APPENDIX A

Scope of Work

Boeing Habitat Projects

Seattle/Tukwila, Washington

December, 2009

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1.0 INTRODUCTION

This document is Appendix A to the Consent Decree issued to The Boeing Company and is the result of a cooperative effort between a work group comprised of Trustee representatives and The Boeing Company. The document describes the work that will be required for the development of two habitat projects along the Boeing Plant 2 shoreline on the Lower Duwamish Waterway. The information included herein has been jointly developed by the work group.

Due to the industrialization of the Waterway, off-channel habitats used by juvenile salmonids, birds, and other estuarine species have been largely eliminated, which results in limited spring/summer off-channel rearing habitat and limited high-flow refuge. Riparian functions have also been greatly reduced by diking and streambank development which results in reduced shading and input of leaf litter and insects. Off-channel and riparian habitats have been identified as limiting factors for Green River anadromous salmonid populations.

The two projects will restore and/or create off-channel and riparian habitats in the Lower Duwamish Waterway in an area where they have been largely eliminated due to the channelization and industrialization of the Waterway. The objectives for enhancement along the Boeing Plant 2 shoreline are to increase the area and functional value of habitat for salmonids and other resource species by:

- removal of over-water structures,
- slope reduction/bank cutback,
- bank softening,
- creation of new intertidal habitat,
- creation of brackish marsh fringe, and
- addition of large woody debris.

Between the two projects:

- approximately 4.8 acres of intertidal and riparian area will be restored/created (detailed in Section 3.0);

- approximately 2,400 linear ft of shoreline will be restored (at elevation +10 ft MLLW);
- approximately 700 linear ft of new shoreline will be created (at elevation +10 ft MLLW);
- approximately 53,000 ft² of over-water building will be removed; and
- approximately 560 piles and 10,000 ft² of skirting will be removed.

The habitat projects will be permitted and constructed concurrently with the Plant 2 Resource Conservation and Recovery Act (RCRA) Corrective Measure for the Duwamish Sediment Other Area (DSOA). The final design of the projects will be refined by a joint Trustee/Boeing team.

The purpose of this document is to describe:

- the baseline concept of the habitat projects;
- the process that will be used to refine the design of the habitat projects;
- the site-specific investigations that will be undertaken as part of the design process;
- the maintenance and monitoring program that will be implemented to ensure that the objectives of the restoration are met; and
- set forth the success criteria and monitoring methods and frequency that will be used for the project.

2.0 PROJECT DESCRIPTION

The proposed restoration projects are located along the Boeing Plant 2 shoreline in the Lower Duwamish Waterway (Figure 1). They are:

- The Building 2-41 and Southwest Bank Project: the removal of the over-water portion of the Building 2-41 complex at the south end of Plant 2 with subsequent restoration of shoreline along the Southwest Bank and Building 2-41; and
- The Building 2-122 Project: the creation of a side channel at the north end of Plant 2 adjacent to Boeing's Building 2-122 that will restore/create shoreline.

The projects are more fully described below.

2.1 BUILDING 2-41 AND SOUTHWEST BANK

The Building 2-41 and Southwest Bank restoration project involves the removal of an approximately 1,000-ft-long section of Buildings 2-41, 2-44, and 2-49 that overhangs the Duwamish Waterway and the subsequent restoration of the shoreline adjacent to the building and the Southwest Bank (Figure 2).

The overhanging portion of the buildings is approximately 50 ft wide and is supported by wooden piles. Along the waterward face of the building, there is timber wave abatement skirting attached to the piles supporting the building. The building is physically separated from the uplands by a continuous bulkhead wall (Figure 3). Running underneath the overhang are a number of pipes, vaults, and other utility infrastructure that once supported the former manufacturing operations within the buildings. The surface beneath the overhang is a steep riverbank slope, covered with riprap extending to a scalloped sediment interface that is only exposed during low tide. In addition to the 50-ft overhang that will be removed, some portion of the buildings on the uplands will be removed. It is the intent of Boeing to remove piling that support the building within the intertidal area to the extent practicable. In some cases if the piling cannot be removed or they break during extraction, the piling may be cutoff below the post-restoration grade.

The Southwest Bank refers to the southern-most portion of the Plant 2 property fronting the Duwamish Waterway, specifically that section of riverbank located between the Plant 2 southern property boundary and the 2-49 building located approximately 400 ft to the north (Figure 2). The current bank is steep (1:1) and consists of riprap and fill. During the preliminary design for the RCRA Corrective Measure for the Waterway, the Southwest Bank was evaluated for structural stability during and after implementation of the Waterway Corrective Measure and for its potential to re-contaminate the Waterway sediment surface after construction of the Corrective Measure. The preliminary conclusion of that evaluation was that the Southwest Bank was sufficiently steep (approximately 1:1 slope) and contained enough construction debris and contaminated soil that removal of the debris within the Southwest Bank was deemed more practical than capping this material. Therefore, removal of the bulk of the contaminated bank fill material was selected as the preferred remedial alternative in this location.

After removal of the building overhang and the construction of the Southwest Bank Corrective Measure, the shoreline will be restored to provide habitat for aquatic resources. After construction the riparian zone will be planted with native vegetation as shown in Table 1. A portion of the intertidal zone along the shoreline will be planted with appropriate vegetation (as shown in Table 1). Intertidal elevations at which vegetation will be established will be determined based on the results of the habitat parameter investigation described in Section 3.4, below. The initial target elevations are low marsh between +5.5 and +10.0 ft MLLW and high marsh between +10.0 and +12.0 ft MLLW.

In addition, large wood debris will be placed along the restored shoreline at approximately 200-ft intervals to add habitat complexity. The baseline concept of the restoration project is shown on Figure 4, including cross sections of both the existing shoreline configuration and the proposed shoreline configuration. Based on current and potential future land use, the maximum footprint of the Building 2-41 and Southwest Bank restoration project is also shown on Figure 4. In addition, Boeing will coordinate with the Muckleshoot Tribe to establish goals for the number, location and structure of net attachments subject to property owner requirements (if net attachments are not located on property owned by Boeing), permit conditions and approval by the Duwamish Waterway Natural Resource Trustees (Trustees).

2.2 BUILDING 2-122

The Building 2-122 restoration project is located at the north end of Boeing Plant 2 adjacent to Building 2-122 (Figure 5). The project involves the construction of a blind channel to the Duwamish Waterway. The existing Waterway bankslopes in the area, except for the channel entrance, will be regraded to remove riprap. After construction of the channel and the regrading of the banks, the riparian zone area will be planted with native vegetation and a portion of the intertidal zone along the shoreline will be planted with appropriate aquatic vascular vegetation (as shown in Table 1). Intertidal elevations at which vegetation will be established will be determined based on the results of the habitat parameter investigation described in Section 3.4, below. The initial target elevations are low marsh between +5.5 and +10.0 ft MLLW and high marsh between +10.0 and +12.0 ft MLLW. In addition, large wood debris will be placed along the restored and newly-constructed shoreline at approximately 200-ft intervals. The baseline concept of the project is shown on Figure 6, including cross sections of both the existing shoreline configuration and the proposed shoreline configuration. Based on current and potential future land use, the maximum footprint of the Building 2-122 restoration project is also shown on Figure 6. Boeing will coordinate with the Muckleshoot Tribe to establish the goals for the number, location and structure of net attachments subject to property owner requirements (if net attachments are not located on property owned by Boeing), permit conditions and approval by the Trustees.

3.0 DESIGN PROCESS

The baseline concepts of the habitat projects are presented in Sections 2.1 and 2.2. Between the two projects, approximately 4.8 acres of intertidal and riparian area will be restored/created (Figure 7) consisting of:

- 0.8 acre of habitat from elevation +2.0 ft to +5.5 ft MLLW,
- 2.5 acres of habitat from elevation +5.5 ft to +12 ft MLLW, and
- 1.5 acres of habitat above elevation +12 ft MLLW.

The Trustee/Boeing design team will further refine the baseline concepts within the identified project boundaries below the currently-defined +12 ft MLLW elevation to maximize the potential habitat values while considering a cost-benefit analysis process. In addition, the final design of the projects will be influenced by:

- the chemical quality of sediment, soil, and groundwater within and adjacent to the footprint of the habitat projects;
- the stability of the post-construction slopes;
- the stability of the post-construction surfaces with respect to prevailing river flows; and
- the physical/chemical characteristics of the water that influences plant communities in the Lower Duwamish Waterway.

The final design of the projects will restore/create at least 90 percent of the areas identified in Section 3.0, or a lesser amount if otherwise approved by the Trustees. Final design of the projects must be approved by the Trustees before the Trustees authorize Boeing to begin construction of the projects. The Trustees have approved success criteria provided in Table 2 of this Statement of Work. The Trustees' approval of final project design includes Trustee approval of initial habitat creation and planting plans to achieve the success criteria, maintenance plans, and monitoring plans, all of which are described in more detail in Section 5.0. If there is any dispute regarding the Trustee's approval (or disapproval) of initial habitat creation and planting plans to achieve the success criteria, maintenance plans, or monitoring plans, Boeing may challenge the Trustees' decision under the Consent Decree's dispute resolution process.

The investigations required for the design are discussed below.

3.1 ENVIRONMENTAL INVESTIGATION

An important factor in determining the success of the restoration project is the chemical quality (i.e., level of contaminants) of the final habitat substrate. Environmental data have been collected as part of the existing RCRA Order on Consent with the U.S. Environmental Protection Agency (EPA), EPA Docket No. 1092-01-22-3008(h). Additional environmental

investigations will be conducted to supplement the existing information within and adjacent to the footprints of the two habitat restoration projects to determine existing conditions in these areas with respect to potential sediment, soil, and groundwater contamination. Additional soil and groundwater investigations will be conducted pursuant to the existing Plant 2 RCRA Order. It is anticipated that work specific to the two habitat projects will be conducted in conjunction with other environmental site investigations that will be conducted as part of the Order. Therefore, all habitat project investigations regarding environmental conditions will require approval by EPA prior to conducting the work.

3.2 GEOTECHNICAL INVESTIGATION

Geotechnical investigations will be conducted at both of the proposed habitat project locations. There are several geotechnical considerations that will be crucial to the success of the project, including slope stability, shoreline scour, and constructability. The stability of the newly-created shoreline will be of the utmost importance in maximizing the area of the newly-developed habitat. Scour of the new shorelines could impact the quality of the newly-developed habitat and, if severe enough, may impact the engineering characteristics of the slopes. Information on the existing subsurface soil will assist contractors in developing the construction and sequencing approach to the project based on ease of excavation and strength and stability of the soils. Evaluation of the potential for scour is discussed in Section 3.3; other geotechnical aspects will be addressed through a comprehensive geotechnical study and evaluation.

