TUKWILA SOUTH PROJECT

DRAFT

SENSITIVE AREA MASTER PLAN

Prepared for

Segale Properties
P.O. Box 88028
Tukwila, WA 98138

Prepared by

A.C. Kindig & Co.
12501 Bel-Red Road, Suite 210
Bellevue, WA 98005

Cedarock Consultants, Inc.
19609 244th Ave NE
Woodinville, WA 98077

Raedeke Associates, Inc.
5711 NE 63rd Street
Seattle, WA 98115

June 29, 2005

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

TUKWILA SOUTH PROJECT
SENSITIVE AREA MASTER PLAN

I PURPOSE OF REPORT

This report should enable a City Council conclusion that implementation of a Sensitive Area Master Plan under the provisions of TMC 18.45.160 for the Tukwila South Project will result in net improvement in sensitive area functions and values compared to development under the general provisions of TMC 18.45.

II EXECUTIVE SUMMARY

The Tukwila South Project Sensitive Area Master Plan (Master Plan) will result in greater environmental benefit than could be achieved under standard TMC 18.45 Sensitive Areas Ordinance (SAO) provisions. The Tukwila South Project site is uniquely suited to provide substantial local and regional habitat benefits. The site contains Johnson Ditch, a degraded and ditched tributary to the Green River that could be restored to functioning fish habitat. Johnson Ditch is adjacent to over 30 acres of poor quality wetlands now in cropland production that could be rehabilitated as habitat. The project is adjacent to the Green River where it is confined within levees that have eliminated most off-channel habitat necessary for anadromous salmon, affording an opportunity to create this type of habitat which regional Green River studies have identified as a high priority for salmon population restoration.

The purpose of the Tukwila SAO under TMC 18.45.010 is to protect the environment, human life, and property; designate and classify ecologically sensitive and hazardous areas and to protect these areas and their functions and values; and allow for reasonable use of public and private property. By using the Master Plan provisions of the SAO, the Tukwila South Project developed a proposal consistent with project function and needs, substantially enhancing regional fisheries and wetland functions, and preserving water quality. The net gain in environmental benefits using the Master Plan is far greater for both within-site and regional habitat benefits than could be achieved using standard TMC SAO provisions.

By focusing on net environmental benefit promoted by the Master Plan Overlay provisions, rather than mitigation using like-kind and avoidance measures emphasized by standard TMC SAO requirements, the Tukwila South Project is

able to convert poor quality agricultural ditched streams and poor quality agricultural cropland wetlands into improved fish habitat and associated wetlands and increase fish habitat and wetland functions and values on the site. Rather than avoiding or retaining ditched streams providing little or no fish access and impairing the quality of water delivered to the Green River, the project proposes creation of out-migrant holding, summer rearing, winter refuge, and upstream migrant holding fish habitat in the Green River. The need for this type of off-channel habitat at this location is recognized by the Green River Habitat Limiting Factors Analysis for Washington Resource Inventory Area (WRIA) 9. Rather than avoiding Johnson Ditch and leaving it ditched with poor quality buffers in place as would result under standard TMC SAO provisions, the project proposes to relocate and restore Johnson Ditch in a larger channel with greatly enhanced fish passage to the Green River through an improved floodgate, further opening up off-channel habitat now regionally limiting to anadromous and resident fish in the Green River. The Master Plan further proposes to rehabilitate over 32 acres of degraded cropland wetlands and connect them in a habitat corridor through the Johnson Creek channel to the Green River (Exhibit 1).

III INTRODUCTION

A. Project Description

The Tukwila South Project proposal calls for the long-term development of a 490-acre contiguous site that is intended to create a viable employment and emerging advanced technology commercial hub. Market research shows these industries prefer large-scale campus settings that include a complementary array of companies or institutions, include a wide range of complementary retail, commercial, and residential uses, and can provide for future expansion. Individual campus environments are defined by spatially cohesive building settings with organized open spaces such as central plazas and public gathering places, where circulation is pedestrian oriented, and where vehicular circulation is simplified on secondary roads. This setting provides a contiguous secure common internal circulation that allows for short transit times between campus areas. Large building footprints are required to accommodate research laboratories, interaction between offices, conference and meeting facilities, laboratories and associated supporting services, and close proximity between multidisciplinary facilities. Multiple, interconnected campus settings are necessary to form the advanced technology national and international center that is the purpose and need for the Project.

The proposed development concept for the site would have between 10 and 14 million square feet of a mixed use development campus, including research, office, retail, residential, hotel, and entertainment uses. A fundamental component of the site development concept is the extension and expansion of Southcenter Parkway through the entire site in an alignment that follows the base of the western hillside. The extension of Southcenter Parkway through the site from South 180th Street to the City limits is a planned improvement project independent of the Tukwila South project that is included in the City of Tukwila's 2004-2009 Capital Improvement Program. Southcenter Parkway would function as the major transportation arterial into and out of the advanced technology campus hub and surrounding development. South 178th Street would be realigned and would intersect with Southcenter Parkway at Segale Park Drive C.

B. Tukwila Project South - Location and Environmental Opportunities

The Tukwila South Project is located within the Tukwila South Planning Area, extending from South 180th Street to South 204th Street. The site is generally bound by South 178th and South 180th Streets on the north, South 204th Street on the south, Orillia Road and Interstate-5 on the west, and the Green River on the east (Exhibit 1). From an environmental perspective the site is uniquely located in an area that is largely still in agricultural production and thus available for habitat restoration and rehabilitation projects, and where the following opportunities exist:

- Perennial springs with good water quality discharge from the western slopes but now must reach the Green River through drainage ditches that compromise water quality. This affords an opportunity to improve the passage of good quality spring discharge to the Green River.
- A major agricultural drainage ditch (Johnson Ditch) collects on- and off-site water to discharge to the Green River through a fish blocking floodgate. This affords an opportunity to restore Johnson Ditch as a tributary steam with good riparian conditions and with a fish-passage friendly floodgate to the Green River.
- Large contiguous wetlands associated with Johnson Ditch are now in pasture, crop, and hay production. Drainage ditches have been dug to lower the water table. These wetlands afford an opportunity to rehabilitate and improve wetland hydrology, water quality, and biological functions, and to connect the rehabilitated wetlands to a restored tributary to the Green River.
- The lower Green River adjacent to the site is contained within levees. This has severely limited fish habitat in the river by eliminating access to off-channel habitat, reducing habitat diversity, and isolating riparian

buffers. The elimination of off-channel habitat prevents out-migrating juvenile salmonids from controlling their transition to salt water. Juvenile salmon need time to adapt to increasing salinity. The inability to hold in off-channel areas out of the main river current is likely a significant source of mortality to salmon. The site affords an opportunity to set back the levee along the west side of the river and construct an off-channel fish habitat area where juvenile salmon can hold during downstream passage in the Green River. This habitat area will also provide summer rearing, winter refuge, and upstream migrant holding habitats for fish. The need for this type of off-channel habitat at this location was recognized by the Green River habitat limiting factors analysis for Washington Resource Inventory Area (WRIA) 9, which identified a number of issues impacting regional salmonid populations.

C. Current Sensitive Area Conditions

Streams and the Green River

Some natural streams originate from springs along the steep western slope. These streams have good water quality, good riparian and shade conditions, and cool temperatures that ranged from 12.5 to 14.5 degrees C (54.5 to 58.0 degrees F) in late July 2004.

At the toe of the western slope and in the southern portion of the site on the valley floor a series of agricultural drainage ditches have been constructed and maintained, most of which are regulated as watercourses (streams) under the Tukwila SAO, which implements the critical areas requirements of the Growth Management Act. Ditched streams C, D, and E, and regulated ditch J-1 are manmade drainage ditches with low quality aquatic habitat, no demonstrated fish use (though the project has conservatively assumed that fish could be present), and riparian buffers largely limited to narrow strips of maintained exotic vegetation. Water temperatures ranged from 15.5 to 17.0 degrees C (59.9 to 62.6 degrees F) in these ditched streams in late July 2004 (Ditch J-1 was dry). Water quality in ditched streams C and D is poor relative to the baseflow springs in the western slopes, because they have low dissolved oxygen and higher turbidity, total suspended solids, fecal coliforms, ammonia and metals due to the agricultural influences that surround them and the fact that they contain standing water with little flow through the drier season. Ditched stream E is a manmade agricultural ditch presumed to be fish bearing but lacking fish access to or from the Green River, and which is highly degraded due to ditch maintenance and agricultural livestock use. Potentially lethal water temperatures to salmonids of 28.5 degrees C (83.3 degrees F) were measured in

the northern (downstream) portion of ditched stream E in late July 2004, where the riparian vegetation is a mixture of turf, pasture, roadway, and some pockets of mixed deciduous/coniferous forest. The influence of untreated Frager Road runoff on ditched stream E water quality is evident in higher petroleum hydrocarbons and dissolved heavy metals in winter. Johnson Ditch is the largest perennial stream feature on the site. Johnson Ditch is a perennial fish-bearing stream maintained as an agricultural drainage ditch. It has a fine silt and sand substrate and is connected to the Green River by a flood gate that opens to release flow from the ditch but impedes fish passage much of the time. The riparian vegetation condition depends on when the ditch was last maintained. Since the last maintenance in 2001 willow, blackberry, and reed canary grass has grown and covers most of the banks between two cornfields. Water temperatures in Johnson Ditch ranged from 14.0 to 14.2 degrees C (57.2 to 57.6 degrees F) in late July 2004.

The entire mainstem of the Green River has been channelized, which has eliminated most side-channel and off-channel salmonid habitat, severely limiting winter refuge habitat for fish and reducing the quantity and quality of habitat preferred by juvenile salmonids as they migrate downstream to make the conversion from freshwater to saltwater habitat. The lower reach of the Green River adjacent to the site is relatively low gradient with levees to protect adjacent lands from flooding. Green River flows are influenced by Howard Hanson Dam operations which have eliminated most high flows above about the 2-year recurrence, and by water withdrawal at the Tacoma Headworks. The dam and permanent diversion of the White River from the Green River have eliminated coarse sediment movement from the upper to lower river reaches which greatly restricts spawning habitat availability. As a result of these influences, the lower Green River reach predominantly is used by fish for migration and rearing purposes. Green River water quality is moderate near the site, being low in nutrients but relatively high in fecal coliforms and some metals, and having relatively high temperature and low dissolved oxygen in the summer. The Green River is on the state 303(d) list as impaired for dissolved oxygen, fecal coliform bacteria, temperature, and mercury. Ecology is developing a TMDL plan to control all of those parameters except mercury in the Green River. Ecology usually does not administer TMDLs for mercury or other toxins that bioaccumulate; rather Ecology will be implementing a regional study on mercury over the next 5 years.

Details on the watercourses and fish habitat can be found in the Tukwila South Project Fisheries Technical Report which is Appendix E to the DEIS (Cedarock Consultants, Inc., February 16, 2005). Details on water quality can be found in

the Tukwila South Project Water Quality Technical Report which is Appendix C to the DEIS (A.C. Kindig & Co., March 8, 2005).

Wetlands

Wetlands delineated within the project site include a variety of vegetative cover types, although most include or are dominated either by forested cover (if located in the western slopes) or by agricultural crops (if located on the valley floor). Many wetlands are small, and several are hydrologically isolated. Most wetlands at the north and south ends of the project site discharge to perennial steams and/or agricultural drainage ditches regulated as streams. The on-site wetlands total about 48.68 acres, although some wetlands extend off-site, based on delineations using the Army Corps of Engineers (ACOE) Delineation Manual (Environmental Laboratory 1987). The ACOE and Ecology completed the jurisdictional review of the wetland boundaries on the Tukwila South site on March 2, 2005.

Most of the wetland area on the project site is located south of South 200th Street and is under agricultural production, either tilled and planted with corn during the spring or mowed for hay production and tilled in the fall. These wetlands are entirely emergent in nature, except for Wetland 10 which is mainly emergent but also contains palustrine scrub-shrub, and forested areas. Scrub-shrub and forested wetlands exist along or at the base of the western slopes. Wetland functions are low to moderate for water quality, and low to high for hydrology depending on where they are located. Some of the smallest wetlands scored highest per unit area for hydrologic function, but provided little net function due their small size. Wetlands 10 and 11 are very large and thus received the highest hydrologic function net scores even though they scored low to moderate for most hydrologic functions on a per unit acre basis. Most wetlands did not score highly for hydrologic function. Similarly the largest wetlands 10 and 11 received the highest water quality function scores due to their size, even though their scores per unit acre were moderately ranked relative to other on site wetlands. In part, the water quality functional scores are influenced by agricultural activity; wetlands within cornfields, for example, are rated as having a higher potential to provide water quality function because of tilling, fertilizer, and pesticide use in these areas. Biological (habitat) function scores were highest for wetlands 10 and 11 due to size but also, for wetland 10, to a high per acre function because of its suitability for wetland associated birds, mammals, and other wildlife, and support to potential fish habitat associated with Johnson Ditch. Most wetlands were rated low to moderate for biological functions.

