4) nearshore littoral transport; 5) wave attenuation; 6) nearshore fills; and 7) supporting food web (predation).

3. Participate in a long-term Aquatic Landscape Management Plan. DNR is beginning to develop an aquatic landscape management plan in order to balance the ecological needs and the needs of the industrial facilities at Cherry Point. PIT's participation in the aquascape management plan can involve providing information to DNR on property ownership, mitigation/enhancement areas, land uses, etc. PIT will also be offered the opportunity to review and comment on the aquascape management plan.

We will allow the construction of the PIT proposed facility only if the completed regional ecological risk analysis shows that construction and operation activities will not pose an unacceptable risk to the Cherry Point herring stock. This risk will be reviewed in a regional context and will be reviewed to ensure that it does not constitute a "takings" under the proposed listing for chinook salmon under the ESA, as determined by the National Marine Fisheries Service.

(The department would also like to initiate discussions regarding additional Best Management Practices, Natural Resources and Water Quality Monitoring, and PIT's Implementation of Adaptive Management Strategies prior to completion of lease negotiations. However, these need not be resolved as part of the settlement of the permit appeal.)

Section B- Regional Ecological Risk Assessment

Introduction:

Ecological risk assessment is a defined process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors. EPA has recently published guidelines for such as assessment[1]. (Pertinent sections from the introduction and a diagram showing the interactions between the participants and the three phases are attached.) DNR intends to use this analysis in assessing whether the proposed construction and operation activities will pose an acceptable or unacceptable risk to the Cherry Point herring stock.

Regional ecological risk assessment can accomplish four goals towards the purpose of analyzing decisions which might impact the Cherry Point herring stock:

1. It involves risk managers, risk assessors, and stakeholders,
2. It creates an agreed-upon set of endpoints, management goals, and understanding of the ecosystem and its interactions,
3. It addresses concerns about cumulative impacts, and
4. Risk to the herring resource can be communicated to the risk managers for decisions.

The risk assessment process does not make management decisions.

The proposed short-term studies are important in the risk assessment process. These topics proposed for study have been identified by state agency's resource managers as areas of high concern or lacking information. It is important to realize results from the studies will not be used separately, but will be used to assess the overall risk to the resource on a regional ecosystem context.

The process will also allow identification of high risk activities and then devise appropriate adaptive management to minimize risk. It will also allow for examining various "what if" trade-off scenarios between different activities.

Resources:

Project Management:

- Project Manager- full time position for 1 year within lead agency.
- Project Coordinator- full time position for 1 year within lead agency.

Teams

- Risk Manager Team, which will include representatives from the proprietary agency (WDNR), regulatory agencies, tribes, port, county, and industry.
- Risk Assessor Team, which will consist of technical staff with expertise in herring biology, marine/estuarine ecology,herring population modeling,contaminated sediments, shoreline geomorphology, stormwater and wastewater toxicology, and oil spill risks/ toxicology.
- Stakeholders Committee, which could include the proprietary agency (DNR), regulatory agencies, tribes, non-tribal commercial fishers, port, county(ies), industry, environmental groups (WEC, etc.), private property owners, and Canadian representation.

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[1] EPA.*Guidelines for Ecological Risk Assessment.* EPA/630/R-95/002F. February, 1998. Available as Acrobat® .pdf document at http://www.epa.gov/ncea/ecorsk.htm

Consulting

- It is highly recommended by those who have gone through the process to have a consultant facilitate/lead the Teams though the process and to provide technical assistance in modeling and risk assessment.

Timeline

It is assumed that the risk managers, in particular DNR, will have the results from the ecological risk assessment process by early 1998 in order to make DNR proprietary decisions by June 1999.