In order to optimize the investigation effort, the available resources will be researched for existing geotechnical information and subsurface features at the site or nearby. Those resources may include Boeing files, University of Washington (UW; where a library of subsurface information in Puget Sound is being accumulated), and the cities of Tukwila and Seattle (together referred to as the City in this section) planning and engineering departments. The findings of the research will be compiled and plotted on the proposed construction drawings. The reliability, adequacy, and completeness of the information will be evaluated and relevant information will be incorporated into the site information. A geotechnical investigation program will be conducted in conjunction with the environmental investigation program (Section 3.1) to gather the necessary subsurface information to support the geotechnical investigation.

The scope of the geotechnical investigation program will be developed after the available information is evaluated and the project moves from conceptual to the detailed design phase. Soil borings will be advanced along and adjacent to the proposed alignment of the channel. In conjunction with the soil borings, cone penetration testing may also be conducted, if the available subsurface information indicates favorable conditions. The environmental and geotechnical investigations will be coordinated to optimize and minimize the investigation effort. The geotechnical testing will include determination of physical properties and indices of the soil layers, such as gradation, moisture content, Atterberg limits, shear strength, organic content, etc.

The subsurface information obtained will be used to develop cross sections of the soil layers along and perpendicular to the existing shoreline and proposed channel. Representative cross sections will be analyzed for slope stability at different stages of the project to ensure that adequate short-term and long-term factors of safety will be maintained. Other applicable factors such as seismic loading and surface loading will be considered in the evaluation. The site soils will be evaluated for liquefaction, and analyzed if required. The impact of the existing subsurface features and soil conditions on the construction approach will be evaluated based on the anticipated construction methodology.

3.3 GEOMORPHOLOGICAL INVESTIGATION

To ensure the sustainability of the habitat restoration/creation design, processes acting upon the Duwamish Waterway's bed and banks need to be examined. These forces can erode or deposit sediment and other debris, with the potential to change the habitat value of restoration projects. These processes are collectively labeled geomorphologic processes, because they affect the form of the Waterway. The geomorphological investigation will evaluate the anticipated stability of the shoreline; the lateral scour acting on the shoreline; and the potential for the channel inlet to be blocked by sediment and debris.

The geomorphological investigation modeling will provide input into the design process, which is expected to be iterative. The model will be run using existing conditions, with an initial design, with and without bioengineering, and with successive iterations of the design until the final design is reached. The proposed approach to the geomorphological investigation primarily focuses on selection and development of an appropriate model that will accurately predict the forces acting upon the proposed design.

A literature review will be conducted to assess the current understanding of processes acting within the Waterway. Fortunately, the Duwamish Waterway is well studied. The dynamics of the salt wedge are fairly well documented, and a relatively long history of streamflow records is available. Existing suspended sediment load and bedload data will be compiled.

To guide the study, the bounding conditions need to be determined. The long-term effects of tidal action, as well as the effects of high freshwater flow effects, must be considered. The Trustee/Boeing design team will determine the appropriate design storm and design tidal conditions to bound the study.

Existing models that have been developed to assess scour and sediment transport will be reviewed. The one-dimensional HEC-RAS model (U.S. Army Corps of Engineers Hydrologic Engineering Centers River Analysis System), that was used previously to examine the potential for scour along the Waterway, will be the first model that will be reviewed to determine its appropriateness for the two habitat restoration sites. Other one- and two-dimensional models will also be considered. Because of the need to look at scour and deposition of sediment, as well as stream/tidal discharge, a hydrodynamic model may also be considered.

After the appropriate model is chosen, input data required for the model will be collected, including historical tide data, streamflow data, sediment load data, and geometric data (proposed channel slope and cross sections). The model will be run with the existing shoreline configuration and calibrated using available flow data in the project reach. The calibrated model will then be run using the proposed shoreline configuration. The modeled shear stress in the side channel will be compared to relevant data, including literature sources and data collected by the Lower Duwamish Waterway Group (Windward and QEA, 2005). The channel and bank design may be adjusted if significant erosion potential is indicated by the modeling.

The geomorphological investigation is expected to be closely linked to the geotechnical investigation described in Section 3.2. The stability of the banks is influenced not only by the potential scour, but also by the internal strength of the materials in the banks. The potential use of bioengineering techniques will be evaluated as part of the design process.

3.4 HABITAT PARAMETER IDENTIFICATION

To assist in informing the design of habitat features for the proposed restoration projects, a literature review of habitat projects that have been completed along the Lower Duwamish

Waterway will be conducted. The focus of this review will be to determine which plant communities currently grow along the Waterway and have been successfully restored.

In addition, a survey of habitat areas both up- and downstream of the project location may be conducted. The survey work, conducted in consultation with the Trustees, would identify potential similar habitat areas in the intertidal zone (+5.5 to +12 ft MLLW) that currently exist in the Waterway. The existing vegetation within these areas would be evaluated, with a particular focus on any marsh communities that may be present in the target intertidal zone. This information will be used to develop planting plans for the restoration areas.

In conjunction with the above efforts, water quality parameters (principally salinity) will be assessed from existing data sources to assist in decision-making regarding habitat features and planting plans in the restoration areas. This study will focus on establishing likely salinity gradients experienced in the target intertidal zone within the proposed restoration areas and areas of existing marsh communities in the Lower Duwamish Waterway (e.g., Kellogg Island). This will allow the design team to understand the relationship between these areas in the Lower Duwamish Waterway and will provide data regarding salinity gradients at the restoration sites that will assist the design team in deciding on appropriate vegetation communities to attempt to establish in the marsh zone.

4.0 CONSTRUCTION, INITIAL HABITAT CREATION, AND INITIAL PLANTINGS

After receiving written authorization from the Trustees to begin construction, Boeing shall construct the project according to the project design developed under Section 3.0 of this plan. The construction phase of the project also includes initial development of habitat and required plantings. Habitat development and initial planting shall be done in order to achieve the success criteria described in the following section.

5.0 MAINTENANCE AND MONITORING

This section describes the maintenance and monitoring plans that will be developed to ensure successful habitat restoration projects.

The maintenance plan will be comprised of two sections:

- initial maintenance during the 10-year performance monitoring period;

- long-term maintenance that will be conducted for an additional 20 years after the initial 10-year monitoring period. This includes maintaining vegetation and other habitat attributes, control of invasive vegetation, and undertaking actions to address perturbations with a foreseeable probability of occurrence (e.g., the beaching of an abandoned barge, illegal dumping, etc.) excluding "force majeure" events.

The initial 10-year maintenance requirements will be developed to ensure that newly-planted vegetation becomes established and is not out-competed by invasive species or destroyed by herbivores. The maintenance plan and its implementation is a key factor in having a successful restoration project. The long-term maintenance component of the plan will describe the maintenance activities that will be conducted after the initial 10-year monitoring. Elements included in the maintenance plan are discussed in Section 5.1.

A monitoring plan will be developed and followed to determine if the goals and objectives of the habitat projects are being achieved. The success criteria and monitoring methods and frequency will be used for the habitat projects, which are elements of the monitoring plan and are discussed in Section 5.2 and summarized in Table 2A, 2B, and 2C. Monitoring plans and their implementation are additional key factors in having a successful restoration project. Implementation of a monitoring plan will determine if:

- restoration objectives are being met;
- the maintenance plan is sufficient;
- contingency measures need to be taken;
- adaptive management strategies need to be implemented; and
- contingency measures or adaptive management strategies are successful.

5.1 MAINTENANCE PLAN

The maintenance plan will include methods, frequency, and duration for the following activities:

Watering. Watering may be necessary, depending on the date of planting and the amount of rainfall throughout the year. Historical weather information will be reviewed to evaluate during what portions of the year watering will be necessary. Monitoring of rainfall and/or soil moisture will be used to determine the need for watering during the first two years after plant installation. Watering will be accomplished using a watering truck or temporary irrigation.

Mulching. Mulching will occur during initial plant installation. Supplemental mulching may occur during weeding activities, as necessary.

Weeding. Weeding around shrubs will be important during the summer of the first year to ensure establishment and prevent stress to the plants from competition for resources. The frequency can be gauged by necessity but should occur at least twice during the spring (ideally May and June), and then once more during the summer months (August or September). A list will be provided of common weed species that will need to be removed. Weeding will be performed using simple hand tools, (e.g., rakes, hoes). Chemical treatment (herbicides) will be considered only if physical removal fails.

Dead Plant Removal. Dead plant material will only be removed after scheduled monitoring to allow for the accurate assessment of planting success needed for the monitoring program. Replacement planting will be detailed under contingency measures in the monitoring plan. This will include species recommendations to maintain the desired diversity in the plant communities of the buffer areas.

Debris Removal. Anthropogenic material that potentially impairs habitat functions will be removed from the sites on an as-needed basis.

Long-term maintenance will be conducted for 20 years after the initial 10-year period to ensure that the habitat functions of the projects are maintained. This includes maintaining vegetation and other habitat attributes, control of invasive vegetation, and undertaking actions to address perturbations with a foreseeable probability of occurrence (e.g., the beaching of an abandoned barge, illegal dumping, etc.) excluding "force majeure" events. The plan will include a description of activities that will be conducted to maintain the ecological function of the projects (i.e., invasive species control and removal of anthropogenic material). These activities will be conducted on an as-needed basis. The plan will not cover "force majeure" events. "Force majeure," in the context of this discussion, includes all physical events (e.g., flood flows or seismic events) that exceed the design criteria for the projects that will be developed using accepted professional engineering standards.

5.2 MONITORING PLAN

The monitoring plan (summarized in Tables 2A and 2B, and in Section 5.2.1 for Marsh Vegetation) will include the following elements:

Goals and Objectives. The goal of the two projects is to create self-sustaining habitats that will restore and enhance ecosystem processes that support the array of key species groups the Trustees believe may have been injured due to contamination in the Duwamish Waterway. The

proposed projects are intended to restore important habitat types historically present in the Duwamish and provide appropriate habitat diversity and ecological niches necessary for foraging and refuge opportunities for juvenile salmon, birds, and resident fish species.

Success Criteria. The success criteria and monitoring methods and frequency have been developed by the joint Trustee/Boeing work group as described in Section 1.0. The success criteria will be used during the monitoring period to determine if the project's goals are being met. The criteria chosen are adapted from monitoring guidelines developed for Duwamish River (EBDRP, 2000) and Commencement Bay (CBNRT, 2000) restoration projects and other sources of monitoring guidelines. These success criteria are chosen because these are standards that can be measured and for which there are contingency or adaptive management measures that can be applied during the monitoring period.

- Physical Criteria:
  - intertidal area;
  - intertidal stability, slope erosion;
  - sediment, soil structure;
  - sediment, soil quality;
  - site salinity;
  - tidal circulation; and
  - elevation and channel morphology.

- Biological Criteria:
  - riparian vegetation survival;
  - riparian vegetation areal coverage;
  - herbivore control measures;
  - riparian invasive species percent cover;
  - riparian plant diversity;
  - marsh areal coverage; and
  - marsh species composition and vegetation survival.