Details on the wetlands can be found in the Wetland Assessment for the Tukwila South Project (Raedeke Associates, Inc., March 28, 2005), which is Appendix F to the DEIS.

D. Opportunities for Increase in Sensitive Area Functions and Values

The opportunities on a site-wide basis are the following:

- For Green River and Johnson Creek Functions and Values: A net gain in water quality function through improvement in base flow conveyance from the western (hillside) springs to the Green River; improvement in riparian conditions promoting water quality in a restored Johnson Creek channel, in the retained portions of ditched stream E, and along the edge of the Green River Off-Channel Habitat Area (See Section V.B. in this report, and for details refer to the assessments in the Fisheries Technical Report (Appendix E of the DEIS) and the Water Quality Technical Report (Appendix C of the DEIS));
- For Fish Habitat Functions and Values: A net gain in fisheries habitat functions through improvements in physical habitat suitability, water quality, and riparian conditions in a restored Johnson Creek and retained portions of ditched stream E; enabling or greatly enhancing salmonid access to restored rearing habitat in Johnson Creek which has been identified as critically needed for regional anadromous salmon populations; and through construction of Green River off-channel habitat which is identified under the Green/Duwamish River Ecosystem Restoration Study (WRIA 9) as one of the critical habitat factors now limiting regional salmon populations (for details refer to the assessments in the Fisheries Technical Report (Appendix E of the DEIS)).
- For Wetlands Functions and Values: A net gain in wetland hydrologic, water quality, and biological (habitat) functions on the site through rehabilitation of wetlands 10 and 11 associated with the restored Johnson Creek tributary (See Section V.C. of this report, and for details refer to the quantitative assessments in the Wetland Report and Mitigation Plan (Appendix F of the DEIS) and to the Wetland Water Quality Function and Impact Assessment (Attachment A to Appendix C of the DEIS)).

IV ELIGIBILITY CRITERIA (TMC 18.45.160.C)

A. Criterion 1: Overlay Area Size

The Tukwila South Project is 498.3 acres in size, which exceeds the minimum criterion of greater than 10 acres.

B. Criterion 2: City Council Finding of Likely Net Gain in Sensitive Area Functions and Values Relative to the General Provisions of TMC Chapter 18.45

A Sensitive Areas Master Plan allows an applicant to propose alternative environmental protection measures to the standard TMC SAO where functions and values of sensitive areas will benefit by taking a different approach to mitigation than the typical case-by-case like-kind habitat mitigation normally utilized. The burden on the applicant is to demonstrate the net result of the action is an improvement to water quality, fish, and wildlife habitat beyond what would occur through strict application of the provisions of the TMC SAO.

The details of the Master Plan and why it will result in a net gain in wetland and stream functions and values relative to standard TMC SAO provisions are provided in Sections V.B through V.C below. It is important to note that disturbance of watercourses or wetlands is allowed for the purposes of rehabilitation or restoration under TMC18.45.070.B.5. For example, interest in improving habitat quality in Johnson Ditch has been expressed by the WRIA 9 committee and it is possible some future civic-sponsored enhancement could occur even under a standard TMC SAO proposal. However, disturbance for the purpose of enhancement differs from disturbance for the purpose of a project action that is accompanied by mitigation. Thus, this project concludes the proposed relocation of Johnson Ditch for project purposes would not be allowed under standard TMC SAO provisions for the purpose of development. Consequently impacts to Johnson Ditch would be avoided and restoration of Johnson Ditch as a mitigation measure would not occur. Similarly, fill of any ditch regulated as a watercourse under standard TMC SAO requirements would likely require that the stream be replaced, not that it be mitigated by restoring another creek or improving the Green River, or the impacted stream's functions and values are lost. It is the flexibility to evaluate whole-site functions and values that give the Sensitive Area Master Plan Overlay provisions of the TMC SAO its strength, relative to standard TMC SAO provisions.

From the perspective of probable changes in sensitive area functions and values associated with a development project, the net gain for the Tukwila South Project under a Master Plan versus standard TMC SAO provisions accrue from the following:

- By not using either avoidance or like-kind mitigation for impacts to most of the agricultural drainage ditches regulated as streams on the site, the Master Plan will create off-channel salmonid refuge, rearing, and holding habitat now in critical short supply in the Green River, rather than maintaining existing ditches or in-kind ditch replacement (Stream E) with no fish access to the Green River; and allow for improved conveyance of good quality baseflow water to the Green River from the western slopes;

- By not using avoidance of development impacts on Johnson Ditch as required under standard TMC SAO provisions, the Master Plan allows for relocation and restoration of Johnson Creek with improved riparian conditions and provision for greatly enhanced fish access at the Green River floodgate, increasing off-channel refuge and rearing habitat which is now critically limiting to salmon in the lower Green River.
- By not using avoidance for the wetlands, the Master Plan allows for a very large contiguous wetland area adjacent to Johnson Creek to be rehabilitated as a large habitat area contiguous with the Green River via the Johnson Creek corridor, having much enhanced hydrology, biological, and water quality functions than could be achieved by in-kind mitigation.

V SENSITIVE AREA MASTER PLAN (TMC 18.45.160.F and G)

Section 18.45.160.F provides for development of a Sensitive Areas Master Plan under the direction of the Director of Community Development. Section 18.45.160.G includes factors the director must consider when determining whether the Plan results in a net overall benefit to the environment and is consistent with best available science. This section describes the following:

- Explanation of Unavoidable Wetland and Stream Impacts
- Fisheries, Streams and Wetland actions proposed under the Sensitive Areas Master Plan; differences in project configuration and mitigation between the proposed Master Plan and the results of applying standard TMC SAO requirements; and consistency of the proposal with Sensitive Areas Master Plan requirements.

Wetland and stream mitigation construction during the first two years of the project, and subsequent monitoring, are described in Section VII. Conceptual mitigation and monitoring plans for streams and wetlands are attached as Exhibits 2 and 3.

A. Explanation of Unavoidable Wetland and Stream Impacts

This section explains why wetland and stream impacts proposed under the Tukwila South Project Master Plan are unavoidable in order to meet Project Purpose and Need[1] objectives. Four main categories of unavoidable impact causes are explained, along with why such categories of impacts are proposed to meet the Project's Purpose and Need. The unavoidable cause for each proposed

[1] For details please refer to the Tukwila South Project DEIS Purpose and Need Section of Chapter 2.

wetland and stream impact is summarized in Section V and described in detail and in the Tukwila South Project DEIS.

Categories of Unavoidable Impact

The four categories of unavoidable impact causes based on Purpose and Need for the Project are the following:

1. **Minimum contiguous area needed for a viable, large-scale campus master plan environment** attractive to national and international emerging technology industries;
2. **Campus area dimensional and circulation requirements** (pedestrian and secondary road circulation, not by use of the Southcenter Parkway);
3. **The minimum finished site elevation to provide sewer and stormwater service** throughout the Project; and the
4. **Minimum buildable area for supporting services and retail at the north and south entrances** to the Project.

1. Minimum Contiguous Large-Scale Campus Master Plan Environment

The Project is intended to create a viable employment and emerging advanced technology commercial hub. Market research shows these industries prefer large-scale campus settings that include a complementary array of companies or institutions, include a wide range of complementary retail, commercial, and residential uses, and can provide for future expansion. Individual campus environments are defined by spatially cohesive building settings with organized open spaces such as central plazas and public gathering places, where circulation is pedestrian oriented, and where vehicular circulation is simplified on secondary roads. This setting provides a contiguous secure common internal circulation that allows for very short transit times (measured in minutes) between campus areas. Large building footprints are required to accommodate research laboratories, interaction between offices, conference and meeting facilities, laboratories and associated supporting services, and close proximity between multidisciplinary facilities. Multiple, interconnected campus settings are necessary to form the advanced technology national and international center that is the Purpose and Need for the Project. Research demonstrates the contiguous developable area needed to support the intended Project, including future expansion, is at least 250 acres plus an additional 100 acres for supporting uses, not divided into street grids. The developable portion of the 498.3-acre

Tukwila South Project site under current conditions is approximately 275 acres,[2] excluding open space, critical areas, and storm control area requirements. In large measure, the developable contiguous area is limited by a flood protection barrier dike which precludes development south of its location due to unavailability of flood insurance (necessary in the event of river levee failure upstream). Relocation of the flood protection levee from South 196th Street to the southern boundary of the site (north of South 204th Street) is essential to create contiguous buildable area of sufficient size to meet the Purpose and Need. Under SEPA Alternatives 1 and 2, the developable portion of the site would rise to approximately 368 acres, excluding open space, critical areas, and storm control area requirements. Approximately 78.55 acres of the gain in buildable area are due to relocation of the flood protection barrier dike and related impacts to wetlands and streams (see "Area D" in Exhibit 1-A).

2. Campus Area Dimensional and Circulation Requirements

As shown in Exhibit 1-A, the site is long and narrow, constricted to the west by steep slopes and to the east by the Green River. The Green River meander creates one severe site constriction approximately 420 feet wide (east to west), and another sizeable area further south where the site width between the slopes and the river ranges from about 750 feet to about 1,200 feet. The City of Tukwila's planned extension of the Southcenter Parkway between South 180th Street and South 200th Street must pass through these constrictions. Through the northerly constriction, the Southcenter Parkway alignment becomes limiting to connecting campus-style development with secondary roads. Through the southerly constriction, and throughout the site, the Southcenter Parkway alignment establishes the contiguous area available for large-scale campus development between it and the river. The further to the west Southcenter Parkway is placed, the better the alignment becomes to meet the Project Purpose and Need for contiguous buildable area described above. At the northerly constriction, the Southcenter Parkway must be aligned as far west as feasible to allow room for a secondary road and campus connection from north to south along the river. Under both SEPA Alternatives 1 and 2, the minimum distance between the proposed Southcenter Parkway and the river levee would be approximately 360 feet. All of this space at the constriction would be needed under Alternatives 1 and 2 for construction of an internal road that would likely require a 65-foot right-of-way, office/research campus buildings, and approximately landscaped pedestrian walkways. The north to south internal

[2] Source: Goldsmith & Associates, Inc. July 23, 2004 Tukwila South Master Plan No Action Alternative Developed Site Area Table.

roadway, campus-style pedestrian connections, and building orientations are required by the Project's Purpose and Need

Extension of the Southcenter Parkway from South 180th Street to South 200th Street has independent utility to the City of Tukwila and is planned to occur regardless of whether the Tukwila South Project proceeds. The Southcenter Parkway extension is planned by the City to be a 5-lane road having a roadway width (fill prism) of between 80 feet and 90 feet. Design geometrics (alignment, curvature, and grade) for Southcenter Parkway must meet the requirements for a Collector Arterial in accordance with the City of Tukwila and AASHTO[3]. The Southcenter Parkway must extend south from the existing fixed intersection at Southcenter Parkway and South 180th Street, which because of minimum turning radius requirements makes impacts to stream "E" near the fixed intersection unavoidable no matter what alignment the Parkway takes further south. Under Alternatives 1 and 2, the Southcenter Parkway alignment is shifted west, relative to the no action Alternative 3, in order to meet the Purpose and Need objectives for total contiguous buildable area and minimum distance between the river and Parkway at the northerly constriction that are described above.

To provide a minimum 360-foot distance between the levee and the Parkway at the northerly constriction, the Parkway alignment must turn southwest once past the intersection's influence and then turn southerly again through the constriction area (see "Area B" in Exhibit 1-A). Lines of sight and maximum road curvature restrict the alignment adjustments necessary to provide the minimum 360-foot distance at the constriction, making direct impacts to stream E near Segale Park C Drive unavoidable, along with the direct impacts to stream E at the northerly constriction itself. If the Parkway alignment were to be shifted east to avoid stream E impacts near Segale Park C Drive and at the northerly constriction, then (1) the ability to connect campus development with a secondary road is lost at the constriction, and (2) approximately 9.5 buildable acres would be removed from campus-style development (see Area B in Exhibit 1-A) which is contrary to Purpose and Need objectives.

3. The Minimum Finished Site Elevation to Provide Sewer and Stormwater Service

The master plan for the site requires provision for one sewer system and three stormwater systems to serve the Project. Mass grading of the site south and west

[3] American Association of State Highway and Transportation Officials. These requirements include a minimum radius curvature between 850 to 1,000 feet, minimum tangent lengths between curves of approximately 200 feet to 300 feet for transition of superelevations, and Washington State Department of Transportation standards for highway intersections at South 180th Street, Segale Park C Drive, and South 200th Street.

of the existing Segale Business Park is necessary to accomplish this purpose. The controlling elevation for the site sewer is determined by the City of Tukwila's planned elevation for sewer main improvements at the Southcenter Parkway and South 180th Street intersection (the current sewer main elevation at the intersection is about 5 feet higher and would require more fill throughout the site). The entire Project sewer would connect to the City's existing system at this point. Therefore, the Project grade must allow for that connection elevation, a 0.1 percent minimum sewer grade, and a minimum 4-foot cover depth. The City of Tukwila strongly prefers sewer lift stations with gravity flow for reasons of long term City benefit through enhanced reliability, and reduced operating expense. The southern portion of the site (where most fill impacts to wetlands would occur) would be served by one stormwater treatment facility located at the southern end of the site. The pond surface of the southern stormwater facility is established by (a) Green River water surface elevations under a variety of conditions and the need for the pond to discharge to the river through a floodgate, and (b) site runoff conditions. The resulting backwater elevation from the pond establishes minimum elevation site grade. Taken in combination, the site grade needed to accommodate sewer and stormwater infrastructure, given fixed control points at the Tukwila sewer connection point and the Green River for stormwater, require developed grade elevations of between about 29 feet and 30 feet. Existing elevations in the southern portion of the site to be filled range between about 16 feet to 25 feet (see "Area D" in Exhibit 1-A). The grade requirements for utility infrastructure are the cause of the majority of the unavoidable wetland fill impacts.