Costs:

Staff:	
- Project Manager- full time for 1 year- DNR-	$75,000
- Project Coordinator- full time for 1 year- DNR-	$60,000
Consultant	$150,000
Studies (See section A-1,2)	
Short -term:	$684,000
Long-term less vessel traffic safety study	$200,000
Vessel traffic safety study	$2,000,000

Relationship to Herring Recovery Plan and ESA

The ecological risk assessment process is viewed as a part of or leading to an potential long-term herring recovery plan. As indicated in the NMFS criteria in the DRAFT State Salmon Strategy, (Joint Natural Resources Cabinet, 1/19/98) "Critical and substantive elements of a comprehensive salmon restoration plan...are:

1. Identify major limiting factors that have contributed to the decline.
2. Establish priorities for action.
3. Establish explicit objectives and timelines for correcting factors for decline and achieving desired population characteristics.
4. Establish quantifiable criteria and standards by which progress toward each objective will be measured.
5. Adopt measures/actions needed to achieve the explicit objectives. A plan should include measures to protect and restore habitat wherever habitat condition is a factor of decline, whether on private and public lands.
6. Provide high level of certainty that the identified measures and actions will be implemented, commitments, funding, staffing, and enforcement measures.
7. Establish a comprehensive monitoring and reporting program, including methods that measure whether objectives are being met and detect subpopulation declines and increases in each ESU.
8. As much as possible integrate federal, state, tribal, local, corporate, and nongovernmental activities and projects that are designated to recover salmon populations and the habitat upon which they depend.
9. Utilize an adaptive management approach that actively shapes management actions to generate needed information."

The proposed ecological risk assessment process meets many of these criteria and it should be a logical next step to create a herring restoration plan from the process.The ecological risk assessment process for a fish stock also should also be useful in determining the risk of a chinook "taking" under ESA. A herring restoration plan would provide long-term certainty and protection under the ESA for activities in salmon and herring habitat.

From: Environmental Protection Agency. 1998. *Guidelines for Ecological Risk Assessment.* EPA/630/R-95/002F. (Available as Acrobat .pdf document at http://www.epa.gov/ncea/ecorsk.htm)

"**Ecological risk assessment** is a process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors The process is used to systematically evaluate and organize data, information, assumptions, and uncertainties in order to help understand and predict the relationships between stressors and ecological effects in a way that is useful for environmental decision making. An assessment may involve chemical, physical, or biological stressors, and one stressor or many stressors may be considered.

Ecological risk assessments are developed within a risk management context to evaluate human-induced changes that are considered undesirable.

Ecological risk assessments can be used to predict the likelihood of future adverse effects (prospective) or evaluate the likelihood that effects are caused by past exposure to stressors (retrospective).

Ecological risk assessment includes three primary phases: problem formulation, analysis, and risk characterization.

In problem formulation, risk assessors evaluate goals and select assessment endpoints, prepare the conceptual model, and develop an analysis plan.

During the analysis phase, assessors evaluate exposure to stressors and the relationship between stressor levels and ecological effects.

In the third phase, risk characterization, assessors estimate risk through integration of exposure and stressor-response profiles, describe risk by discussing lines of evidence and determining ecological adversity, and prepare a report. The interface among risk assessors, risk managers, and interested parties during planning at the beginning and communication of risk at the end of the risk assessment is critical to ensure that the results of the assessment can be used to support a management decision. Because of the diverse expertise required (especially in complex ecological risk assessments), risk assessors and risk managers frequently work in multidisciplinary teams.

After completion of the risk assessment, risk managers may consider whether follow-up activities are required. They may decide on risk mitigation measures, then develop a monitoring plan to determine whether the procedures reduced risk or whether ecological recovery is occurring. Managers may also elect to conduct another planned tier or iteration of the risk assessment if necessary to support a management decision.

From: Environmental Protection Agency. 1998. *Guidelines for Ecological Risk Assessment.* EPA/630/R-95/002F. (Available as Acrobat .pdf document at http://www.epa.gov/ncea/ecorsk.htm)