Monitoring Frequency. Monitoring will occur over a 10-year period. In addition, a detailed as-built survey will be completed within 30 days after the initial planting. Monitoring will be performed during the growing season after deciduous plants have flowered or leafed-out.

Contingency Measures. Contingency measures will be developed as part of the Monitoring Plan for each success criterion in the event that a standard is not met. Contingency measures are activities designed to help meet success criteria, such as replacing (replanting) dead plant material, adding soil amendments, installing supplemental irrigation, augmenting herbivore exclusion systems, etc. Prior to any contingency measure being implemented, an investigation as to why the criterion was not met will be conducted. In the event that a success criterion is not met because of installation flaws or lack of routine maintenance, then contingency measures will be implemented. If the success criterion is not met because of design flaws, mortality due to herbivory, or routine maintenance is not sufficient, then an adaptive management approach will be used.

Adaptive Management. Prior to any adaptive management measures being implemented, the cause for the failure to meet a success criterion will be investigated. Adaptive management measures could include, but are not limited to, changing plant species, changing plant densities, adding fertilizer, or installing herbivore exclusion systems (e.g., netting/cages around emergent vegetation).

Monitoring Methods. Monitoring methods are identified in Tables 2A, 2B, and 2C where practical. The Boeing/Trustee team will further develop the methods to be used for monitoring the physical and biological parameters identified in Tables 2A, 2B, and 2C, during the design process. The methods will be documented as standard operating procedures to be attached to the monitoring plan.

5.2.1 Marsh Vegetation (Aquatic Vascular Plants)

As described above, the projects are intended to restore important habitat types historically present in the Duwamish, including tidal marshes. Elevations suitable for tidal marsh development will be planted with aquatic vascular plants within the footprint of the projects. The goal of the marsh plantings is to establish tidal marsh communities that will provide critical habitat functions, such as feeding and refuge for anadromous salmonids and other species. The establishment of marsh vegetation is one of the primary objectives of the Trustees. Wetland vegetation is one of the most obvious and straight-forward indicators of habitat condition. Vegetation provides habitat structure for aquatic and terrestrial organisms, facilitates sediment accretion and build up of marsh substrate, and serves as a source of organic material to support detritus-based food webs.

The proposed restoration at the Building 2-122 area should create large areas that are suitable for tidal marsh colonization. After removal of the Building 2-41 overhang and construction of the Southwest Bank Corrective Measure, the shoreline will be restored and the intertidal zone planted with marsh vegetation. Changes in vascular plant populations often lag behind environmental changes, because most species are limited in their ability to become established even when the habitat structure is appropriate. Periodic examination of the vegetation will assist in the identification of potential problems, such as colonization by invasive species, excessive herbivory, or trampling by humans. Useful measures of vegetation community condition include plant distribution, and species composition. Success in achieving the performance goals will be assessed using the following indicators and methods.

5.2.1.1 Marsh Vegetation Areal Coverage

The areal extent (percent cover) of vegetation should be stable or increasing within portions of the project within elevations suitable to marsh establishment.

Monitoring Tasks. An as-planted survey will be conducted following initial planting(s). Areal extent of vegetation will be measured from aerial photographs, if available. Alternatively and complementary, given the anticipated size of vegetation patches or bands, GPS or traditional survey techniques will be used to map the patch perimeter. Permanent photo points will be established and color photographs to adequately cover the site will be collected each sampling period.

Contingency Measures. Evidence of plant failure, or if natural recruitment rates fail to meet expectations (stable or increasing) should trigger consideration of contingency measures. Depending on the hypothesized reason for failure, responses could include additional planting, soil amendments, herbivore exclusions, and/or focused stewardship efforts. Assumptions about appropriate plant species, elevation, salinity, and other design factors will be reexamined and the project goals readjusted if new information suggests this path.

5.2.1.2 Marsh Vegetation Survival and Species Composition

The goal for survival of planted species should be at least 50 percent at Year 3. The project should not contain more than 5 percent cover by area of non-native or invasive plant species. Invasive plant species of special concern include, but are not limited to, *Spartina* spp. (cordgrass), *Lythrum salicaria* (purple loosestrife), *Phalaris arundinacea* (reed canarygrass), and *Phragmities communis* (common reed).

Monitoring Tasks. Several permanent statistically-based transects will be established relative to the shoreline; the number of transects will be based on habitat area and shape to adequately define the entire project. The transects will encompass portions of the project area suitable for intertidal vegetation establishment. In addition, data analysis will include an estimate of areal extent of marsh vegetation cover and any observations in changes over time.

Quantitative sampling for vascular plant species composition will record species presence (for frequency of occurrence data), visual cover estimates for all species, and possibly a more intensive analysis for pickleweed (*Salicornia* sp.) or *Carex* spp., which are often target restoration species. The most important feature for measuring occurrence data is comparable quadrat size. To determine species composition and cover, permanent sampling locations (quadrats along transects) will be established and marked for elevation. Species composition of marsh vegetation and the occurrence of an individual invasive species that exceeds 1 percent by area will be reported. The 2007 King County Noxious Weed List (King County, 2007) and the Washington State 2008 Noxious Weed List (WSNWCB, 2008) are shown on Table 3. Noxious weeds that are on the State list but not on the County list are species either not known to occur in King County (i.e., occurrences were limited to eastern Washington) or only posed a serious problem to agriculture production. Therefore, invasive species to be identified and potentially controlled as part of this monitoring are defined as those plants that are on the 2007 King County Noxious Weed List.

Contingency Measures. Any occurrence of an individual invasive species that exceeds the threshold of 1 percent by vegetated area, or total non-native and invasive species exceeding 5 percent by vegetated area, will be controlled primarily by physical means (pulling, mowing, burning). *Spartina* spp. that is found to colonize any portion of the site (irrespective of the areal coverage) will be immediately controlled. Physical removal will occur as soon as invasive plants are identified and definitely prior to seed set. Chemical treatment (herbicides) will only be considered if physical removal fails.

Evidence of plant failure, or if natural recruitment rates fail to meet expectations, will trigger consideration of contingency measures. Depending on the hypothesized reason for failure, responses could include additional planting, soil amendments, herbivore exclusions, and/or focused stewardship efforts. Assumptions about appropriate plant species, elevation, salinity, and other design factors will be reexamined and the project goals readjusted if new information suggests this path.

5.2.1.3 Marsh Vegetation Herbivory Avoidance

Confirm the success of stopping physical herbivory by Canada geese using physical barriers of wire, rope, rebar, posts, string, or netting.

Monitoring Tasks. Periodic, and initially frequent, visual inspections of herbivore exclusion systems and immediate repair to reduce herbivory until the plant root systems have established themselves.

Schedule. Installation of devices must take place before or simultaneous with planting of intertidal vegetation. Devices will be maintained for at least 4 years post-planting (initial planting or replanting). Periodic monitoring will be used to confirm adequate site maintenance of devices. Observations will be logged for 5 years post-planting (or replanting).

Contingency Measures. Boeing shall immediately repair of any damage to the herbivore exclusion devices caused by logs, trampling, or geese. Canada geese can destroy newly-planted restoration project sites in a matter of hours. There are several exclusion device designs that have proven successful in studies conducted in the Duwamish River and Commencement Bay. Such a design will be employed and monitored at both restoration project sites.

5.2.1.4 Summary

Failure to meet the success criteria indicates that a basic restoration goal is not being met and will trigger discussions and potential investigations regarding possible causes. Data from an individual sampling period (e.g., spring of the third-year post-construction) indicating that a success criteria assessment measure is not in conformance will trigger discussions on the reason that the measure is not in conformance. If remedial measures are judged by the Trustees and Boeing to be feasible and cost-effective, Boeing will, upon the Trustees' written recommendation, implement them during that year. If the goals are not being met at Year 5, Boeing will, in consultation with the Trustees, conduct an investigation of the reasons for the non-conformance, addressing:

- Can the cause of the non-conformance be identified?
- Is it technically feasible to modify or adjust the physical, chemical, or biological feature(s) of the marsh, or regulate operation or maintenance of the marsh, such that a parameter could subsequently achieve an acceptable level of development?
- What is the projected success and cost of the proposed modification?

Results of the investigation will determine modifications that may need to be implemented by Boeing, which may include, but not be limited to: replanting the intertidal marsh area, changing plant species, changing plant densities, regrading limited portions of the area, adding soil amendments, excavating drainage channels, etc. Implementing modifications after Year 5 will require monitoring of the performance assessment measures to continue in Years 6 through 11. Data from an individual sampling year during this period indicating that a performance assessment measure is not in conformance will trigger discussions on the potential to take additional immediate remedial measures.

If Boeing is required to implement corrective actions after Year 5, and has demonstrated best effort to satisfy the performance goals through Years 1 through 5 and Years 6 through 11 (including performing immediate remedial activities as needed), then Boeing will not be required to implement additional corrective actions or conduct monitoring with regard to marsh vegetation past Year 11.

5.2.2 Additional Monitoring Requirements

Additional monitoring requirements to be described in the plan will include marsh vegetation areal coverage and fish and invertebrate prey resources that are present within the footprint of the restoration projects. Requirements are summarized in Table 2C.

5.2.2.1 Fish Presence

Sampling will be conducted during the peak of the anadromous salmonid migration period to determine presence and abundance of fish at the 2-122 site. Sampling at the Building 2-41 and Southwest Bank site will not be conducted to prevent damage to marsh plantings. Fyke nets will be used to collect and identify species and origin (for salmonids - hatchery or wild salmonids) of all fish collected (record fork lengths for salmonids and identify as hatchery or wild). Within the channel at the 2-122 site, fyke nets will be more effective than seines for assessing utilization of the channel. Sampling will be conducted on one daylight ebb tide three times a year during (early, mid, and late) the peak of the juvenile salmonid outmigration (March through June). The sampling is to be conducted during Years 1, 2, 3, 5, 7, and 10. Failure of fish to use the areas could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes. The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement.

5.2.2.2 Invertebrate Prey Resources

Sampling will be conducted at the same time as the fish sampling to assess benthic community development. Benthic organisms will be sampled with 10 cm cores. At both sites, five replicate samples will be collected in each of three elevation strata (i.e., high marsh [+10 to +12 ft MLLW], low marsh [+5.5 to +10.0 ft MLLW], and mudflat [+2 to +5 ft MLLW]). In each sample that is collected, invertebrates will be identified to the lowest practical taxonomic level and enumerated. The sampling is to be conducted during Years 1, 2, 3, 5, 7, and 10. Failure of the benthic community to develop could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes. The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement.