The northern portion of the site would be served by two stormwater systems, both draining north to existing connections to pump stations in the City of Tukwila. The north portion of the site, west of the existing Segale Business Park, drains stormwater to the South 180th Street pump station, and is included in its service area.[4] Water quality treatment would need to be provided at the northern end of the site prior to connection to the South 180th Street pump station. The Segale Business Park would eventually be redeveloped under the Master Plan, but that is not likely to occur during the first phases of development, and the existing business park is in the "northeast" stormwater drainage area served by the P17 pump station. Consequently the stormwater pond for the north area must be placed west of the Parkway at the north end of the site in "Area A" (see Exhibit 1-A). This requires grading the area of wetland 16 down to an elevation suitable for stormwater pond discharge to the off-site connection to the South 180th Street pump station, and suitable for gravity flow of stormwater from the project to the pond.

[4] Please reference the Tukwila South Project Master Drainage Plan for details.

4. Minimum Buildable Area for Supporting Services and Retail At the North and South Project Entrances

As explained above, the Project is intended to create a viable employment and emerging advanced technology commercial hub on a national and international scale. This requires that the Project include, among other features, a range of complementary retail and commercial services readily accessible to those working in, living in, or visiting the site. Retail and commercial services within the Project would benefit from drawing customers from within and outside the site boundaries, which requires that they be placed at site entrances where the trip counts are high enough to generate drive-by recognition and business. The highest trip counts at the Tukwila South Project are at the intersections of Orillia Road and South 200th Street, and at Southcenter Parkway and South 180th Street. In addition, these retail services are intended to compliment the surrounding area by forming a logical business transition between it and the Tukwila South Project. Market research indicates that an area about 100 acres in size for such retail/commercial/residential areas would serve the needs of an advanced technology center at this location.

This placement of retail/commercial services at the desired locations results in the fill of one wetland, wetland 13. Partial fill of wetland 10 and partial fill of wetland 16 is anticipated where cut for the north area stormwater pond is required (see "Area D4" and "Area A" in Exhibit 1-A).

Specific Wetland and Stream Impacts

The areas where the four categories of unavoidable impacts would occur are overlain with each proposed wetland and stream impact in Exhibit 1-A. All streams proposed for impact are currently used as irrigation drainage ditches and are regulated watercourses by the City of Tukwila. Impacts to wetlands and streams are summarized in Table 1. Detailed descriptions of each affected wetland and stream and the proposed impacts are located in the Tukwila South Project EIS and its appendices, as is the regulatory status of each affected wetland.[5]

[5] Raedeke Associates, Inc. March 28, 2005. Wetland Report and Mitigation Plan, Tukwila South; Raedeke Associates, Inc. March 29, 2005. Plants and Animals Assessment, Draft EIS Report; and Cedarock Consultants, Inc. February 16, 2005. Fisheries Technical Report, Tukwila South Project.

TABLE 1

Specific Stream and Wetland Unavoidable Impact Explanation

(Table Order is Generally North to South through the Site; see Exhibit 1-A)

Resource	Exhibit 1-A Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 16	Area A	3, 4	0.65 ac. (all of wetland)	The area would be cut down in elevation, removing the wetland.	The elevation of this area would be lowered in order to build a stormwater pond serving the north area of the project that would discharge to the S. 180th St. Pump Station immediately to the north. This portion of the site is within the pump station service area, and this specific location is nearest the pump station connection at the site boundary. A secondary reason is to develop retail / commercial services at the north entrance to the site, at the margins of the pond; however the elevation required by the stormwater pond is the reason for the impact.

Resource	Exhibit 1-A Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Stream E	Area B	1, 2	2,807 linear ft. 0.42 ac.	A portion of stream E would be placed in a culvert.	The proposed alignment of the Parkway is necessary to minimize the northerly constriction between the Green River levee to the east and the steep slopes to the west. A width of about 300 feet is required for a secondary road, pedestrian connections, and campus-style development objectives. Significant highway design restrictions are identified in the text above. *Note: The City's extension of Southcenter Parkway is independent of the Tukwila South Project. The extension of a 5-lane collector arterial south from the existing intersection makes impacts to Stream E in the immediate vicinity of the Southcenter Parkway and S. 180th Street unavoidable.*
Wetland 1	Area C	1, 2	0.26 ac. (portion of 2.17 ac wetland)	A portion of wetland 1 would be filled.	The alignment of the Parkway through this area is necessary to maximize space between the Green River levee to the east and the steep slopes to the west along the southerly site constriction. This space is required for campus-style development objectives to be met.
Wetland 2	Area D (D-1)	3	0.09 ac. (all of wetland)	Filled from ~25 ft to 30-ft elev.	The elevation of these areas must be raised in order to be served by sewer and stormwater utilities. Site grades are driven by control points at the sewer main connection to the City of Tukwila and, for stormwater in the southern portion of the site, by elevations of the Green River.
Wetland 3	Area D (D-2)	3	0.03 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	

Resource	Exhibit 1-A Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 3-A	Area D (D-2)	3	0.01 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	If some or all of these wetlands were to be retained contrary to Purpose and Need, they would exist as closed depressions within the area of fill with no ability to drain by a surface route. The severity of the hydrologic impacts from this isolation would be so great that site functions and values are better served by mitigating the entire wetlands.
Wetland 4-A	Area D (D-2)	3	0.04 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	
Wetland 5	Area D (D-2)	3	0.02 ac. (all of wetland)	Filled from ~16 ft to 30-ft elev.	
Wetland 6	Area D (D-3)	3	0.03 ac. (all of wetland)	Filled from ~22 ft to 29-ft elev.	
Wetland 7	Area D (D-3)	3	3.07 ac. (all of wetland)	Filled from ~16 ft to 29-ft elev.	
Wetland 8	Area D (D-3)	3	1.50 ac. (all of wetland)	Filled from ~16 ft to 29-ft elev.	
Wetland 9	Area D (D-3)	1, 3	2.71 ac. (all of wetland)	The area would be filled from about elevation 16 to 18 ft to elevation 29 ft.	Partially filled by relocated flood protection levee; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.

Resource	Exhibit 1-A Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 10	Area D (D-4)	1, 3, 4	0.91 ac. (portion of wetland)	The area would be filled.	Partially filled by the relocated flood protection levee in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above. A secondary reason is to develop retail/commercial services at a south entrance to the site. If this portion of the wetland were to be retained contrary to Purpose and Need, it would exist within an area 6 to 7 feet bellow finished grade and could not drain through the flood protection levee to the remainder of Wetland 10. The severity of the hydrologic impacts from this isolation would be so great that site functions and values are better served by mitigating the entire wetland impact area.
Johnson Ck.	Area D (D-3)	1	1,346 linear ft. 0.30 ac.	The stream would be relocated	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above. The stream would be relocated south of the new flood protection levee.

Resource	Exhibit 1-A Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Stream J-1	Area D (D-3)	1	875 linear ft. 0.04 ac.	The stream would be placed in a culvert.	The stream would be filled by the relocated flood protection levee in order to have the minimum developable area.
Stream C	Area D (D-3)	1	852 linear ft. 0.10 ac.	The stream would be placed in a culvert.	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.
Stream D	Area D (D-3)	1	1,247 linear ft. 0.21 ac.	The stream would be placed in a culvert.	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.
Wetland 13	Area E	4	0.11 ac. (all of wetland)	The wetland would be filled.	The wetland would be filled to develop retail/commercial services at a south entrance as required by Purpose and Need.

Total wetlands fill: 9.40 ACOE-regulated wetlands fill; 9.43 total wetlands fill (48.79 ac. total wetlands on-site).

Total stream fill: 7,127 linear feet filled; 1.07 acres filled (13,338 linear feet, or 2.03 acres, total streams on-site).

B. Fisheries and Streams

Habitat Protection under the Sensitive Areas Master Plan

This section provides the reasons that Sensitive Area Functions and Values will be increased under the proposal for fish and stream habitat. Net changes in functions and values are summarized in Table 2.

TABLE 2

Fish Habitat Functions and Values
Comparison of Existing versus Proposed Conditions

Habitat Function	Existing Conditions	Proposed Actions
Summer Rearing	Moderate to very low quality based on warm temperatures, low dissolved oxygen, shallow depths, livestock use, and exotic vegetation in Johnson Ditch channel.	Enhanced riparian conditions, addition of woody debris, and livestock absence will result in improved water quality, increased pool frequency, and more diverse habitat. Access to habitat in Johnson Creek will be enhanced by new flood gate.
Winter Rearing	Channelized character of the lower Green River between RM 11 and 32 has resulted in the loss of most winter rearing habitat (Kerwin and Nelson 2000).	Approximately 4.5 acres of new off-channel rearing habitat and 0.34 acres of new tributary habitat will provide rare high quality rearing opportunities in the lower Green River. Johnson Creek will be accessible under most flow conditions.
Winter Refuge	Refuge habitat in the lower Green River is scarce due to levees, silt substrate, limited LWD, and absence of off-channel holding locations. Turbulent, high velocity streamflow is common.	Approximately 4.5 acres of new off-channel rearing habitat will provide new high quality, calm-water refuge location in the lower Green River. Benefits to juvenile Chinook, coho, steelhead, and resident trout.

Habitat Function	Existing Conditions	Proposed Actions
Spawning Habitat	Neither the project site nor the Green River adjacent to the site provide habitat suitable for use by salmon or resident trout for spawning.	No change to spawning habitat quality is proposed or anticipated.
Adult Migration (Upstream) [a]	On-site channels not currently used by adult salmon to migrate upstream. Access to Johnson Ditch blocked by flood gate. Green River diked along entire project site with no off-channel resting habitat available.	Approximately 4.5 acres of new off-channel rearing habitat, 0.34 acres of enhanced mainstem tributary habitat, and new fish-passable flood gate will provide critical resting areas and overall net benefit to adult salmonid migration habitat.
Juvenile Migration (Downstream) [b]	Only Johnson Ditch might currently be used by juvenile salmonids during outmigration. Habitat in the ditch is poor and access is normally blocked by flood gate. Green River diked along entire project site with no off-channel holding or refuge habitat available.	Approximately 4.5 acres of new off-channel rearing habitat, 0.34 acres of enhanced mainstem tributary habitat, and new fish-passable flood gate will provide critical areas for juvenile salmonids to smoltify on migration to estuary. Habitat meets critical need identified in Salmonid Limiting Factor Analysis.

[a] Upstream migrants are adult salmon returning to spawn.

[b] Downstream migrants are juvenile salmonids heading to saltwater to rear.

Source: Cedarock Consultants, Inc. April 2005. Fisheries Mitigation Plan, Tukwila South Project (Exhibit 2).

Five specific fisheries-related development actions are proposed under the Sensitive Areas Master Plan conditions, excluding those actions related to mitigation. These are the following:

1. Complete fill of ditched streams C and D, and ditch J-1 to create buildable land;
2. Fill of approximately 0.5 miles of ditched stream E to realign and construct Southcenter Parkway;
3. Proposed buffer widths less than TMC 18.45.100 requirements on part of the remaining stream E channel;
4. Partial fill of Johnson Ditch to create buildable land; and

5. Proposed buffer widths less than TMC 18.45.100 requirements on portions of the restored and relocated Johnson Creek.

In addition, the applicant proposes extensive measures under the Sensitive Areas Master Plan designed to mitigate the impacts of the actions described above. The proposed mitigation is not entirely consistent with the standard TMC SAO, though the benefits to fisheries clearly exceed TMC SAO standards. A discussion of the proposed Master Plan and its differences from standard TMC SAO requirements is provided below for each affected resource.

Ditched Streams C and D, and Ditch J-1
Ditched streams C and D and ditch J-1 are manmade agricultural watercourses regulated as Type 2 streams with presumed fish use that will be filled in their entirety. TMC Sections 18.45.070 and 18.45.110 describe allowed uses of watercourses in Tukwila. These sections allow filling of watercourses under certain circumstances such as access road crossings (TMC 18.45.070.B.2), utilities (TMC 18.45.070.B.6), and as part of a stream restoration project (TMC 18.45.110.B.3). The proposed Master Plan differs from standard TMC SAO provisions in filling of sensitive areas to provide buildable land. This is not allowed under standard TMC SAO provisions.