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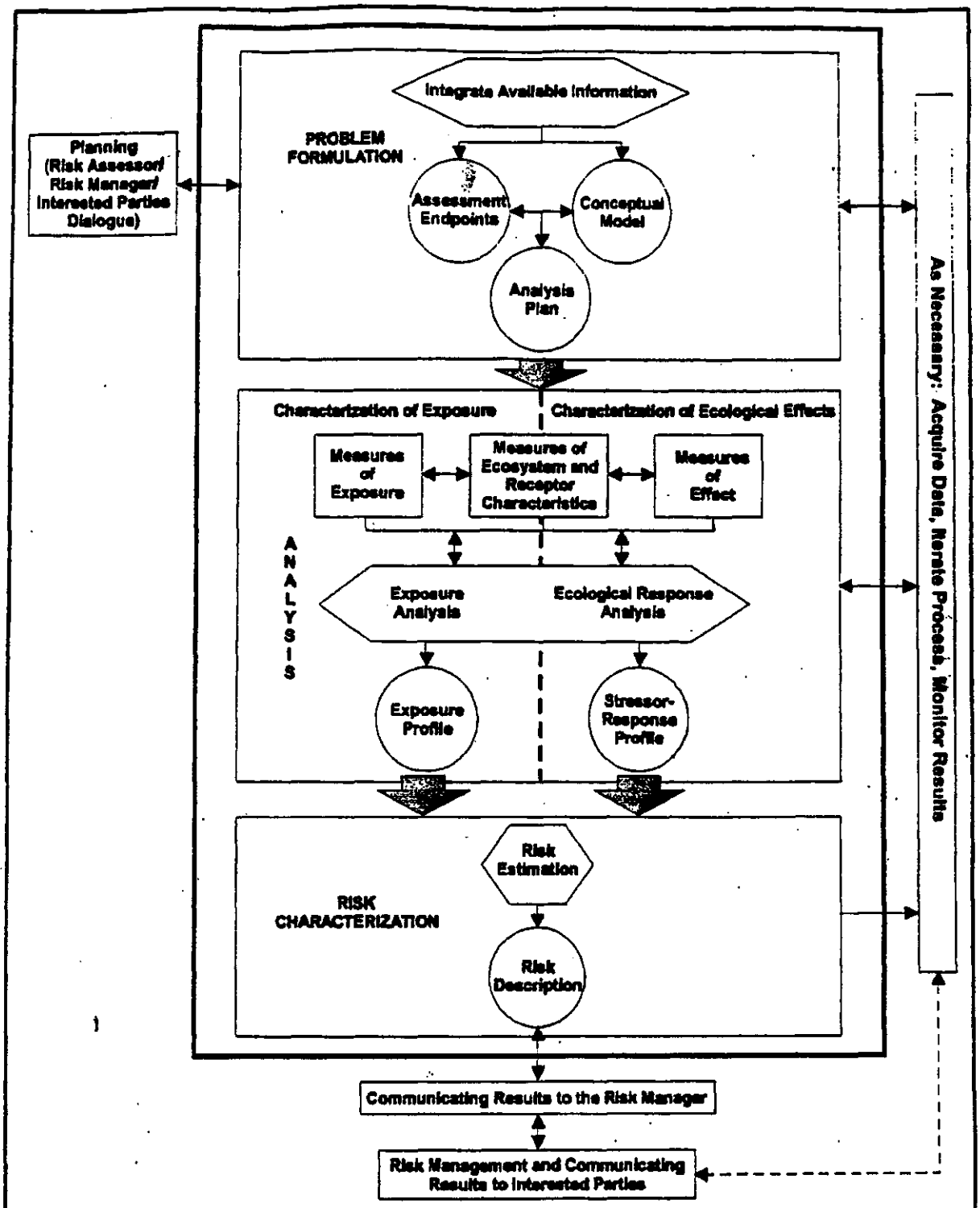

Figure 1-2. The ecological risk assessment framework, with an expanded view of each phase. Within each phase, rectangles designate inputs, hexagons indicate actions, and circles represent outputs. Problem formulation, analysis, and risk characterization are discussed in sections 3, 4, and 5, respectively. Sections 2 and 6 describe interactions between risk assessors and risk managers.

C. **Participate in a long-term ~~Aquatic Landscape~~ Aquascape Management Plan** — The DNR is beginning to develop an ~~aquatic landscape~~ aquascape management plan in order to balance the ecological needs and the needs of the industrial facilities at Cherry Point. Because ARCO is in essence also a land manger at Cherry Point, ARCO will be able to provide valuable information as to the management state-owned aquatic lands. ARCO's participation as a co-sponsor in the aquascape management plan will involve providing valuable information to DNR on property ownership, mitigation/enhancement areas, land uses, etc. ARCO will also be offered the opportunity to review and ~~provide public support comment~~ on the aquascape management plan.