5.3 RECONTAMINATION

The restoration sites will be monitored to determine if the habitat substrate (sediment) becomes recontaminated over time. The compliance criteria that will be used to assess potential recontamination will be the Washington State Department of Ecology's Sediment Management Standards (SMS) Sediment Quality Standards (SQS; WAC 173-204-320). The SQS is the current cleanup goal of the Plant 2 RCRA Corrective Measure for the DSOA. It is anticipated that recontamination monitoring will be conducted as part of the RCRA process. Any areas exceeding the SQS, or other standards agreed to by the Trustees and Boeing, that are identified under the RCRA monitoring program will trigger discussions on the possible causes and appropriate responses. If an investigation indicates that recontamination above the SQS of the habitat substrate is due to on-site migration of upland contaminants or migration of upland contaminants to groundwater, then action by Boeing to address the recontamination may be required by the Trustees. In that event, Boeing and the Trustees will discuss what action(s), if any, will be taken.

6.0 DOCUMENTATION

6.1 DESIGN DOCUMENTATION

Prior to submitting applications for permits that will be required for construction of the restoration projects, Boeing will submit a design package to the Trustees for approval. The design package will include, at a minimum, the following:

- Results of the environmental, geotechnical, geomorphological, and habitat parameter identification and monitoring investigations described in Sections 3.1, 3.2, 3.3, and 3.4, respectively;
- detailed design drawings;
- description of construction sequencing;
- planting plans and plant schedule; and
- maintenance and monitoring plans as described in Sections 5.1 and 5.2, respectively.

Coordination with the Trustees will be conducted if any changes to the project are required as part of the permitting process.

6.2 CONSTRUCTION COMPLETION REPORT

Within 60 days of completion of the construction activities, a construction completion report will be prepared that describes the as-built condition of the projects. This report will be submitted with the Notice of Completion of Construction and will serve as the baseline for monitoring that will be conducted as described in Section 5.2.

6.3 MONITORING AND MAINTENANCE REPORTS

After each monitoring event as described in Section 5.2, an ecologist will prepare a report for submittal to the Trustees. The report will be submitted to the Trustees within 90 days of each monitoring event. The following will be included in each report:

- data tables;
- species lists;
- date of survey;
- a narrative description of methods and contingency measures taken;
- identification of planted and naturally recruited trees and shrubs;
- interpretation of results;
- color photos; and
- a description of maintenance activities that were conducted.

Within 90 days of completion of the monitoring, a monitoring completion report will be submitted to the Trustees with the Notice of Completion of Monitoring. Upon completion of the 10-year monitoring period, Boeing will provide written Notice of Completion of Vegetation and Habitat Development and Monitoring Obligations to Trustees in accordance with

Sections VII (Project Development) and XXIII (Notices and Submissions) of the Consent Decree.

7.0 SCHEDULE

Work that is described in Section 3.0 of this document will begin once the Consent Decree has been entered, the Trustees provide written authorization under Section 3.0 for Boeing to commence construction, and the construction phase of the DSOA has begun. Much of this work is dependent upon approval of Work Plans by the EPA under the existing RCRA Order for Plant 2, and therefore the schedule is ultimately dependent on these approvals.

Construction of the habitat projects is dependent on both EPA's approval of work to be done under the DSOA and receipt of permits from federal, state, and local agencies. The work is also contingent on the authorized in-water construction work windows. The habitat project construction will be completed within one year of the completion of the DSOA remedial action.

8.0 REFERENCES

CBNRT (Commencement Bay Natural Resource Trustees), 2000, Commencement Bay, Natural Resource Damage Assessment Restoration Monitoring Plan: NOAA, U.S. Department of Interior and the State of Washington, Seattle, Washington.

EBDRP (Elliott Bay/Duwamish Restoration Program), 2000, Intertidal Habitat Projects Monitoring Program, Panel Publication 23, U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office, Lacey, Washington.

King County (King County Noxious Weed Control Program), 2007, King County Noxious Weeds List: King County, Department of Natural Resources and Parks, Water and Land Resources Division, Seattle, Washington, http://dnr.metrokc.gov/wlr/lands/weeds/pdf/2007-King-County-Noxious-Weed-List.pdf (accessed April 19, 2007).

Windward and QEA (Windward Environmental, LLC, and Quantitative Environmental Analysis, LLC), 2005, Sediment Transport Characterization Data Analysis Report – Draft: Prepared for the Lower Duwamish Waterway Group by Windward Environmental, Seattle, Washington.

WSNWCB (Washington State Noxious Weed Control Board), 2008, Washington State Noxious Weed List: Washington State Noxious Weed Control Board, Olympia, http://www.nwcb.wa.gov/weed_list/weed_list.htm (accessed January 21, 2008).

Tables

TABLE 1

PLANTING DENSITIES FOR PLANT 2 HABITAT RESTORATION PROJECTS

Boeing Habitat Projects
Seattle/Tukwila, Washington

Plant Community		Habitat Type	
		Emergent Marsh	Forested Buffer
Herbaceous Plants			
4-inch pot or 10-inch plug	O.C. (ft)	1.5	4
	Plants/ft²	0.44	0.063
1-gallon pot	O.C. (ft)	6	6
	Plants/ft²	0.028	0.028
Shrubs			
3-ft live stake	O.C. (ft)	—	3
	Plants/ft²	—	0.11
1- to 2-gallon pot or 36- to 48-inch-height bare root	O.C. (ft)	—	6
	Plants/ft²	—	0.028
5-gallon pot	O.C. (ft)	—	9
	Plants/ft²	—	0.012
Trees			
3-ft live stake	O.C. (ft)	—	3
	Plants/ft²	—	
1- to 2-gallon pot or 36- to 48-inch-height bare root	O.C. (ft)	—	6
	Plants/ft²	—	0.028
5-gallon pot	O.C. (ft)	—	9
	Plants/ft²	—	0.012
5- to 6-ft-height ball and burlap	O.C. (ft)	—	15
	Plants/ft²	—	0.0044

TABLE 2A

PHYSICAL CRITERIA
SUCCESS CRITERIA FOR RESTORATION PROJECTS
Boeing Habitat Projects
Seattle/Tukwila, Washington

	Intertidal Area	Intertidal Stability/ Slope Erosion	Tidal Circulation	Sediment/ Soil Structure	Sediment/ Soil Quality	Site Salinity	Elevation/ Channel Morphology
Description:	The total restored area between an elevation of +12 ft NOS MLLW and -2 ft MLLW will be at least 90% of the target intertidal elevation.	The as-designed contour elevations, especially for intertidal plant introductions, will be +/- 0.5 ft of the elevations specified in the construction plan. 75% of the target elevations will be maintained through Year 5.	The tidal amplitude, as determined by both timing and elevation of high and low tide events, is equivalent inside and outside of the project area.	Over time, sites may accumulate fine-grained materials and organic matter. This would be evidenced by a decrease in mean grain size and in increase in organic carbon in the surface sediments and site soils.	No evidence of contamination due to sediment transport or on-site migration of upland contaminants to groundwater or aquatic area.	Salinity is suitable for emergent plant propagation, colonization and growth. Salinity affects seed germination and plant establishment.	The as-designed low gradients necessary for marsh development should be stable over time both along the marsh channel and perpendicular to the marsh channel (Bldg 2-122), and perpendicular to the waterway (Bldg 2-41).
Monitoring Tasks:	Estimate the total intertidal acreage below +12 ft MLLW of the project and provide "as-built" plan drawings within 2 months of completion. Visually inspect after extreme episodic flood events to determine erosional impacts.	Estimate changes in surface topography of the project site, using transects derived from the Biological Performance Criteria and provide "as-built" plan drawings within 2 months of completion. Visually inspect after extreme episodic flood events to determine erosional impacts.	Periodic visual inspections of the project area for impeded tidal flow, or potential fish stranding.	Grain size distribution and organic carbon determination by collecting core samples in conjunction with benthic invertebrate sampling in vegetated (>+10 ft MLLW) and unvegetated (<+9 ft MLLW) areas. Test for total nitrogen after Kjeldahl digestion or directly with CNH analyzer (if warranted).	Conduct visual monitoring to ensure sediment and soil are staying in place, and sample sediments and groundwater to ensure that contaminants have not mobilized onto the site.	Sample soil and intertidal sediment surface and/or core using standard sampling methods and accredited soils testing laboratory. Note areas void of vegetation. Determine surface water salinity at multiple locations in the intertidal area to the nearest ppt. Measure dissolved oxygen as appropriate.	Estimate changes in gradient annually (after runoff) and after episodic flood events using permanent transects spaced evenly along the marsh areas. Bldg 2-122 site: Measure (longitudinal) gradient of channel from Slip 4 entrance to head of marsh; measure gradient of marsh perpendicular to channel. Bldg 2-41 site: Measure gradient perpendicular to waterway.
Monitoring Methods:	Geo-referenced aerial photography, GPS, photo-points.	Geo-referenced aerial photography, GPS, photo-points	Tidal gauges (if appropriate), data loggers.	Random sampling among predetermined sampling grid using 10-12 meter transects, 4-6 cores. Hydrometer and sieve to determine particle size. Replicate samples taken under similar tidal regime.		Hand-held salinity probe or refractometer, and data logger at multiple locations. Collect 4-6 soil cores along predetermined 10-12 meter transects.	Geo-referenced aerial photography, GPS, photo-points
Schedule:	Years: 1, 2, 5, 7, and 10.	Years: 1, 2, 5, 7, and 10.	Years: 1, 2, and 5.	Years: 0 and as needed if the marsh fails to meet success criteria.	Conducted as part of the RCRA monitoring program for the Duwamish Sediment Other Area.	Years: 0 and as needed if the marsh fails to meet success criteria.	Years: 1, 2, 5, 7, and 10.
Contingency Measures:	None - unless gross deviations occur that exceed the criterion.	Excessive erosion will be stabilized by non-structural approaches such as vegetation, fiber mats, or other such "soft" engineered options.	Failures of tidal circulation or inundation as prescribed for the site triggers discussion of potential remedies.	If the intertidal sediments or upland soils do not support the biological production anticipated, amendments can be considered to augment nutrient deficiencies.	If monitoring results indicate that contaminants may be migrating to site, additional sampling will be required to determine if remedial actions are required.	If salinity is a limiting factor to plant growth and propagation, more appropriate plantings or species will be considered.	Gradient changes that limit the establishment of marsh vegetation will trigger discussion of potential remedies, which may include both structural and non-structural alternatives.