The applicant proposes to mitigate the loss of 0.35 acres of manmade drainage ditch by creating new off-channel salmonid rearing habitat in the Green River Off-Channel Habitat Restoration Area at a mitigation ratio of at least 4:1. The plan will meet all conditions required under TMC 18.45.110.E. The mitigation site is located on-site in the same drainage basin and within 0.5 miles of the impacted watercourses. Under all functional evaluation criteria, the proposed mitigation site will provide superior salmonid habitat conditions relative to existing conditions.

Ditch E
Ditch E is a manmade agricultural Type 2 watercourse with presumed fish use that will be placed in a culvert for 82 percent of its length on the project site (approximately 0.5 miles or 0.42 acres). The remaining portion will have a variable buffer width in a crescent shaped area ranging between 0 and 80 feet along the east side of the channel where it will be adjacent to the Southcenter Parkway (see Figure 3.2-3 in the DEIS). The forested buffer along the west side will extend up the valley slope for between 300 and 500 feet to the western property line. The proposed Master Plan differs from standard TMC provisions in filling of sensitive areas for a road alignment other than an access crossing and

by providing less than standard buffers along the east side of the remaining stream channel.

The applicant proposes to mitigate the loss of 0.42 acres of manmade drainage Ditch E by creating new off-channel salmonid rearing habitat in the Green River Off-Channel Habitat Restoration Area at a mitigation ratio of at least 4:1.[6] The buffer along the east side of the remaining portion of Stream E will be crescent shaped between the stream and Southcenter Parkway, ranging from zero feet in width at each end and up to 80 feet in the central portion of the crescent. In this area, the buffer will be enhanced by replacing the mowed field grasses with native species designed to enhance riparian productivity and improve shading.

Together with mitigation proposed for Streams C, D, and J-1, the mitigation area will contain 4.5 acres of new open water aquatic habitat and 2.6 acres of riparian buffer. Under all evaluation criteria, the proposed mitigation site will provide superior salmonid habitat conditions relative to existing conditions.

Johnson Ditch/Creek

The existing Johnson Ditch is a manmade agricultural Type 2 ditch with known fish use. The existing buffer consists of a 10- to 20-foot-wide strip of maintained willow, mowed roadside buffer, and exotic vegetation along each bank abutted by agricultural fields. The applicant proposes to realign 82 percent of the channel length on the project site to create buildable area. No development is proposed adjacent to the remaining portion of the channel and its existing buffer will be protected as required under standard TMC SAO provisions, but remain in its current condition. Johnson Ditch on the north side of South 204th Street between J-1 Ditch and the west hill (and further upstream) will not be affected in any way by the Project, either in terms of impact or restoration.

The proposed Master Plan differs from standard TMC SAO provisions in the relocation of Johnson Ditch and its restoration, in order to provide buildable land. The applicant has proposed to mitigate the loss of 0.30 acres of Johnson Ditch and its buffer by creating approximately 0.34 acres of new salmonid rearing habitat in a relocated Johnson Creek, providing a buffer adjacent to Johnson Creek ranging from 30 to 100 feet in width, and creating 0.99 acres of new off-channel habitat as part of the total 4.5 acre Green River Off-channel

[6] Approximately 1.2 acres of area below the ordinary high water mark of the Green River will qualify as wetland creation and is being credited as mitigation for wetland impacts in addition to qualifying as fish habitat mitigation. Wetlands adjacent to instream habitat provide excellent juvenile fish rearing and refuge habitat. For accounting purposes, if these created wetlands are removed from fish habitat credit, the overall fish habitat mitigation ratio is approximately 3.4:1.

Habitat Restoration Area.[7] This would mitigate at a ratio of at least 4:1. Aquatic habitat will be designed to maximize summer and winter rearing conditions for salmonids. Upstream fish passage from the Green River into Johnson Creek will be improved with a new larger diameter and shorter culvert under the levee, a lower outfall elevation, and a fish-friendly flood gate (normally open except at high Green River flow, instead of normally closed except when Johnson Creek flow pressure is greater than Green River flow pressure). The new buffer will be planted with native shrubs and trees designed to enhance riparian productivity and improve shading. Under all evaluation criteria, the proposed mitigation site will provide superior salmonid habitat conditions relative to existing conditions.

For details on the conceptual mitigation plans for the Green River Off-Channel Habitat Restoration Area and the Johnson Creek Restoration, please refer to Cedarock Consultants, Inc. April 2005 Fisheries Mitigation Plan, Tukwila South Project (Exhibit 2). Construction timing and monitoring under these plans are described in Section VII and in Exhibit 2.

Conceptual Action Under Standard TMC Code Provisions

This section describes how watercourses within the project area might have looked were the project to have been designed and mitigated under standard TMC SAO provisions, as required under TMC 18.45.160.H. Differences between the standard TMC SAO and the proposed Master Plan are highlighted and the net habitat benefits of the proposed Master Plan are discussed relative to standard requirements. The conceptual design is based on conservative assumptions of functions and values necessary to meet all applicable permitting requirements in addition to those listed under the TMC. Design differences and assumptions are included in the discussion of each feature.

The conceptual project design under standard TMC SAO application would be the same as the No Action Alternative in the Tukwila South Project DEIS. This alternative is a scenario consisting of approximately 2 million square feet of new light industrial and retail land uses, no relocation of the existing flood barrier protection dike, and limited changes to existing wetland and ditch/stream conditions. The extension of Southcenter Parkway would probably occur in an alignment designed to avoid Stream E with the exception of 327 feet (0.05 acres) of the ditch near the northern property boundary. The Stream E channel would probably be realigned and enhanced to provide an equal amount of stream

[7] Mitigation for stream impacts is allocated to the Green River and Johnson Creek mitigation areas in acres for each impacted stream (Johnson Ditch, D, E, and J1), as described in Table 13 in the Appendix E to the Draft EIS.

channel to the ditch that filled. It is assumed that the existing Segale Business Park and certain other existing uses would remain, and other portions of the site would be preserved from development (areas south of the existing flood barrier protection dike, wetlands, streams, and slopes over 40 percent). None of the other watercourses on the site would be impacted. Neither the Green River Off-channel Fish Habitat Restoration Area, nor the Johnson Creek realignment, restoration, and improved fish access, would be created.

Impacts and Likely Mitigation under Standard TMC SAO - Streams C, D, E, and J-1
Under standard TMC SAO code provisions streams have to be protected except as necessary for road, utility, or trail crossings and other exceptions described in TMC 18.45.070.B. It is reasonable to assume that under standard requirements these watercourses, any adjacent wetlands, and buffers meeting TMC SAO code widths, would be protected and set aside in their existing condition.

As the area around streams C and D and ditch J-1 is currently used for agricultural purposes, continued use of the watercourses and adjacent fields for these purposes is assumed. Periodic ditch cleaning would continue to occur by King County Drainage District #2.

Construction of the Southcenter Parkway extension to S. 200th Street would require filling of 327 linear feet of ditched stream E. It is reasonable to assume that impacts to the stream and buffer would be mitigated by realignment of the stream channel to an area adjacent to the Parkway. New stream channel would likely be constructed at a 1:1 ratio. Instream structure would likely be created to provide similar or better aquatic habitat than what currently exists. A riparian buffer along both sides of the channel would be set aside and planted as required under the TMC SAO. The Green River Off-channel Fish Habitat Restoration Area would not be created under this scenario.

Future Habitat Comparison for Streams C, D, E, and J-1 - Standard TMC SAO vs. Master Plan Proposal
Under standard TMC SAO requirements, the existing low quality functions and values of ditched streams C, D and ditch J-1 would be maintained as is. A portion of ditched stream E would be filled for the Southcenter Parkway improvements, and likely replaced by an improved channel of equal length. The watercourses could be periodically used by fish, but access would be limited by a flood gate at the Green River and the stormwater system downstream of Stream E.

Under the proposed Sensitive Area Master Plan all of ditched streams C and D and ditch J-1, and portions of ditched stream E, will be filled and mitigated by creation of fish habitat in the Green River. The proposed Green River Off-channel Fish Habitat Restoration Area conceptual plan was developed pursuant to regional salmonid habitat needs identified in the Green/Duwamish River Ecosystem Restoration Study. The study built on findings and recommendations provided in the Salmon and Steelhead Habitat Limiting Factors Analysis for the Cedar River (WRIA 9)[8]. One of the key recommendations identified during the study provided the basis for the proposed mitigation:

> *Fish passage and habitat values along the leveed portion of the Green River (between Auburn and Tukwila) should be improved consistent with flood protection goals in this reach. A program to revegetate and add woody debris in this reach is recommended in this study.*

The Green River Off-Channel Habitat Restoration project will create a 7-acre area designed to provide summer rearing, winter refuge, and upstream migrant holding habitats. The upland area will be planted and large woody debris added to enhance habitat values. A conceptual plan was discussed with biologists from the Army Corps of Engineers, Muckleshoot Tribe, and Washington Department of Fish and Wildlife. Comments were incorporated into the conceptual plan.

While an action designed to be consistent with standard TMC SAO requirements would protect salmonid habitat in its existing condition, this manmade habitat is of very poor quality and rarely used by fish. The Green River Off-Channel Fish Habitat Restoration Area that will be created under Sensitive Areas Master Plan provisions will provide habitat superior in (1) quantity and quality, (2) fish access, and (3) type needed in the Green River basin.

Impacts and Likely Mitigation under Standard TMC SAO - Johnson Ditch

Under standard TMC SAO code requirements, it is reasonable to assume that Johnson Ditch would be protected in its existing ditched condition. Continuation of the existing stream buffer conditions and use of adjacent fields for agricultural use is assumed. Periodic ditch cleaning by King County Drainage District #2 would continue to occur. As no development would occur near Johnson Ditch, no mitigation would be provided. The fish-passable flood gate would not be installed at the Green River confluence under this scenario.

[8] Kerwin, J. and T.S. Nelson. (Eds.). 2000. Habitat limiting factors and reconnaissance assessment report, Green/Duwamish and Central Puget Sound watersheds (WRIA 9 and Vashon Island). Washington Conservation Commission and the King County Department of Natural Resources.

Future Habitat Comparison for Johnson Ditch - Standard TMC SAO vs. Master Plan Proposal

Under standard TMC SAO requirements, the existing low quality functions and values of Johnson Ditch would be maintained as is. The ditch would be periodically used by fish, but access would be limited by the flood gate at the Green River. Interest in improving habitat quality in the ditch has been expressed by the WRIA 9 committee and it is possible some future civic-sponsored enhancement could occur even under a standard TMC SAO proposal. Any enhancement would not be related to the proposed development.

The Johnson Creek restoration plan proposed under the Master Plan will provide significant fish habitat benefits. The design was developed pursuant to regional salmonid habitat needs identified in the Green/Duwamish River Ecosystem Restoration Study. One of the key recommendations identified during the study provided the basis for the proposed mitigation:

> *Productive tributaries…should be protected through acquisition and land use regulations, and disturbed habitats along these tributaries should be restored for salmon spawning and rearing and other fish and wildlife use.*

As proposed, the mitigation project will create a meandering stream channel designed to provide summer rearing and winter refuge habitats. The riparian area will be planted and large woody debris added to enhance habitat values. A fish-passable flood gate will be installed at the confluence to the Green River to allow fish uninterrupted migration potential into the tributary, except during very high storm flows. A conceptual plan was discussed with biologists from the Army Corps of Engineers, Muckleshoot Tribe, and Washington Department of Fish and Wildlife. Comments were incorporated into the conceptual plan. Stream buffers are described in the Wetland and Stream Buffer Plan, Appendix B to the Final EIS.

Fisheries Summary

Under the standard TMC SAO requirements the area south of South 200th Street would remain as agricultural fields. Johnson Ditch salmonid habitat would continue in its existing condition. This manmade habitat is of very poor quality and rarely used by fish. The new stream channel that will be created under the Master Plan proposal will provide habitat superior in quantity and quality and in fish access. Under the Sensitive Area Master Plan, stream habitat functions and values will be significantly increased. Together, the Green River Off-Channel Habitat Restoration Area and Johnson Creek realignment under the Master Plan proposal will provide over four times the area of habitat lost during

development and will provide habitat superior in quantity and quality, and in fish access to that proposed for fill. The proposed 4:1 mitigation ratio is more than any mitigation ratio required by local, state, or federal code.

C. Wetlands

Habitat Protection under the Sensitive Areas Master Plan

This section provides the reasons that Sensitive Area Functions and Values will be increased under the proposal for wetlands. Net changes in functions and values are summarized in Table 3 below.

The following wetlands-related development actions are proposed under the Sensitive Areas Master Plan conditions, excluding actions related to mitigation:

1. Fill 0.90 acres of the 16.38-acre Type 1 Wetland 10 to create buildable land;
2. Proposed buffer widths less than TMC 18.45.080 requirements on portions of the retained Wetland 10.
3. Fill 0.18 acres of the 2.11-acre Type 2 Wetland 1 to establish the new Southcenter Parkway;
4. Proposed buffer widths less than TMC 18.45.080 requirements on part of the retained portions of Wetland 1;
5. Fill the entire 3.07 acres of the Type 2 Wetland 7 to create buildable land;
6. Fill the entire 1.5 acres of the Type 2 Wetland 8 to build the flood protection dike and stormwater ponds;
7. Fill the entire 2.71 acres of the Type 2 Wetland 9 to build the flood protection dike and stormwater ponds;
8. Fill the entire 0.11 acres of the Type 2 wetland 13 to create buildable land;
9. Excavate the entire 0.65 acres of the Type 2 Wetland 16 to establish new stormwater ponds.
10. Fill the entire 0.03 acres of Type 3 Wetland 3 to create buildable land;
11. Fill the entire 0.04 acres of Type 3 Wetland 4A to create buildable land; and
12. Fill the entire 0.03 acres of Type 3 Wetland 6 to create buildable land;

Extensive measures are included under the Sensitive Areas Master Plan designed to mitigate the impacts of these actions. The proposed mitigation is not entirely consistent with the standard TMC SAO, though the benefits to wetland resources clearly exceed TMC standards.

The proposal meets the mitigation sequencing criteria of TMC 18.45.090.C by avoiding impacts to 80% (39.3 acres) of existing wetland site. The proposal further minimizes wetland impacts by placing proposed development away from the higher quality wetlands on the site and affecting only the wetland area necessary to meet the project's purpose and need (see Section V.A.). The

proposal mitigates for unavoidable wetland impacts by providing replacement wetland functions on-site in a ratio that exceeds the TMC requirements and by proposing to rehabilitate, enhance, and create wetlands (see Exhibit 3). The proposed mitigation location meets TMC 18.45.090.E requirements by being on-site, in the same Green River watershed as the wetland loss, and where existing degraded wetland and other disturbed upland occurs. The intent of the mitigation is to compensate for all impacts to wetland functions and values, including those caused indirectly by reductions in buffers below standard city requirements.

The overall goal of the compensatory mitigation is to create, restore, and rehabilitate wetland habitat in the southwestern portion of the Tukwila South property. To accomplish this, 32.43 acres of existing degraded agricultural wetlands (all of the onsite portion of Wetland 11 and the retained, degraded portions of Wetland 10) will be graded, as appropriate, to establish different hydrologic regimes than are currently found on the site. Existing non-native, invasive plant species (i.e., reed canarygrass) will be mowed, baled and removed from the site. Excavation, grading, and shaping of the mitigation site will be conducted to establish a permanently ponded hydrologic regime in the lower portions of the mitigation site. Soil excavated to form the lower troughs will be mounded at other locations in the mitigation area in order to create suitable planting locations for wetland plant species that do not require prolonged ponding. A discussion of the proposed Development Scenarios and their discrepancies with standard TMC SAO requirements is provided for each wetland below.

Wetland 10

Wetland 10 is a City of Tukwila Type 1 wetland that will be partially filled in order to construct the new flood protection dike and establish buildable land on the S. 200th Street frontage. TMC Sections 18.45.070 and 18.45.090 indicate allowed uses of wetlands in Tukwila. These sections allow filling of wetlands under certain circumstances such as access roads (TMC 18.45.070.B.2), utilities (TMC 18.45.070.B.6), and as part of a habitat mitigation plan (TMC 18.45.070.F.9[3]). The proposed Master Plan differs from standard TMC SAO provisions in filling of sensitive areas to provide buildable land which is not allowed under standard TMC SAO provisions. The retained portion of Wetland 10 will have a variable buffer width of between 0 and 100 feet along the north and east sides based on its distance from the proposed flood protection dike and stormwater ponds (see discussion below, under "Wetland Buffers").

Wetlands 1, 7, 8, 9, 13, 16

Wetland 1 is a City of Tukwila Type 2 wetland. Type 2 wetlands generally require an 80-foot-wide buffer under Title 18.[9] Approximately 0.18 acres of this 2.11 acre wetland and portions of its buffer will be filled in order to construct the new Southcenter Parkway along the east side of the wetland, and an additional 0.08 acres of this wetland will be impacted by road construction for a total of 0.26 acres of impact to Wetland 1. The retained portion of Wetland 1 will have a variable buffer width of between 0 and 80 feet along the east side based on its distance from the Southcenter Parkway alignment. The buffer along the west side will extend up the valley wall for between 300 and 500 feet to the property line. The proposed Master Plan differs from standard TMC SAO provisions in filling of sensitive areas for a road alignment and by providing less than standard buffers along the east side of the remaining wetland. It is possible the Director could grant variation to the standard buffer width of Wetland 1 of up to 50% , but not less in some areas as is proposed under the Master Plan.

Wetland 7 is an agricultural wetland located south of S. 200th Street. Wetland 7 is a City of Tukwila Type 2 wetland because it is hydrologically connected to a Type 2 stream. The proposal is to fill the entire 3.07 acres of Wetland 7 in order to achieve necessary site grades for the proposed site construction. The proposed Development Scenarios differ from standard TMC SAO provisions because filling of greater than 0.10 acres of Type 2 wetland to provide buildable land is not allowed.

Wetland 8 is an agricultural wetland located south of S. 200th Street. Wetland 8 is a City of Tukwila Type 2 wetland because it is hydrologically connected to a Type 2 stream. The proposal is to fill the entire 1.5 acres of Wetland 8 in order to construct the new flood protection dike and establish the new stormwater ponds. The proposed Development Scenarios differ from standard TMC SAO provisions because filling of greater than 0.10 acres of Type 2 wetlands is not allowed.

Wetland 9 is an agricultural wetland located south of S. 200th Street. Wetland 9 is a City of Tukwila Type 2 wetland because it is hydrologically connected to a Type 2 stream. The proposal is to fill the entire 2.71 acres of Wetland 9 in order to construct the new flood protection dike and establish the new stormwater ponds. The proposed Development Scenarios differ from standard TMC SAO provisions because filling of greater than 0.10 acres of Type 2 wetlands is not allowed.

[9] Under TMC 18.45.080.G.1 the Director may reduce the standard Type 2 80-foot wetland buffer by up to 50% if it contains no slopes 15% or greater.

Wetland 13 is a depressional wetland located north of S. 200th Street in the western portion of the site. Wetland 13 is a City of Tukwila Type 2 wetland because it is hydrologically connected to a Type 2 stream and does not meet the criteria for a Type 1 wetland. The proposal is to fill the entire 0.11 acres of Wetland 13 in order to achieve necessary site grades for the proposed site construction. The proposed Master Plan differs from standard TMC SAO provisions because filling of greater than 0.10 acres of Type 2 wetland to provide buildable land is not allowed.

Wetland 16 is a forested wetland located in the northern portion of the site, west of Frager Road. Wetland 16 is a City of Tukwila Type 2 wetland because it is hydrologically connected to a Type 2 stream and does not meet the criteria for a Type 1 wetland. The proposal is to excavate the entire 0.65 acres of Wetland 16 in order to construct a new stormwater pond. The proposed Master Plan differs from standard TMC SAO provisions because altering greater than 0.10 acres of Type 2 wetlands is not allowed.

Wetland Mitigation Overview (see Exhibit 3)

The applicant proposes to mitigate the loss of wetland functions described above by a combination of on-site compensatory actions. The overall goal of the mitigation plan is to compensate for impacts to 9.45 acres of wetland through enhancement and rehabilitation of previously degraded wetland habitats on the site and through creation of new wetland on the site. Implementation of the mitigation plan will increase habitat diversity, improve wetland habitat functions, and establish contiguous wetlands similar to those that occurred in the Green River Valley prior to agricultural activities and construction of flood control dikes on the river.

The proposed mitigation includes breaking drainage tiles, and wholly plugging drainage ditches where they are contained within the property, or excavating to partially breach a significant off-site drainage ditch (East Fork Johnson Ditch) at the point where it passes into and out of the property. Other actions proposed as part of the wetland compensation include cessation of tilling and mowing, scarification, establishment of native plant communities and removal of invasive species, and removal of grazing (see Exhibit 3).

Compensatory mitigation for the impacts to 9.45 acres of wetlands on the Tukwila South Property includes enhancement, rehabilitation, and/or creation of 35.47 acres of wetland on-site. These actions will provide functional replacement of 12.25 acres of wetland in accordance with the City of Tukwila (2004)

Municipal Code. The specific objectives of the mitigation plan (see Exhibit 3) are the following:

- Enhancement and/or rehabilitation of 32,15 acres of existing on-site wetlands at a ratio of 3:1, resulting in 10.72 acres of compensatory mitigation.
- Creation of 3.05 acres of new wetland at a ratio of 2:1, resulting in 1.53 acres of compensatory mitigation. As proposed, the compensatory wetland mitigation plan provides approximately 2.5 more acres of wetland creation than is required. This wetland creation would be constructed and be reserved as a contingency for unanticipated impacts or the unlikely failure of any portion of the mitigation areas.
- Establishment of 5.24 acres of functional vegetated buffer along the upland edges of the compensatory wetland mitigation areas.

Achieving these goals and objectives will result in no net loss of wetland functions by increasing the biologic and hydrologic functions of the wetlands to greater than current site conditions.

Table 1 in the Wetland Mitigation Plan (Exhibit 3) outlines the proposed mitigation ratios and their application to the Tukwila South project. For impacts to degraded wetlands 2, 3A, 4A, 5, 6, 7, 8, and 9, the proposed mitigation ratios for enhancement and rehabilitation are 50% lower than the standard ratios for each Category, because of the very low risk to rapid and full replacement of impacted wetlands functions and values. The proposed mitigation ratios for creation and all non-degraded wetlands (1, 3, 10, 13, and 16) are equal to the standard guidance by Ecology. As shown in Table 1 in Exhibit 3, the mitigation plan provides over 2.5 acres of wetland creation more than the minimum required to compensate for the proposed impacts. This wetland creation area would be constructed and reserved as a contingency for unanticipated impacts or unlikely failure of any portion of the mitigation area.

In addition to the application of compensatory mitigation ratios reasonable for this project and consistent with 2004 Guidance from the Washington Department of Ecology, a wetland functional assessment was conducted for the project using *Methods for Assessing Wetland Functions Volume I: Riverine and Depressional Wetlands in the Lowlands of Western Washington* (WAFAM; Hruby et al. 1999). A comparison of the anticipated functional scores of the compensatory mitigation area to the functional scores from the wetlands to be altered as a result of the proposed development yielded a net gain in wetland hydrologic and biological functions. Table 3 contains a summary of the functional losses resulting from the

proposed development and the functional replacement provided by the proposed mitigation. A complete description of the wetland functional analysis is contained in the *Draft Environmental Impact Statement for the Tukwila South Project* (City of Tukwila 2005). The updated functional analysis scores are contained in the updated Wetland Mitigation Plan (Table 3 in Exhibit 3).

TABLE 3

Wetland Functions and Values Comparison of Existing versus Proposed Conditions

Wetland Function	Existing Conditions	Proposed Actions[10]
Water Quality Functions		
Potential for Removing Sediment	Moderate to low functional scores due to small size of wetlands, lack of vegetative cover in agricultural wetlands, and depressional outflow hydrogeomorphic (HGM) classification of most wetlands impacted by proposal.	Rehabilitation and enhancement of wetlands will result in vegetated wetlands habitats providing greater opportunity to remove sediments.
Potential for Removing Nutrients	Moderate to low functional scores due to small size of wetlands, lack of vegetative cover in agricultural wetlands and depressional outflow HGM classification of wetlands to be effected by the development.	Rehabilitation and enhancement of wetlands will result in vegetated wetland habitats better suited to uptake and remove nutrients from water column. Increased residence time in long duration hydroperiod wetlands results in greater opportunity to remove nutrients.
Potential for Removing Heavy Metals and Toxic Organics	Moderate functional scores due to wetland locations in agricultural fields and nearby industrial activity.	Rehabilitation and enhancement of wetlands will result in near duplication of WAFAM acre-point scores. Discontinuation of agricultural and industrial activities on project site will eliminate existing untreated pollutant sources. DEIS concluded net project plus wetland alterations impact on water quality will be neutral to beneficial (DEIS Appendix C, Attachment A – *Wetland Water Quality Function and Impact Assessment*)
Hydrologic Functions		
Potential for Reducing Peak Flows	Moderate to low functional scores due to small size and depressional outflow HGM of most wetlands impacted.	Rehabilitation and enhancement of wetlands will result in longer duration hydroperiod within mitigation wetlands. Increased woody vegetation will slow water, reducing peak flows
Potential for Reducing/Decreasing Downstream Erosion	Moderate to low functional scores due to small wetland size and depressional outflow HGM of most wetlands affected by development.	Rehabilitation and enhancement will establish semi-permanently flooded hydrologic regimes, increasing the ability of wetlands to slow water velocities.

[10] WAFAM scores for depressional and riverine HGM classes are shown in Exhibit 3, Table 3.