TABLE 2B

BIOLOGICAL CRITERIA
SUCCESS CRITERIA FOR RESTORATION PROJECTS
Boeing Habitat Projects
Seattle/Tukwila, Washington

	Marsh Vegetation Areal Coverage	Marsh Vegetation Survival/Species Composition	Marsh and Riparian Vegetation Herbivory Avoidance	Riparian Vegetation Areal Coverage	Riparian Vegetation Survival
Description:	Percent cover of vegetation should be stable or increasing within portions of the project within elevations suitable to marsh establishment.	Survival of planted species should be at least 50% at Year 3. The project should not contain more than 5% cover by area of non-native or invasive plant species.	Confirm the success of stopping physical herbivory by Canada geese using physical barriers of wire, rope, rebar, posts, string, or netting.	Percent cover of native riparian vegetation should be stable or increasing over time, and cover not less than 90% of the upland vegetated area of the project after 10 years. Invasive and non-native plant coverage should be less than 5%. Evaluation of success will be assessed at Years, 3, 5, and 10. The following success criteria will be used. Year 3: Herbs >70%, shrubs >30%, trees >25%, non-native <2%. Year 5: Herbs % may decline as other layers mature, bare ground <10%, shrubs >50%, trees >40%, non-native <5%. Year 10: Herbs may decline as other layers mature, bare ground <10%, shrubs >80%, trees >70%, non-native <5%.	Riparian vegetation plantings should maintain not less than 75% survival over the first 4 years following initial planting.
Monitoring Tasks:	An as-planted survey will be mapped following initial planting(s). Areal extent of vegetation will be measured from aerial photographs, if available.	Permanent statistically-based transects will be established relative to the shoreline; the number of transects will be based on habitat area and shape to adequately define the entire project. The transects will encompass portions of the project area suitable for intertidal vegetation establishment. In addition, data analysis will include an estimate of areal extent of marsh vegetation cover and any observations in changes over time.	There are several exclusion device designs that have proven successful in studies conducted in the Duwamish River and Commencement Bay. Such a design will be employed and monitored at all newly planted NRDA restoration project sites. Installation of devices must take place before or simultaneous with planting of intertidal vegetation. Periodic, and initially frequent, visual inspections of herbivore exclusion systems and immediate repair to reduce herbivory until the plant root systems have established themselves.	Conduct an “as-planted” survey following initial plantings to serve as baseline of various cover classes using established color photo points.	Conduct an “as-planted” survey following initial plantings to serve as baseline using established color photo points.
	Alternatively and complementary, given the anticipated size of vegetation patches or bands, use GPS or traditional survey techniques to map the patch perimeter. Permanent photo points will be established and color photographs to adequately cover the site will be collected each sampling period.	Quantitative sampling for vascular plant species composition to record species presence (for frequency of occurrence data), visual cover estimates for all species. Permanent sampling locations (quadrats along transects) will be established and marked for elevation. Species composition of marsh vegetation and the occurrence of invasive species that exceeds 1% will be reported.	Devices must be maintained for 4 years post planting (initial planting or re-planting). Periodic monitoring should confirm adequate site maintenance of devices. Observations will be logged for 5 years post planting (or re-planting).	Establish vegetative transects through riparian zone and determine percent coverage for each of the herb, shrub, and tree components by species.	Establish vegetative transects through riparian zone and determine percent survival for each of the herb, shrub, and tree components by species.
Monitoring Methods:	Aerial photography, GPS or traditional survey techniques. Daubenmire and established photo points.	Randomly distributed 0.25 X 0.25 meter quadrats along length of transect. Daubenmire and line intercept.	Periodic visual inspections.	Aerial photography, GPS or traditional survey techniques. Daubenmire, line intercept, point intercept-spherical densiometer, and established photo points.	Line Transect, point line intercept or quadrats to estimate plant survival along a transect line.
Schedule:	Years: 1, 2, 3, 5, 7, and 10.	Years: 1, 2, 3, 5, 7, and 10.	Years 1 through 5 post planting (or re-planting).	Years: 1, 2, 3, 5, 7, and 10.	Years: 1, 2, 3, and 4.

TABLE 2B

BIOLOGICAL CRITERIA
SUCCESS CRITERIA FOR RESTORATION PROJECTS
Boeing Habitat Projects
Seattle/Tukwila, Washington

	Marsh Vegetation Areal Coverage	Marsh Vegetation Survival/Species Composition	Marsh and Riparian Vegetation Herbivory Avoidance	Riparian Vegetation Areal Coverage	Riparian Vegetation Survival
Contingency Measures:	Evidence of plant failure or if recruitment rates fail to meet expectations will trigger appropriate actions including determining cause of failure and making needed project adjustments and/or re-planting.	Any occurrence of an individual invasive species that exceeds the threshold of 1 percent by vegetated area, or total non-native and invasive species exceeding 5 percent by vegetated area, will be controlled primarily by physical means (pulling, mowing, burning). *Spartina* spp. that is found to colonize any portion of the site (irrespective of the areal coverage) will be immediately controlled. Physical removal will occur as soon as invasive plants are identified and definitely prior to seed set. Chemical treatment (herbicides) will only be considered if physical removal fails. Evidence of plant failure, or if natural recruitment rates fail to meet expectations, will trigger consideration of contingency measures. Depending on the hypothesized reason for failure, responses could include additional planting, soil amendments, herbivore exclusions, and/or focused stewardship efforts. Assumptions about appropriate plant species, elevation, salinity, and other design factors will be reexamined and the project goals readjusted if new information suggests this path.	Immediately repair of any damage to the herbivore exclusion devices caused by logs, trampling, or geese.	Excessive failure rates (25% loss annually) for plant survival addressed by secondary planting if appropriate, and if causal factors of failure can be determined and corrected.	Excessive failure rates (25% loss annually) for plant survival addressed by secondary planting if appropriate, and if causal factors of failure can be determined and corrected.

TABLE 2C

ADDITIONAL MONITORING REQUIREMENTS

Boeing Habitat Projects
Seattle/Tukwila, Washington

	Fish Presence	Invertebrate Prey Resources
Description:	Estuarine fish should access the project, with increasing utilization and colonization by resident species. Juvenile salmonids should be present.	Invertebrate prey taxa known to be important to juvenile salmonids should be present.
Monitoring Tasks:	Monitor fish use of 2-122 project area.	Monitor benthic invertebrate community development.
	Record fork length and source (hatchery or wild) for salmonids. Record presence (species) of non-salmonid fishes.	At both sites, five replicate samples will be collected in each of three elevation strata (i.e., high marsh [+10 to +12 ft MLLW], low marsh [+5.5 to +9.5 ft MLLW], and mudflat [+2 to +5 ft MLLW]). In each sample that is collected, invertebrates that are known to be important salmonid prey items will be identified to the lowest practical taxonomic level and enumerated.
Monitoring Methods:	Fyke net. Nets set before high tide and monitored during subsequent ebb. Sample for one day—three times (early, mid, late) during peak of juvenile salmonid outmigration (March through June).	Benthic invertebrates sampled using 10-cm cores. Sample stations located near fish sampling sites at high tide and concurrent with juvenile salmon outmigration. Samples will be collected once each year during the juvenile salmonid outmigration (May or June).
Schedule:	Years: 1, 2, 3, 5, 7, and 10.	Years: 1, 2, 3, 5, 7, and 10.
Contingency Measures:	Failure of fish to use the areas could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes. The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement.	Failure of the benthic community to develop could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes. The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement.