Wetland Function	Existing Conditions	Proposed Actions[10]
Potential for Groundwater Recharge	Moderate to low functional scores due to depressional outflow HGM of most wetlands and lack of long duration hydroperiod.	Most impacted wetlands are rated low or moderate for this function, and overall, wetlands located on the bluff between the Green River valley and I-5 appear to be sites of seasonal or perennial groundwater discharge. Cropped wetlands in the Green River Valley may seasonally contribute recharge to the shallow groundwater table; but the dynamics of groundwater on the site are largely controlled by the Green River and its periodic flooding. Mitigation at Wetlands 10, Wetland 11, adjacent to Johnson Creek and adjacent to the Green River will provide replacement functions in proportion to estimated project impacts.
Biologic Functions		
General Habitat Suitability	Low functional scores due to small size, agricultural use, lack of connectivity to other habitats, and lack of vegetation in most wetlands proposed to be altered.	Rehabilitation and enhancement will result in increased habitat through establishment of different vegetation strata, longer duration hydroperiods.
Habitat suitability for Invertebrates	Low functional scores due to agricultural practices and lack of vegetation in wetlands to be effected by development.	Rehabilitation and enhancement will result in contiguous vegetated wetland habitats.
Habitat suitability for Amphibians	Low functional scores due to agricultural practices, short duration hydroperiod, and lack of vegetation in wetlands to be altered.	Rehabilitation and enhancement will result in contiguous vegetated wetland habitats with long duration hydroperiods.
Habitat suitability for Anadromous Fish	Low functional scores due to lack of connectivity to fish bearing waters for many wetlands proposed to be affected.	Rehabilitation and enhancement will result in improved flow to fish bearing waters. Increased vegetation diversity will improve food sources for fish
Habitat suitability for Resident Fish	Low functional scores due to lack of connectivity to fish bearing waters for many wetlands proposed to be affected.	Rehabilitation and enhancement will result in improved flow to fish bearing waters. Increased vegetation diversity will improve food sources for fish
Habitat suitability for Wetland Associated Birds	Moderate to low functional scores due to lack of vegetation in agricultural wetlands. Flooded agricultural fields do provide wintering waterfowl habitat.	Rehabilitation and enhancement will increase vegetation structure, provide greater nesting and forage opportunities for passerines. Longer duration hydroperiod portions of mitigation area provide some waterfowl habitat.

Wetland Function	Existing Conditions	Proposed Actions[10]
Habitat suitability for Wetland Associated Mammals	Moderate to low functional scores due to small wetland size. Agricultural fields do provide forage habitat for small mammals.	All filled wetlands provide relatively low habitat functions to wetland-associated mammals. They lack the surface water and vegetation conditions that these animal species require. The wetland mitigation actions will establish native vegetation in areas of perennially flowing and seasonally standing water. The new features will provide habitat benefits to beaver, muskrat, and river otter above levels provided in the filled wetland. The functional assessment indicates that the mitigation actions in the depression wetlands (Wetland 10 and Wetland 11) would not compensate for the project impact, but in combination with the riverine creation functional replacement is likely. Professional experience suggests that the increased access of wetland dependent mammals to the mitigation sites through the new seasonal and perennially flooded aquatic habitats, and the improved vegetation communities will result in improved habitat conditions for these species.
Native Plant Richness	Low functional scores due to agricultural practices.	Rehabilitation and enhancement will provide a diverse native plant community.
Primary Production and Export	Moderate functional scores due to depressional outflow HGM of wetlands to be altered.	Replacement of herbaceous vegetative cover in wetlands with woody vegetation will reduce this function in depressional wetlands, but riverine wetland creation will offset this loss.

The mitigation plan in Exhibit 3 presents the design features and their locations, monitoring plan outline, evaluation criteria and performance standards, and a discussion of contingency plans intended to meet the stated goals and objectives. The proposed plantings are designed to simulate native Pacific Northwest plant communities and provide enhanced function in the enhanced, rehabilitated, and created wetlands.

Wetland Rehabilitation

The wetland mitigation plan will remove reed canarygrass and expand the area of scrub-shrub and forested wetland vegetation on the site. Grading of the existing degraded wetlands will alter the hydrologic regime in portions of the mitigation area by varying elevation within a relatively low range (less than 2

feet). Hydrology will be rehabilitated in most of Wetlands 10 and 11 by breaking all drainage tiles and by either plugging and dispersing drainage ditch water through the rehabilitated wetland areas, or excavation into a (largely) offsite drainage ditch at the point where it enters the property to allow drainage flow to disperse through a rehabilitated wetland area. These activities, in combination with soil scarification, cessation of mowing, removal of invasive species, removal of grazing, establishment of native plant communities, and monitoring to prevent invasive re-establishment and ensure native plant success, are proposed to establish wetland plant communities and habitat functions and values that do not currently occur on the site.

Excavation to allow the East Fork of Johnson Ditch to flow into the wetland rehabilitation area will restore hydrology to large portions of the mitigation area previously altered by ditching and tilling of the agricultural field. A natural flow regime will be restored to Wetland 11 by breaching a portion of the west bank of East Fork Johnson Ditch. The establishment of natural flows and establishment of a native plant community is anticipated to rehabilitate 21.7 acres of Wetland 11.

Water that currently flows from Wetland 13, north of S. 200th Street will be routed to the northern portion of the wetland rehabilitation area to restore hydrologic regimes in the wetlands and restore previously affected flow paths. Two linear drainage ditches in the northern portion of the wetland rehabilitation area that now drain Wetland 10 will be blocked and dispersed through the rehabilitated wetland. A drainage ditch conveying flow around Wetland 10 will be plugged and dispersed into the eastern portion of Wetland 10. Drainage tiles will be broken in Wetland 10. These activities are anticipated to rehabilitate the eastern and southern 6.1 acres of Wetland 10.

Wetland Enhancement

Wetland enhancement will involve excavation and grading, removal of invasive species, breaking drainage tiles, and establishment of native plant communities in areas within Wetlands 10 and 11 that are degraded by invasive plants, mowing, and livestock grazing. The portion of Wetland 10 with forested scrub-shrub native plant community characteristics and the small stream J-2 will be retained within the compensatory mitigation plan, but invasive plant species will be removed, and native plant communities will be re-established.

Wetland Creation

Wetland creation will involve excavation and grading of three existing upland areas in order to establish elevations that will support wetland hydrology. The three areas of wetland creation are: (1) conversion of upland to wetland within

the northwest portion of Wetland 10; (2) creation of wetland along the Green River within an Off-Channel Habitat Restoration Area by relocation of the Green River levee and excavation on the river side of the relocated levee; and (3) creation of wetland associated with a restored Johnson Creek channel, a tributary to the Green River which conveys drainage from the Wetland 10 and 11 compensatory mitigation areas to the Green River. The newly graded areas will be planted with species adapted to the hydrologic regimes determined by measurements from: (1) shallow groundwater monitoring wells since October 2003, for the purposes of wetland creation adjacent to the new Johnson Creek channel, and wetland rehabilitation, enhancement, and creation in Wetlands 10 and 11; and (2) Green River stage height flow duration data for wetland creation adjacent to the Green River.

All wetland mitigation areas will, at a minimum, have wetland hydrology within the majority of the root zone (saturation within 12 inches of the ground surface) for at least 12.5% of the growing season. The applicant proposes to mitigate the loss of the above wetlands and their buffers by rehabilitating, restoring, enhancing and, creating 32.43 acres of wetland in the southernmost portion of the site (onsite portion of Wetland 11 and the retained, degraded portions of Wetland 10). In addition, the reduced buffer width along the east side of the unaffected portion of Wetland 1 will be mitigated by planting the remaining buffer (currently mowed field grasses) with native species designed to enhance riparian productivity and improve shading. The reduced buffer width along the northern and eastern sides of the retained and restored portions of Wetland 10 also will be mitigated by planting the remaining buffer and dike with native plant species intended to improve buffer functions and to provide screening of the mitigation area from development areas. Planting on the flood barrier protection dike will conform to Army Corps of Engineer requirements to prevent root extension into the functional levee structure. Under all evaluation criteria, the proposed mitigation under the Master Plan will provide greater wetland function than both the existing conditions and mitigation developed under standard TMC SAO requirements.

No Net Loss of Wetland Functions and Values

There will be a net gain in wetland functions and values on the site. Wetland functions and values for the 19 delineated on-site wetlands were assessed by Raedeke Associates, Inc. in Appendix F to the DEIS. Table 3 summarizes the existing wetland functions that will be lost as a result of filling and or buffer impacts that will occur as a result of the Tukwila South Project. The lost functions are compared to functions that will be gained by rehabilitated, enhanced, and created wetlands proposed by the project in Table 3 above, which

demonstrates a net gain in wetland functions and values. Specific details on the mitigation ratios for each type of compensatory mitigation proposed are included in Table 1 of Exhibit 3, the Wetland Mitigation Plan.

Wetland Buffers

Details of the proposed buffer protection for wetlands and streams is provided in the Wetland and Stream Buffer Plan, Appendix B to the Final EIS. Vegetated buffers will be provided along the margins of the enhanced, rehabilitated, and created wetlands where they abut uplands. The slopes of the new flood protection levee (north and east of Wetland 10, north of Johnson Creek, and south and west of the Green River Off-channel habitat area) will be planted with low shrubs and small trees in order to provide screening and intrusion prevention functions. The southern border of the Johnson Creek mitigation area will be planted with deciduous and coniferous trees to provide shading and screening functions to the creek and riparian wetland habitat. Additional buffering function will be provided to the Johnson Creek and Wetland 10 mitigation areas by the presence of the stormwater ponds along their northern and eastern boundaries. These stormwater ponds will provide additional intrusion prevention and screening to the mitigation areas by separating them from the development area by over 300-feet. The Green River Off-channel habitat mitigation area also will be functionally buffered by development restrictions within the shoreline management zone of the Green River.

Where the compensatory mitigation wetlands abut existing wetland (i.e., the western edge of Wetland 10, the southern, eastern, and western perimeter of Wetland 11) no additional buffer is proposed. Where Wetlands 10 and 11 abut the existing S. 204th Street, no additional buffer is proposed. Existing farmed wetland extends south, east and west from Wetland 11 for several hundred feet. Compensatory mitigation in Wetland 11 will be protected by development restrictions and buffer requirements for the Class 1 wetland that extends offsite in City of Kent jurisdiction. The existing buffer along the western edge of Wetland 10 is comprised of 50- to greater than 100-feet of forested hillside extending westerly to Orillia Road. The western buffer of Wetland 10 will be protected by development restrictions and buffer requirements for Class 1 wetlands in the City of Tukwila. The existing buffers for these wetlands will be retained in their current condition.

Conceptual Action Under Standard TMC SAO Code Provisions

This section describes how wetlands within the project area might have looked were the project to have been designed and mitigated under standard TMC

requirements, as required under TMC 18.45.160.H. Differences from the proposed Master Plan are highlighted and the net wetland habitat benefits of the proposed Master Plan are discussed relative to the standard TMC SAO requirements. The conceptual design is based on conservative assumptions of functions and values necessary to meet all applicable permitting requirements in addition to those listed under the TMC. Design differences and assumptions are included in the discussion of each feature.

Wetland 10

Under standard TMC SAO provisions this wetland would have to be protected except as necessary for road, utility, or trail crossings and other exceptions described in TMC 18.45.070. One exception would be placement of the flood barrier protection dike through wetland 10, which would be allowed under standard TMC SAO as an essential utility (see Section VI.A.1.a). As such, it is reasonable to assume that under standard TMC SAO requirements this wetland would be protected and the area set aside in its existing condition, since there would be no reason to relocate the flood barrier protection dike under the No Action Alternative. As the area is currently used for agricultural purposes, continued use for these purposes is assumed. The Compensatory Wetland Mitigation Area would not be created under this scenario. Wetland buffers would be maintained in their current state of cleared gravel parking pads and mowed, non-native pasture grasses. No buffer enhancement would occur under the standard TMC SAO provisions.

As proposed, mitigation under the Master Plan will rehabilitate, restore, enhance and create a 32.43-acre habitat area designed to provide greater wetland functions than those lost as a result of the proposed development. The conceptual plan was discussed with biologists from the Army Corps of Engineers, The Washington Department of Ecology, and Washington Department of Fish and Wildlife. Comments were generally supportive of the mitigation concept.

While an action designed to be consistent with standard TMC SAO requirements would protect existing wetland habitat, this habitat is of very poor quality and is used to graze livestock. The Compensatory Wetland Mitigation Area that will be created under Sensitive Areas Master Plan provisions will provide functionally better habitat.

Wetlands 1, 7, 8, 9, 13, and 16

Under standard TMC SAO provisions these wetlands would have to be protected except as necessary for road, utility, or trail crossings and other

exceptions described in TMC 18.45.070. As such, it is reasonable to assume that under standard TMC SAO requirements no more than 0.10 acre of each of these wetlands would be altered. The majority of each these wetlands would be retained in its existing condition.

Wetland habitat in the Type 2 wetlands would be retained under standard TMC SAO requirements and overall wetland function in the region would be limited to providing some resting and feeding habitat for migratory waterfowl. The wetlands currently used for agricultural production would continue to be used for farming.

As described above, the proposed Compensatory Wetland Mitigation Area has been designed to improve wetland functions in the lower Green River valley. Under the Sensitive Areas Master Plan, wetland functions will be improved above and beyond those functions that will be retained by preserving the majority of existing Type 2 wetland acreage.