TABLE 3

NOXIOUS WEED LIST

Boeing Habitat Projects
Seattle/Tukwila, Washington

Common Name	Scientific Name	State Listing[1]	King County Listing[2]	Common Name	Scientific Name	State Listing[1]	King County Listing[2]
absinth wormwood	*Artemisia absinthium*	C	ND	knapweed, spotted	*Centaurea biebersteinii*	B	B
Austrian fieldcress	*Rorippa austriaca*	B	B	knapweed, Vochin	*Centaurea nigrescens*	A	A
babysbreath	*Gypsophila paniculata*	C	—	knotweed, Bohemian	*Polygonum bohemicum*	B	ND
blackberry, evergreen	*Rubus laciniatus*	—	WOC	knotweed, giant	*Polygonum sachalinense*	B	ND
blackberry, Himalayan	*Rubus armeniacus*	—	WOC	knotweed, Himalayan	*Polygonum polystachyum*	B	ND
blackgrass	*Alopecurus myosuroides*	B	B	knotweed, Japanese	*Polygonum cuspidatum*	B	ND
blueweed, viper's bugloss	*Echium vulgare*	B	B	kochia	*Kochia scoparia*	B	B
Brazilian elodea	*Egeria densa*	B	B	kudzu	*Pueraria montana* var. *lobata*	A	A
buffalobur	*Solanum rostratum*	A	A	lawnweed	*Soliva sessilis*	A	A
bugloss, annual	*Anchusa arvensis*	B	B	lepyrodiclis	*Lepyrodiclis holosteoides*	B	B
bugloss, common	*Anchusa officinalis*	B	B	longspine sandbur	*Cenchrus longispinus*	B	B
butterfly bush	*Buddleia davidii*	C	ND	loosestrife, garden	*Lysimachia vulgaris*	B	B
camelthorn	*Alhagi maurorum*	B	B	loosestrife, purple	*Lythrum salicaria*	B	B
clary sage	*Salvia sclarea*	A	A	loosestrife, wand	*Lythrum virgatum*	B	—
cockle, white	*Silene latifolia* ssp. *alba*	C	—	mayweed, scentless	*Matricaria perforata*	C	—
common catsear	*Hypochaeris radicata*	B	—	meadow clary	*Salvia pratensis*	A	A
common crupina	*Crupina vulgaris*	A	A	Mediterranean sage	*Salvia aethiopis*	A	A
common fennel	*Foeniculum vulgare*	B	ND	milk thistle	*Silybum marianum*	A	A
common groundsel	*Senecio vulgaris*	C	ND	nightshade, bittersweet	*Solanum dulcamara*	—	WOC
common reed	*Phragmites australis*	C	C	nightshade, silverleaf	*Solanum elaeagnifolium*	A	A
common St. Johnswort	*Hypericum perforatum*	C	ND	old man's beard	*Clematis vitalba*	C	ND
common tansy	*Tanacetum vulgare*	C	ND	oxeye daisy	*Leucanthemum vulgare*	B	ND
cordgrass, common	*Spartina anglica*	B	B	parrotfeather	*Myriophyllum aquaticum*	B	B
cordgrass, dense flower	*Spartina densiflora*	A	A	perennial pepperweed	*Lepidium latifolium*	B	B
cordgrass, salt meadow	*Spartina patens*	A	A	perennial sowthistle	*Sonchus arvensis*	B	B
cordgrass, smooth	*Spartina alterniflora*	B	B	poison-hemlock	*Conium maculatum*	C	ND
cress, hoary	*Cardaria draba*	C	—	policeman's helmet	*Impatiens glandulifera*	B	B
curly-leaf pondweed	*Potamogeton crispus*	C	ND	primrose, water	*Ludwigia hexapetala*	B	B
dodder, smoothseed alfalfa	*Cuscata approximata*	C	—	primrose-willow, floating	*Ludwigia peploides*	A	A
dyers woad	*Isatis tinctoria*	A	A	puncturevine	*Tribulus terrestris*	B	—
English holly	*Ilex aquifolium*	—	WOC	reed canarygrass	*Phalaris arundinacea*	C	ND
English laurel	*Prunus laurocerasus*	—	WOC	reed sweetgrass	*Glyceria maxima*	A	A
Eurasian watermilfoil	*Myriophyllum spicatum*	B	ND	rush skeletonweed	*Chondrilla juncea*	B	B
fanwort	*Cabomba caroliniana*	B	B	Russian knapweed	*Acroptilon repens*	B	B
field bindweed	*Convolvulus arvensis*	C	ND	rye, cereal	*Secale cereale*	C	—
fragrant water lily	*Nymphaea odorata*	C	ND	saltcedar	*Tamarix ramosissima*	B	B
garlic mustard	*Alliaria petiolata*	A	A	Scotch broom	*Cytisus scoparius*	B	ND
giant hogweed	*Heracleum mantegazzianum*	A	A	Spanish broom	*Spartium junceum*	A	A
goatgrass, jointed	*Aegilops cylindrica*	C	—	spikeweed	*Hemizonia pungens*	C	—
goatsrue	*Galega officinalis*	A	A	spurge flax	*Thymelaea passerina*	A	A
gorse	*Ulex europaeus*	B	B	spurge laurel	*Daphne laureola*	B	ND
grass-leaved arrowhead	*Sagittaria graminea*	B	B	spurge, eggleaf	*Euphorbia oblongata*	A	A
hairy willowherb	*Epilobium hirsutum*	C	C	spurge, leafy	*Euphorbia esula*	B	B
hawkweed, mouseear	*Hieracium pilosella*	B	B	spurge, myrtle	*Euphorbia myrsinites*	B	ND
hawkweed, orange	*Hieracium aurantiacum*	B	B	starthistle, purple	*Centaurea calcitrapa*	A	A
hawkweed, oxtongue	*Picris hieracioides*	B	B	starthistle, yellow	*Centaurea solstitialis*	B	B
hawkweed, polar	*Hieracium atratum*	B	B	sulfur cinquefoil	*Potentilla recta*	B	B
hawkweed, queen-devil	*Hieracium glomeratum*	B	B	swainsonpea	*Sphaerophysa salsula*	B	B
hawkweed, smooth	*Hieracium laevigatum*	B	B	Syrian bean-caper	*Zygophyllum faba*	A	A
hawkweed, yellow	*Hieracium caespitosum*	B	B	tansy ragwort	*Senecio jacobaea*	B	B
hawkweed, yellow devil	*Hieracium floribundum*	A	A	Texas blueweed	*Helianthus ciliaris*	A	A
Hedge Bindweed	*Calystegia sepium*	—	WOC	thistle, bull	*Cirsium vulgare*	C	ND
hedgeparsley	*Torilis arvensis*	B	B	thistle, Canada	*Cirsium arvense*	C	ND
henbane, black	*Hyocyamus niger*	C	—	thistle, Italian	*Carduus pycnocephalus*	A	A
herb Robert	*Geranium robertianum*	B	ND	thistle, musk	*Carduus nutans*	B	B
hoary alyssum	*Berteroa incana*	B	B	thistle, plumeless	*Carduus acanthoides*	B	B
houndstongue	*Cynoglossum officinale*	B	—	thistle, Scotch	*Onopordum acanthium*	B	B
hydrilla	*Hydrilla verticillata*	A	A	thistle, slenderflower	*Carduus tenuiflorus*	A	A
indigobush	*Amorpha fruticosa*	B	—	toadflax, Dalmatian	*Linaria dalmatica* ssp. *dalmatica*	B	B
ivy, Atlantic	*Hedera hibernica*	C	ND	toadflax, yellow	*Linaria vulgaris*	C	ND
ivy, English	*Hedera helix* Baltica	C	ND	velvetleaf	*Abutilon theophrasti*	A	A
ivy, English	*Hedera helix* Pittsburgh	C	ND	white bryony	*Bryonia alba*	B	B
ivy, English	*Hedera helix* Star	C	ND	whitetop, hairy	*Cardaria pubescens*	C	—
johnsongrass	*Sorghum halepense*	A	A	wild carrot	*Daucus carota*	B	ND
knapweed, bighead	*Centaurea macrocephala*	A	A	wild chervil	*Anthriscus sylvestris*	B	B
knapweed, black	*Centaurea nigra*	B	B	wild four o'clock	*Mirabilis nyctaginea*	A	—
knapweed, brown	*Centaurea jacea*	B	B	yellow archangel	*Lamiastrum galeobdolon*	—	ND
knapweed, diffuse	*Centaurea diffusa*	B	B	yellow flag iris	*Iris pseudacorus*	C	ND
knapweed, meadow	*Centaurea jacea* x *nigra*	B	B	yellow floating heart	*Nymphoides peltata*	B	B
				yellow nutsedge	*Cyperus esculentus*	B	B

1. WSNWCB, 2008.
2. King County, 2007.

A = Class A Noxious Weed
B = Class B Noxious Weed
C = Class Noxious Weed
ND = Non-Designated Noxious Weed
WOC = Weed of Concern
— = Not on list

Figures

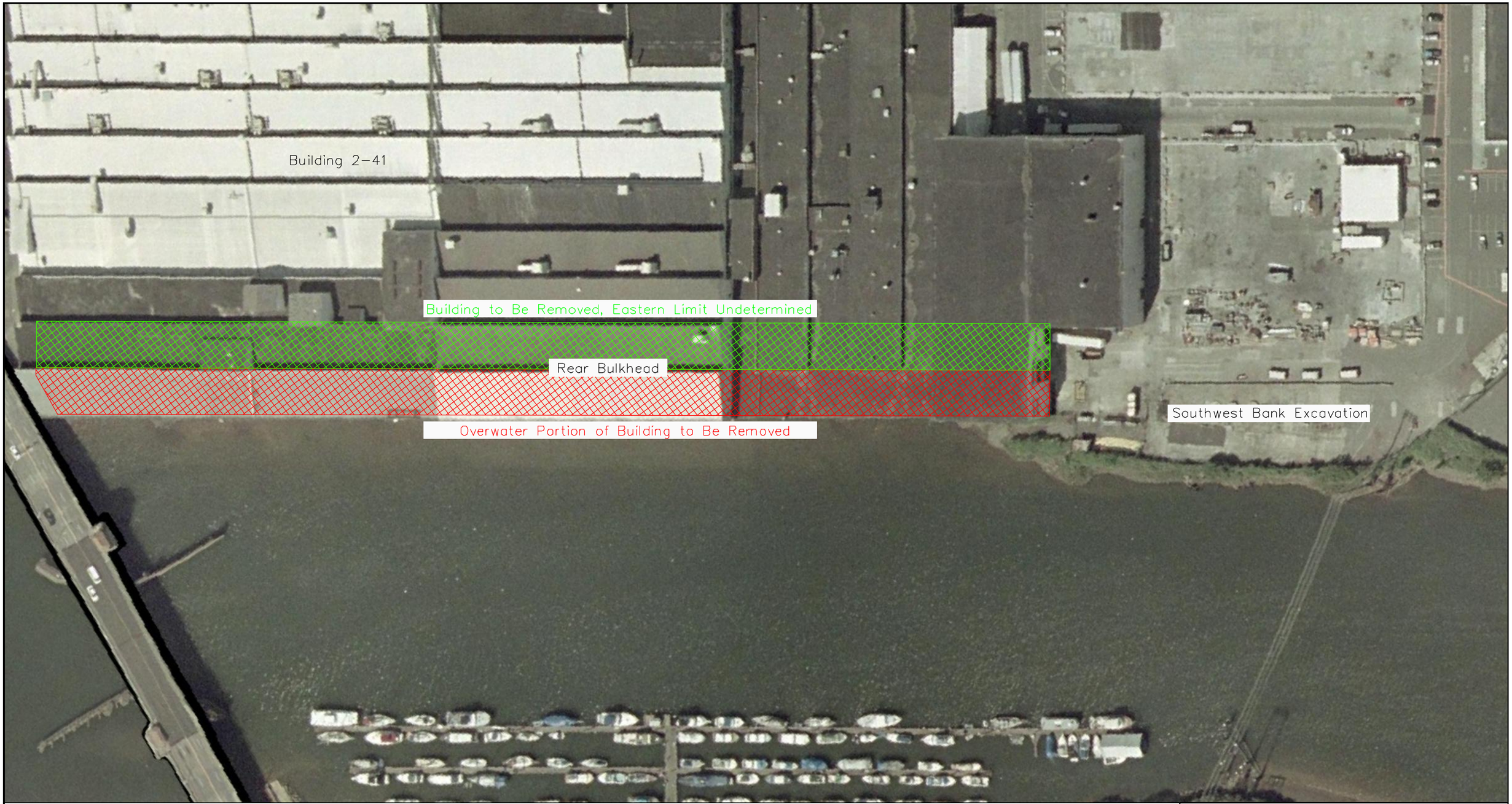
N

APPROXIMATE SCALE IN FEET

0 150 300 600

Location of the Building 2-122 and 2-41 and Southwest Bank Habitat Restoration Projects in the Lower Duwamish Waterway
Scope of Work
Boeing Habitat Projects

Figure 1

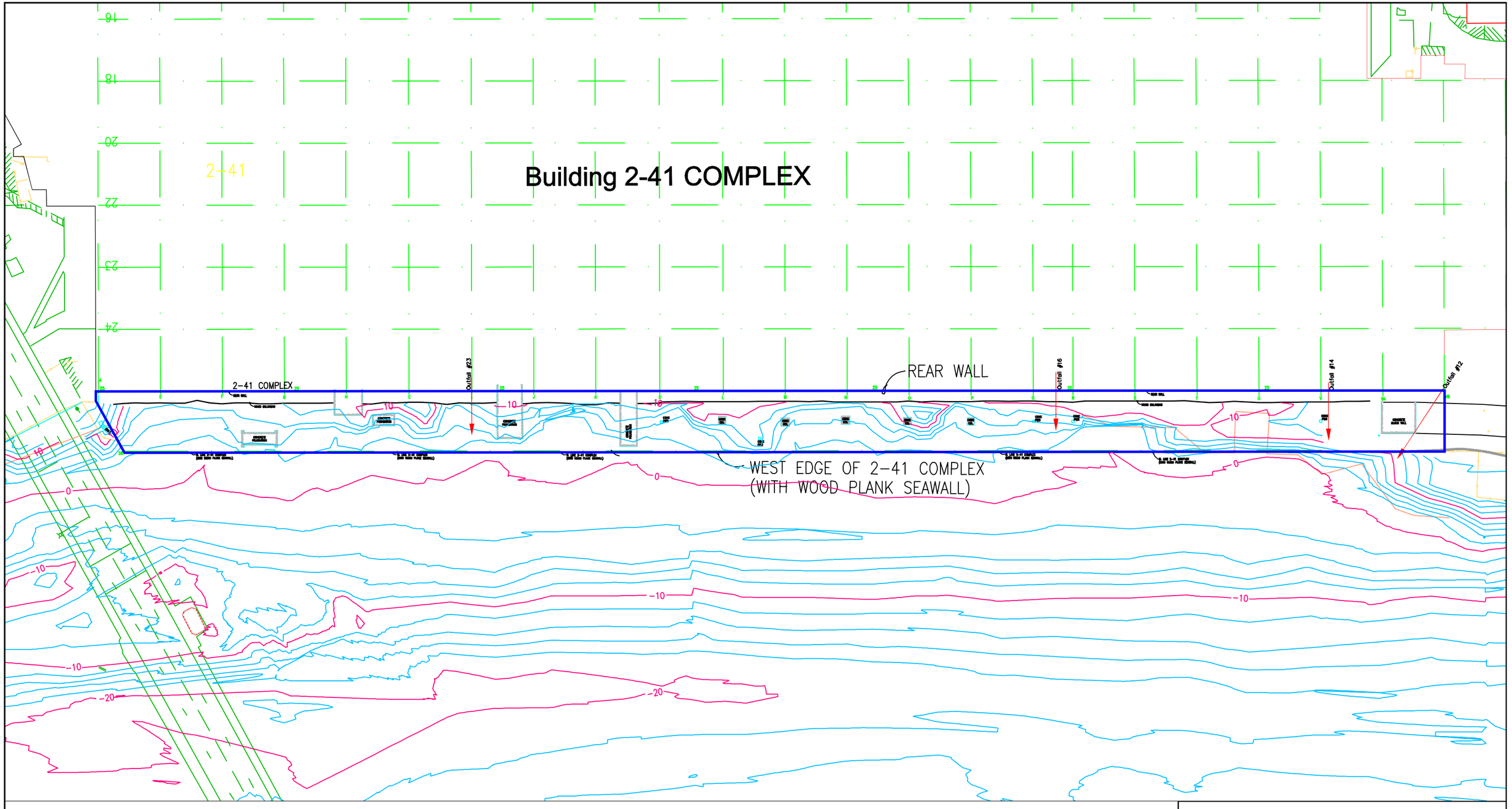


APPROXIMATE SCALE IN FEET
0 50 100 200

Location of the Building 2-41 and Southwest Bank Habitat Restoration Project

Scope of Work
Boeing Habitat Projects

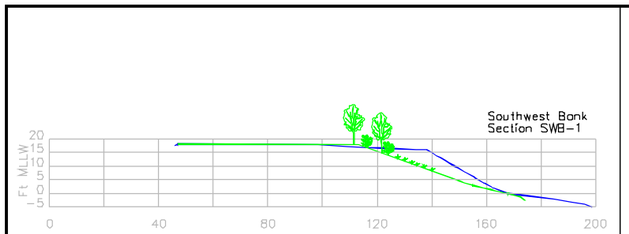
Figure 2

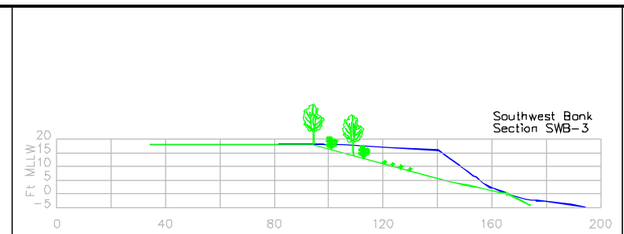


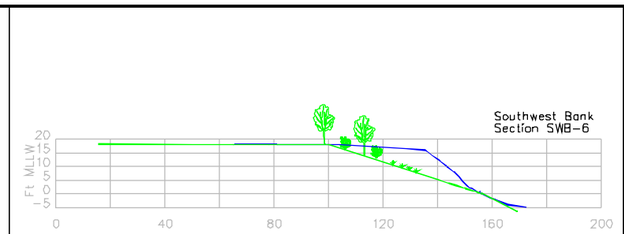
Under Building Area of the Building 2-41 Complex

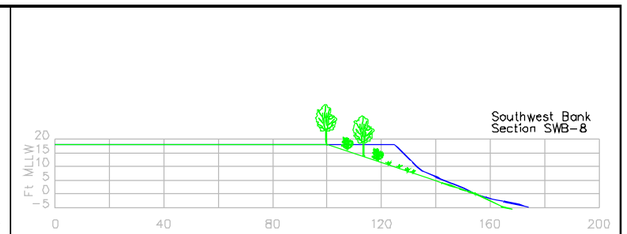
Scope of Work
Boeing Habitat Projects

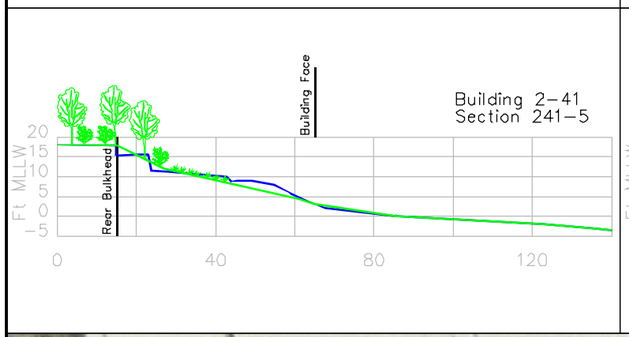
Figure 3

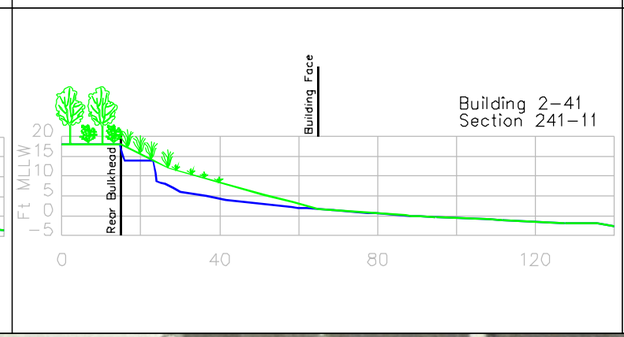


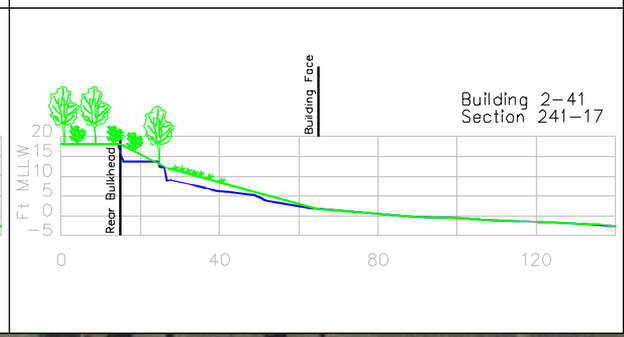


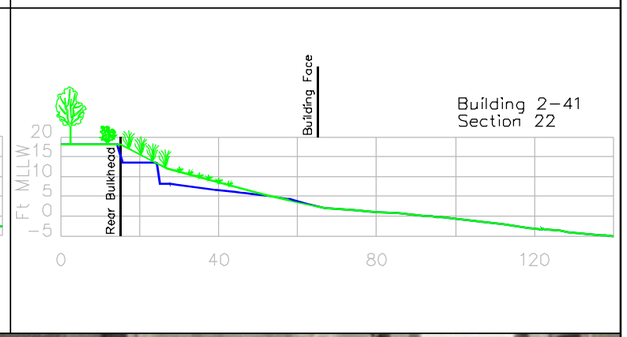


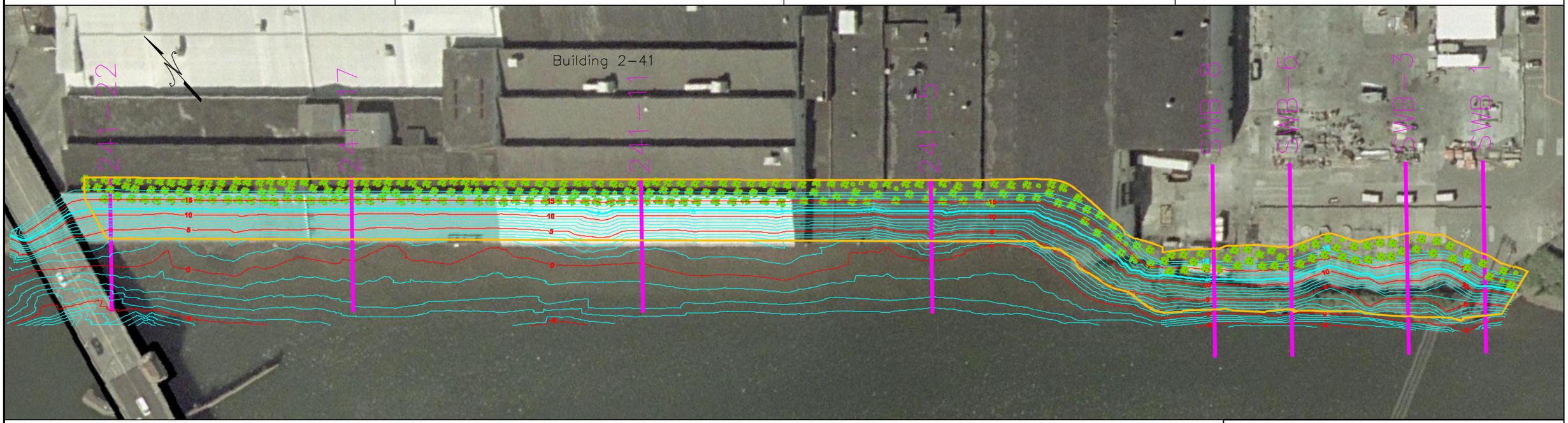












LEGEND

Existing Surface

Proposed Enhancement Surface

Maximum Footprint of Project

APPROXIMATE SCALE IN FEET

0 50 100 200

Baseline Conceptual Design of the Building 2-41 and Southwest Bank Habitat Restoration Project