D. Determination of Master Plan Consistency with TMC 18.45.160.G

Tukwila uses 7 factors under TMC 18.45.160.G to determine Master Plan consistency. They are the following:

1. Consistency with Natural Environment Elements of the Comprehensive Plan
   Details of consistency with the Comprehensive Plan are contained in Section 3.7, Relationship to Plans and Policies, in the DEIS (see City of Tukwila Comprehensive Plan). The discussion provided here is a brief overview. The Natural Environment Element of the Tukwila Comprehensive Plan calls for protection of the natural environment through minimizing developmental impacts on natural functions and values, protecting the quantity and quality of water resources, and giving special consideration to conservation or protection measures necessary to protect or enhance anadromous fisheries.

   To protect natural stream functions and values, the proposed Master Plan will not impact any natural undisturbed watercourses. Project modifications to watercourses are limited solely to manmade agricultural ditches. The proposed Master Plan will result in significantly better resident and anadromous fish habitat than is currently present or would be present under an action designed under standard TMC SAO requirements.

   To protect natural wetland functions and values, the proposed Master Plan will limit wetland impacts primarily to degraded agricultural sites. Project modifications are mainly to agricultural wetlands. Through avoidance of

natural areas and extensive habitat rehabilitation measures, significantly better wetland habitat than currently exists or would result from standard TMC SAO requirements will result from the Master Plan.

2. Consistency with TMC 18.45.010
   The purpose of the Tukwila SAO under TMC 18.45.010 is to protect the environment, human life, and property; designate and classify ecologically sensitive and hazardous areas and to protect these areas and their functions and values; and allow for reasonable use of public and private property. As prior discussed, actions proposed under the Master Plan provide a net overall benefit to fisheries and wetland habitat, water quality, and hydrology functions and values. Extensive wetland, fisheries, water quality, and hydrologic surveys were conducted to identify and classify sensitive areas so appropriate protection and/or mitigation measures could be applied. Human life and property will be protected by maintaining flood control levees and flood barrier protection dike integrity. The Master Plan allows use of the property consistent with the function and needs of the project while at the same time enhancing regional fisheries and wetland functions and preserving water quality.

3. Inclusion of Mitigation Plans Meeting or Exceeding the Requirements of TMC 18.45.090(D) and/or TMC 18.45.110(D)
   A mitigation plan for the project will be finalized after comments on the DEIS and Technical Reports have been received, and as comments are received from city, federal and state agency review of the various permit applications necessary to the project, most notably but not limited to the Section 404 permit and the Section 401 water quality certification. Conceptual fisheries and wetland mitigation plans are attached as Exhibits 2, and 3, respectively. A description of how the Master Plan meets or exceeds the requirements of TMC 18.45.110(D) is provided above.

4. Net Benefit
   The proposed Master Plan will result in a net benefit to habitat, water quality, and hydrologic functions and values of the streams and wetlands on the site and of the Green River adjacent to the site, with no disturbance to natural (not ditched) watercourses (see Tables 1 and 2 for a summary).

   a. The two major habitat creation elements of the Master Plan, the Green River Off-Channel Habitat Restoration Area and the Johnson Creek Restoration Plan, are expected to provide significantly better habitat than what occurs under the existing condition or would occur under mitigation developed pursuant to standard TMC SAO requirements.

The reasons for this have been previously described, but predominantly relate to creation and restoration of anadromous habitat now recognized by the Green/Duwamish River Ecosystem Restoration Study (WRIA 9) as critically important.

b. The compensatory wetland mitigation element of the Master Plan is expected to provide significantly better habitat than what occurs under the existing condition or would occur under mitigation developed pursuant to standard TMC SAO requirements. Wetland functions and values will increase, except for a reduction in large waterfowl habitat, which will not be mitigated because the mitigation area and much of the site is within the 10,000 foot Federal Aviation Administration wildlife hazard zone around SeaTac airport within which actions encouraging large bird use are prohibited (please refer to the quantitative analysis of wetland functions and values using the Washington State Wetland Functional Assessment Method (WAFAM) in Appendix F of the DEIS).

c. Water quality, an important habitat component, will be protected or improved by (i) protecting and preserving baseflow water quality during conveyance from the western slope to the Green River and (ii) as a result of a net improvement in water quality functions with the wetland mitigation plan (please refer to the quantitative WAFAM assessment for water quality functions described in the Wetland Water Quality Function and Impact Assessment, Attachment A to Appendix C of the DEIS, and updated in Section 1.3 of the Final EIS).

5. Preservation and Enhancement of Anadromous Fisheries

The first mitigation goal is avoidance of impacts where possible. The Master Plan meets this obligation by limiting all proposed impacts to streams and their buffers to those that are manmade agricultural ditches and ditched streams. While some of these streams may receive occasional anadromous fish use, their overall function and value to fish is very low. The current site conditions are, along with conditions in most of the lower Green River basin, limiting to regional anadromous salmonid populations. The ditched streams will be replaced with much higher quality habitat designed pursuant to regional salmonid habitat needs identified in the Green/Duwamish River Ecosystem Restoration Study which built on findings and recommendations provided in the Salmon and Steelhead Habitat Limiting Factors Analysis for the Green River and detailed evaluation of Chinook salmon life histories.

6. On-site Mitigation Proposed
   All mitigation proposed under the Master Plan is within the project boundaries and within the same watershed boundary as the impacts.

7. Mitigation Provided Prior to Impact
   All mitigation is proposed for construction within the first two construction seasons. Due to the magnitude of the work and the need to stabilize and plant the mitigation areas, most work will be done during the first construction season, and final work and connections to the Green River will be completed during the second year of the 25-year project. Most impacts will accrue during the first three years of the project.

In addition to these 7 factors, the director at his discretion may require a proposed Master Plan undergo peer review (18.45.160.G.8).

VI PERMITTED USE CONSISTENCY (TMC 18.45.160.D and .E)

A. Type 1 Wetland and Type 1 Watercourse Use Restrictions under TMC 18.45.070, 18.45.090 and 18.45.110.

1. Under the TMC SAO, Wetland 10 is a Type 1 wetland. There are no Type 1 watercourses within the site boundaries.

   a. Construction of the new flood barrier protection dike will be the primary cause of impact to Wetland 10; essential utilities are a permitted use under 18.45.070.B.6. The flood barrier protection dike is an essential utility; its relocation is required by the Tukwila South Project's purpose and need (please refer to Section 2.2 of the DEIS).
   b. Consistency with 18.45.090 (see VI.B.2 below).

2. New stormwater discharge to the Green River (offsite Type 1 Watercourse)

   a. New stormwater discharges are allowed to Type 1 watercourses under TMC 18.45.070.B.3 provided they meet water quality standards and do not adversely affect watercourse habitat and flow conditions relative to the existing rate. Appendix C to the DEIS contains detailed analysis that confirms water quality standards will be maintained in the Green River. Appendix E to the DEIS contains detailed analysis that confirms Green River habitat and flow conditions will not be adversely affected.
   b. The Type 1 water will be protected as required under TMC 18.45.070.B.6.(b) and (c); new outfall floodgates will be installed by cutting into the levee when the river was at low flow and at an elevation lower

than the outfall construction, so that all work will be out of the water. The cut will be refilled as required for levee integrity and replanted as required by the Army Corps of Engineers. Water quality at the discharge and in the Green River will be protected as determined by analysis in the Tukwila South Project Water Quality Technical Report (A.C. Kindig & Co., November 2004).

B. Type 2 and 3 Wetlands and Type 2-4 Watercourse Restrictions under TMC 18.45.070, 18.45.090 and 18.45.110.

1. TMC 18.45.070 Consistency

   a. Alterations are allowed per TMC 18.45.070.B for construction of new essential streets and roads, rights-of-way and utilities infrastructure, including site grades necessary for gravity sewer and stormwater flow (including grades needed for south storm pond discharge to the Green River at high flow).

2. TMC 18.45.090 Consistency – Wetlands

   a. Alterations to Type 2 and 3 wetlands are the minimum necessary for project feasibility due to infrastructure needs and minimum core project and supporting services and facilities.
   b. A Wetland Mitigation Plan has been prepared for the proposed impacts (See Exhibit C). Proposed buffer enhancements to reduced buffer areas will provide greater wetland protection than application of standard buffer widths alone.
   c. No adverse impact to Water Quality is demonstrated in the Tukwila South Project Water Quality Technical Report (A.C. Kindig & Co., February 2005).
   d. No adverse impacts to fish, wildlife, or habitat are expected to occur after mitigation. All impacts will be mitigated to better than the outcome under standard TMC SAO requirements through the Master Plan provisions as described in Sections V.A and V.B above.
   e. No adverse effect on drainage or stormwater detention will occur as demonstrated through the through provisions and analysis in the Master Drainage Plan for the Tukwila South Project (Goldsmith & Associates, February 2005).
   f. No geological instability, erosion hazard, or scour will occur as demonstrated in the Technical Report on Geology, Soils, and Groundwater (Associated Earth Sciences, Inc., March 2005).

g. No detriment to other property or other sensitive areas will occur as demonstrated in the DEIS for the Tukwila South Project.
h. Type 2 wetland mitigation offered at 1.5:1 or better for creation or restoration or 3:1 or better ratio for enhancement, and proposed on site and in the same watershed as the impact, as required by the TMC SAO (see Exhibit 3, the Wetland Mitigation Plan, Table 1); and the mitigation will increase functions and values (see Table 3).
i. Type 3 isolated wetland mitigation is proposed at a 1.5:1 or better ratio even where the wetland is less than the minimum regulated size under the TMC SAO (see Exhibit 3, the Wetland Mitigation Plan, Table 1); and the mitigation will increase functions and values (see Table 3).
j. Rehabilitation of existing wetlands to restore historic conditions lost in the lower Green River watershed is proposed along with enhancement of degraded wetlands on farmlands and creation of new wetlands from uplands where wetland hydrology is certain to occur; all within the same watershed where the wetland loss will occur (see Exhibit 3, the Wetland Mitigation Plan). The types of compensatory mitigation proposed are consistent with TMC 18.45.090.D and E. Mitigation standards and monitoring are proposed consistent with TMC 18.45.090.F (see Sections 4 and 5 of Exhibit 3, the Wetland Mitigation Plan).

3. TMC 18.45.110 Consistency – Watercourses

a. Watercourse and Fish Habitat Mitigation Plan is proposed for all Watercourse Alterations; impacts to manmade agricultural ditches regulated as Type 2 or Type 3 streams will be mitigated through implementation of the Green River Off-Channel Habitat Restoration Plan (Exhibit A) and through implementation of the Johnson Creek Restoration Plan (Exhibit B).
b. Net habitat and watercourse function will be improved for the benefit of salmonids as described above in Section V.A.
c. Placing some ditched Type 2 or Type 3 watercourses in culverts is required for the project purpose and need. These alterations are allowed per TMC 18.45.110.C.2 for construction of new essential streets and roads, rights-of-way and utilities infrastructure, including site grades necessary for gravity sewer and stormwater flow (including grades needed for south storm pond discharge to the Green River at high flow).
    i. Where Type 2 or Type 3 watercourses are proposed to be placed in culverts mitigation is proposed through relocation and net improvement to regional fish habitat by implementation of the Green River Off-Channel Habitat Restoration Plan (Exhibit A). Where Johnson Ditch will be relocated to accommodate replacement of the

flood barrier protection dike, net improvement to regional fish habitat will occur through implementation of the Johnson Creek Restoration Plan (Exhibit B).

ii. Net fish use of site will be increased through access to the newly created Green River off-channel habitat area (summer rearing, winter refuge, and upstream migrant holding habitat for anadromous species in the Green River) and improved access through a new fish-passable flood gate to a restored Johnson Creek channel (summer rearing and winter refuge for anadromous and resident salmonid species in Johnson Creek).

iii. Stream culverts will be placed per Washington Department of Fisheries and Wildlife Hydraulic Project Approval (HPA) requirements.

iv. Water Quality and Quantity will be maintained or improved as described in the Tukwila South Project Water Quality Technical Report (A.C. Kindig & Co., March 2005) and in the Technical Report on Geology, Soils, and Groundwater (Associated Earth Sciences, Inc., February 2005).

VII MITIGATION CONSTRUCTION AND MONITORING

The entire fish and wetland habitat mitigation plans will be constructed during the first two years of construction.