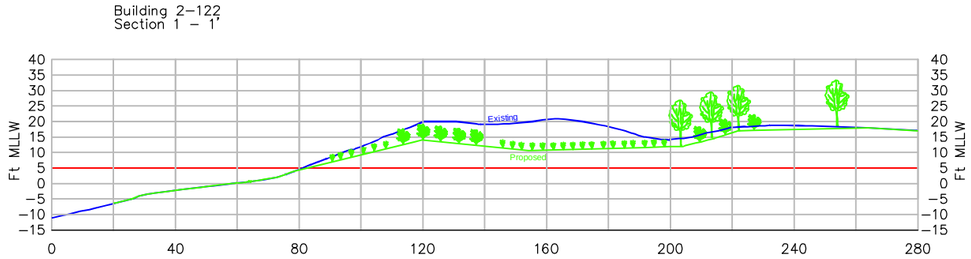
Scope of Work
Boeing Habitat Projects

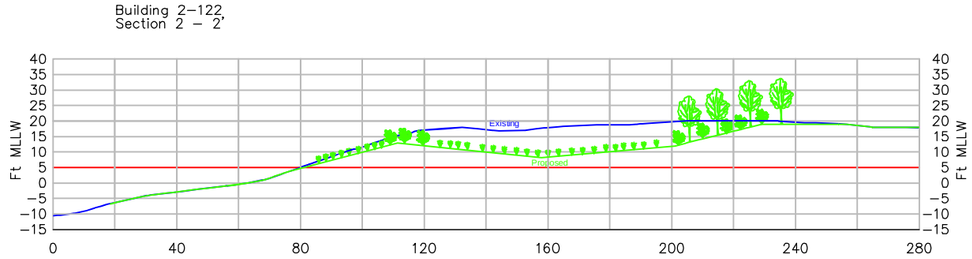
Figure 4

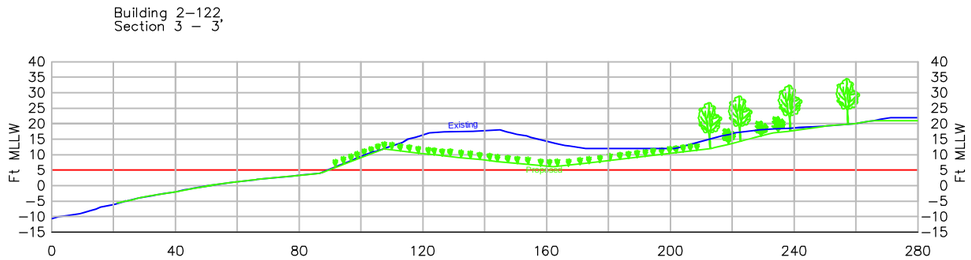
Location of the Building 2-122 Habitat Restoration Project

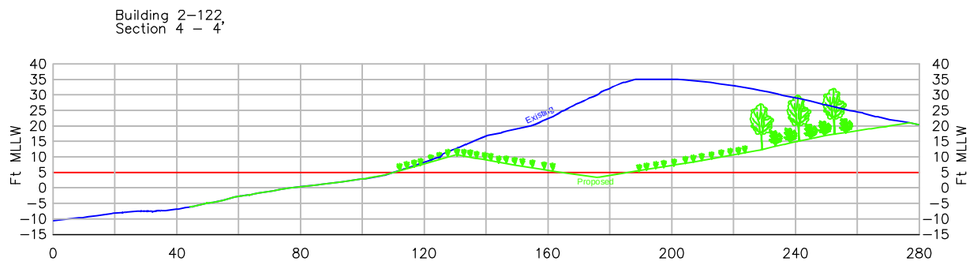
Scope of Work
Boeing Habitat Projects

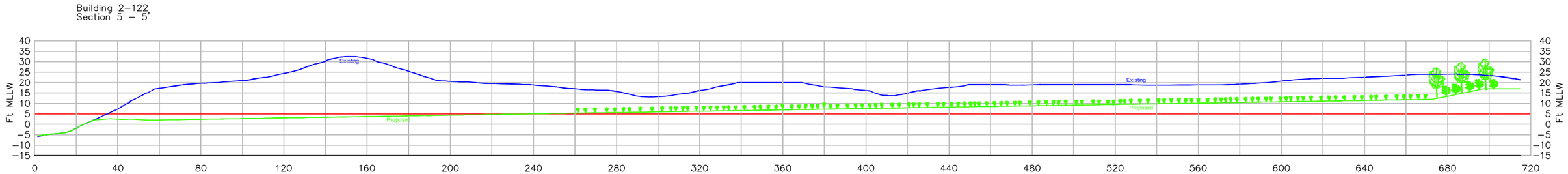
Figure 5

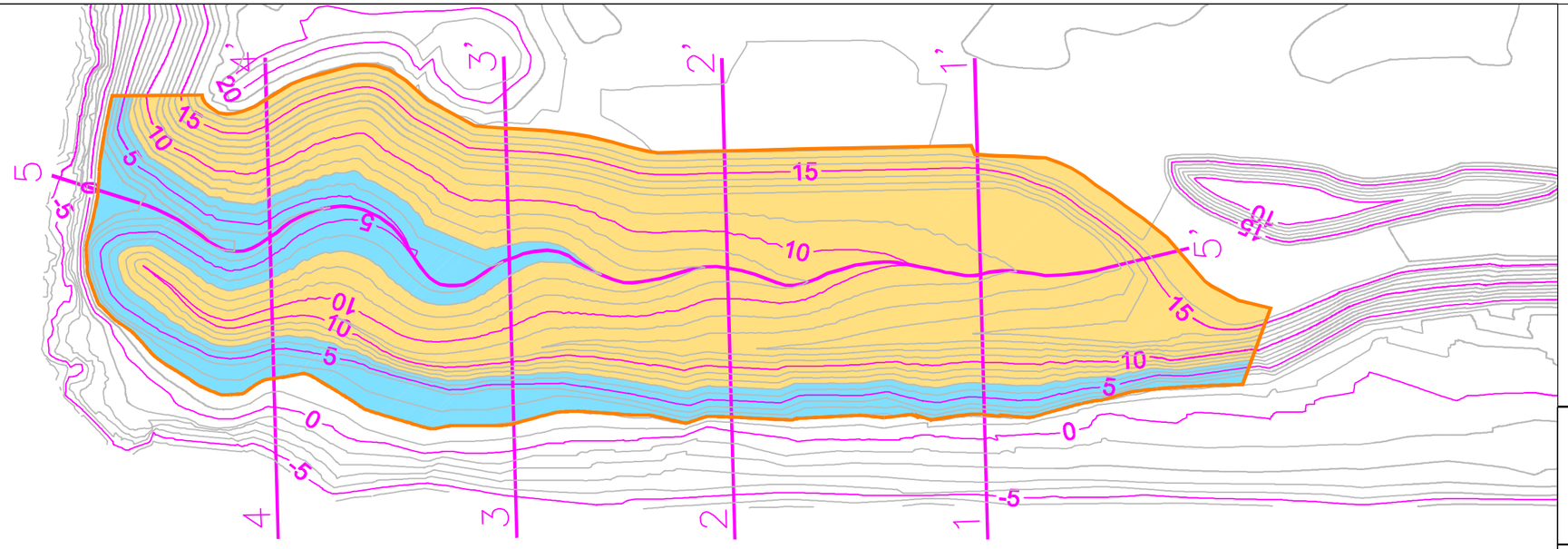












LEGEND

- Dry at +7 ft MLLW
- Wetted at +7 ft MLLW
- Existing Surface
- Proposed Enhancement Surface
- Maximum Footprint of Project

APPROXIMATE SCALE IN FEET

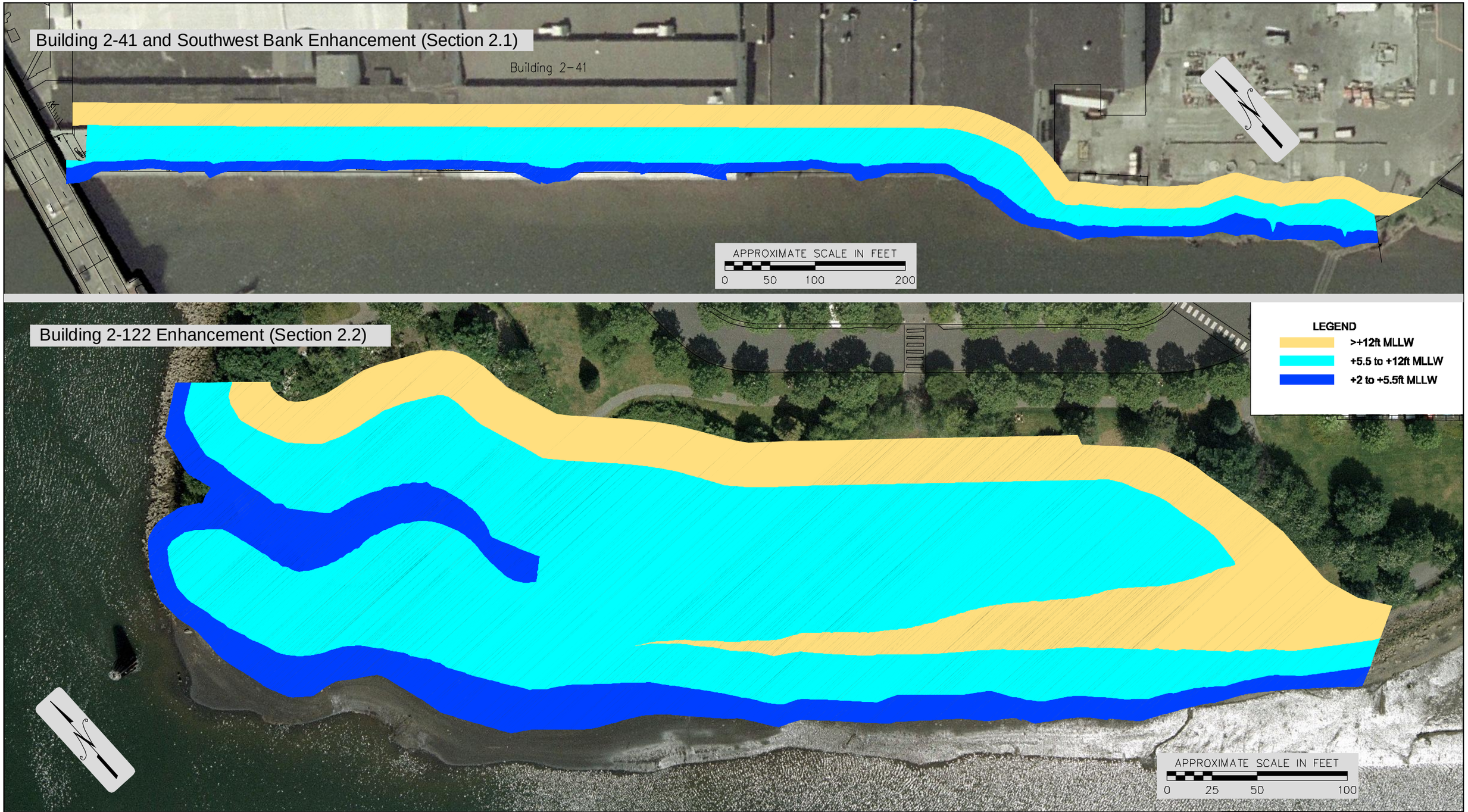
0 40 80 160

Vertical Datum Ft MLLW

Baseline Conceptual Design of the Building 2-122 Habitat Restoration Project

Scope of Work
Boeing Habitat Projects

Figure 6



POST-CONSTRUCTION HABITAT ZONES IN THE BUILDING 2-122 AND BUILDING 2-41 AND SOUTHWEST BANK HABITAT RESTORATION PROJECTS
Scope of Work
Boeing Habitat Projects

Figure 7