Year 1 work planned for the 2006 construction season will include the following (See the DEIS for specific construction sequence details):

- Excavation of most of the Green River Off-channel Habitat Restoration Area (separated from the river by a berm during year 1) and relocation of the Green River levee at this location.
- Excavation and creation of the new Johnson Creek channel and construction of the new Johnson Creek outfall to the Green River through a fish-passage friendly floodgate. The Johnson Creek restoration area will be completed with large woody debris and plantings, but flow through the area will remain in the current Johnson Ditch until the plantings become established the following construction season.
- Construction of the new Flood Protection barrier dike using excavated material from the new Johnson Creek channel and the Green River Off-Channel Habitat Restoration excavations.
- To protect water quality, construction of a long-term and temporary construction stormwater management system, including the following:

  - Permanent stormwater ponds south of South 200th Street will be constructed
  - Construction of temporary TESC collection traps for stormwater, including pressure line interconnections to pump water between the traps and from the traps south to the three main construction treatment ponds adjacent to the permanent ponds south of South 200th Street;
- Dewatering for construction of the flood barrier protection dike, the Green River Off-Channel Habitat Area excavation, and as warranted by any other construction, would discharge after energy dissipation to the Green River provided it meets turbidity standards, or discharge to the construction stormwater treatment system for turbidity control prior to discharge to the Green River in Years 1 through 3.
- Construction of the southern portion of the wetland rehabilitation area Wetland 11), including excavating, grading and planting.

Year 2 and 3 work planned for the 2007 construction season will include the following:

- Complete the excavation and plant the Green River habitat area, create permanent connection to the river by removing the temporary berm during year 3, and install woody debris snags at the upper and lower ends of the mitigation area in the time frame allowed by WDFW HPA permit. The large woody debris snags are proposed to protect the downstream bank from erosion and to prevent sand bar formation from creating an isolated pool.
- Permanently direct flow through the Johnson Creek restored channel during year 2.
- Construct and plant wetland rehabilitation, enhancement, and creation elements within and near retained Wetland 10 during year 2.

<u>Fisheries and Stream Mitigation Monitoring:</u>

Year 1 and/or Year 2 and/or Year 3 Monitoring (see Exhibit 2 for details): Compliance monitoring consists of evaluating streams and buffers immediately after construction. The objectives will be to verify that all design features, as agreed to in the various plans, have been correctly and fully implemented, and that any changes made in the field are consistent with the intent of the design. Evaluation of the planting areas after restoration will be done by the landscape architect and project wetland biologist and is described further by Raedeke (2005). Evaluation of the instream work will be completed by the project fisheries biologist. Evaluation standards and criteria are discussed below.

The compliance monitoring phase will conclude with the preparation of a brief compliance report from the project biologists. The report will verify that all design features have been correctly, fully, and successfully incorporated, and if not, detail what is required to ensure that successful incorporation of all design features are constructed. For more detail on mitigation monitoring see Exhibit B.

Monitoring to evaluate the success of instream habitat creation shall take place once each summer for the first five years after completion of the work (Approximately years 3 through 7). Monitoring shall evaluate each of the following factors:

- Erosion
- Fish Access
- Habitat Suitability
- Fish Stranding

The purpose of the plan is to restore Johnson Creek and the Green River off-channel area to a relatively natural condition, thus a certain amount of erosion is to be expected as the channels adjust to the new configuration. During years with unusually heavy flows, bank erosion may be considerable. However, overall habitat stability will be assessed to ensure construction efforts have resulted in a relatively stable environment with no unusually slide-prone or erosive features. Problem areas could be those that are slumping or eroding due to misguided stormwater runoff for example. Erosion of areas adjacent to the channels is expected to abate somewhat as vegetation matures. Those areas that still show unusually high erosion after 5 years will be noted in the report and discussions with permitting agencies undertaken to identify any appropriate additional mitigation work. Bed erosion (and or deposition) is expected to be continuous and will not be evaluated except in the case where fish access or stranding becomes and issue (discussed below).

Fish access to the new off-channel refuge and holding area in the Green River, and from the Green River into Johnson Creek will be evaluated each year to ensure passage into the new habitat is maintained. While some sediment deposition in the new Green River habitat area is expected, design features are proposed to control deposition patterns to avoid the off-channel rearing area becoming isolated to fish. Deposition will be evaluated and mapped each year during the low flow period. If isolation of significant portions of habitat becomes a concern, it will be noted in the report and discussions with permitting agencies undertaken to identify any appropriate additional mitigation work. This mitigation might consist of minor rearrangement of bed roughness material (e.g. LWD) to change flow patterns. The new flap gate to be installed on the culvert

outlet from Johnson Creek to the Green River will be evaluated each year to make sure it is functioning appropriately. Any necessary adjustments will be noted in the report.

Design goals call for creation of off-channel rearing and holding habitat in Johnson Creek and the Green River. The extent of fish use of the newly created habitat is for the most part independent of actions taken by the applicant, so long as fish habitat functions are provided as intended. The mitigation plan will be designed to create physical habitat meeting characteristics known to be utilized by target fish species and lifestages. Monitoring is proposed to ensure that appropriate habitat is created, and no design or construction faults prevent achieving the intended increase in stream functions and values. If these conditions are met, it must be assumed that fish will immediately or eventually make use of the habitat. Factors independent of the project, including weather, Howard Hansen Dam operations, hatchery operations, ocean conditions, fishing regulations, predator and prey population changes, off-site habitat conditions, normal fish and invertebrate population cycles, and numerous other factors control fish population size and movements. A qualitative assessment of select areas in the Green River and Johnson Creek mitigation areas will be made each year to describe habitat suitability in terms of average channel depths, widths, and flow velocities. As habitat conditions are expected to remain in a state of natural and constant flux, the habitat descriptions will be qualitative in nature and be used only to determine whether or not the overall habitat goals are substantially not being met. Any concerns will be addressed in the annual report. Photos will be taken each year to record conditions and document any changes. These will also be included in the report.

Final design considerations for new and restored channels and wetlands shall include features to ensure that "attractive nuisances" such as isolated ponding areas or channels are not unintentionally created. Monitoring shall include evaluation of any potential stranding hazard locations that might develop over time and observations of any stranded fish or carcasses.

Wetland Mitigation Monitoring

The purposes of the monitoring program are to: (1) document physical and biological characteristics of the wetland and fisheries mitigation areas, and (2) ensure that the goals and objectives comply with permit specifications (See Exhibit 3 for details).

The monitoring process will consist of three distinct phases: (1) construction monitoring; (2) compliance monitoring; and (3) long-term monitoring. The "time-zero" or baseline composition, structure, and cover abundance will be documented during the compliance monitoring phase. The long-term monitoring program will document the survival of planted vegetation and rates of colonization by other plants (i.e., in bare soil areas) over a ten-year period after enhancement activities had been completed.

The success rate of constructed and/or restored wetlands is increased through coordination and communication before and during the construction/ implementation phase. Coordination meetings will include the biologist, landscape architect, project engineers, regulatory agency representatives, and contractors. The landscape architect and project biologists will also be present on-site during various stages of implementation. Their duties will be to: (1) assist in identifying and marking the limits of clearing and grading, where applicable; (2) inspect the plant materials and recommend their final placement before planting; (3) determine the correct type and application rate of amendments to the soil, if needed; (4) make adjustments in planting plans, as needed, in response to field conditions; (5) ensure that construction activities are conducted per the approved plan; and (6) resolve problems that arise during restoration, thus lessening problems that might occur later during the long-term monitoring phase.

Compliance monitoring will evaluate the wetland and fisheries mitigation and buffer areas immediately after planting is completed. The objectives are to verify that all design features, as agreed to in the planting plan, have been correctly and fully implemented, and that any changes made in the field are consistent with the intent of the design. Evaluations will employ the standards and criteria discussed below.

After grading and planting of the wetlands and buffers is completed, fixed sampling stations will be established within areas representative of the plant communities being sampled. The same points will be monitored each monitoring session. These points may be located randomly or along specific transects, depending upon-site conditions.

A quantitative assessment of the plants established in the wetland and buffer (including plant counts and cover-abundance, as appropriate) will be recorded in representative sample plots for baseline data. This information will be used to document "time-zero" conditions from which the long-term monitoring period will begin.

At each point, fixed-point photos will be taken during each monitoring visit to provide physical documentation of the condition of the mitigation areas. Photographs will be taken from all sample plot locations established during the first monitoring site visit (compliance) and thereafter each visit of the monitoring period from the established location points.

The compliance monitoring phase will conclude with the preparation of a compliance report from the project biologists. The report will verify that all design features have been correctly, fully, and successfully incorporated. Substantive changes made in the planting plans will be noted in the compliance report and on the drawings for use during the long-term monitoring phase. Information on changes should include what was done, where, why, at whose request, and the result of the change. Locations of monitoring stations established for the compliance monitoring will be identified on the as-built plans.

The planting plans, with the compliance report, will document "as-built" conditions at the time of construction compliance. The compliance report and as-built drawings will be submitted to the City of Tukwila, the Washington Department of Ecology (DOE), and the U.S. Army Corps of Engineers (COE).

Long-term monitoring will begin only after acceptance of the compliance report and acknowledgment that the construction is complete by the City of Tukwila. Long-term monitoring will be conducted for ten growing seasons. Monitoring will evaluate the establishment and maintenance of the plant communities in the created, enhanced, and rehabilitated wetlands and their planted buffers to determine if the goals and objectives of the mitigation plan have been met.

Monitoring will be conducted semi-annually (twice yearly) in the first, second, fourth, sixth, and eighth year during the ten-year monitoring period. A final site check and summary report will be prepared in the tenth year of monitoring.
At each sample station, plant species will be identified, individual shrubs and trees counted (where appropriate) to document survival, and an estimate of cover and abundance made by appropriate means, such as the Braun-Blanquet methods (Mueller-Dombois and Ellenberg 1974). Plant identifications will be made according to standard taxonomic procedures as described in Hitchcock and Cronquist (1976), with nomenclature as updated by Pojar and MacKinnon (1994), Hickman (1993), and Cooke (1992). The plantings will be examined to document the survival rate of species planted, signs of stress, damage, or disease as well as signs of vigor, and rates of colonization by other plants (i.e., in bare soil areas). Special attention will be paid to species considered to be invasive (e.g., reed canarygrass, Himalayan blackberry [*Rubus discolor*]).

Hydrologic conditions of the wetland sites will be noted at each sample point either by observation of inundated conditions or excavation of shallow pits near the sampling point to determine soil saturation. Separate site visits during the late spring or early summer of each monitoring year may be necessary to document site hydrology in the growing season.

All wildlife observed during the monitoring will be recorded, with notes made regarding habitat use patterns and activities. Any evidence of breeding or nesting activities will be noted.

Monitoring reports will be prepared for submittal to the appropriate regulatory agencies at the end of each monitoring year. The monitoring report will document the changes occurring within the mitigation areas and make recommendations for improving the degree of success or correcting any problems noted during monitoring. Monitoring reports will document how the mitigation is meeting the goals and objectives of the plan.

The overall evaluation criteria will be whether or not the created, enhanced, and rehabilitated wetlands meet the COE 1987 wetland criteria (Environmental Laboratory 1987) and intended hydroperiods after grading and establishment, and the success of the plant community types proposed to provide a net gain in wetland functions and values. Monitoring is proposed to show the key elements of the plan are present, they have the desired functions, and meet the overall mitigation goals for functions and values. Evaluation criteria for success of the vegetation monitoring portion of the mitigation plan should not be 100% survival of individual plant materials over the monitoring period, but the establishment of desirable plant communities within the enhanced, rehabilitated, and created wetlands. Evaluation criteria are:

Year 1: Evidence that the desired plant communities are developing: survival of the planted trees and shrub species and evidence of colonization by desirable non-planted species. At the end of the first growing season after installation is complete, the plantings should demonstrate good health and vigor, and plant coverage of all areas should be sufficient to control erosion. Any planted material that has not survived the first year because of transplant shock should be noted and replaced at this time. If plant material mortality is a result of site conditions, appropriate measures should be taken to ensure plant survival.

Year 2: Evidence that the desired plant communities continue to develop. Evidence of reproduction or new sprouting by the plantings, and expansion of the coverage of desirable plants colonizing the area. Plant community structure,

diversity, and wildlife habitat function should be greater than that documented during the first-year monitoring.

Year 4: Evidence that the desired plant communities continue to develop. Evidence of continuing reproduction or new sprouting by the plantings, and expansion of coverage of desirable plants colonizing the area. Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the second-year monitoring. Desirable plant species communities should be out-competing undesirable plant species throughout the site. Undesirable plant species represent less than 15% of cover within the plant communities.

Year 6: Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the fourth-year monitoring. Desirable plant species communities should be out-competing undesirable plant species throughout the site. Undesirable plant species represent less than 15% of cover within the plant communities.

Year 8: Evidence that the desired plant communities have developed. Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the sixth-year monitoring. Undesirable plant species represent less than 15% of cover within the plant communities.

Specific performance standards to be used in the long-term monitoring are as follows:

- 100% survival of all planted shrubs and trees in wetlands and buffers for one year after planting and at least 85% survival after eight years.
- Coverage by shrub and tree species in planted areas of wetlands and buffers:
    - at least 20% after one year;
    - at least 40% after four years;
    - at least 60% after six years; and
    - at least 80% after eight years.
- At the end of the first growing season after installation (Year 1), herbaceous cover in the planted areas should be sufficient to minimize erosion and discourage establishment of undesirable plant species.
- Establishment of three plant strata (trees, shrubs, and herbs) within the wetlands after six years.
- No more than 15% cover of undesirable or invasive species within the mitigation area after 10 years.

Undesirable or invasive plant species include reed canarygrass, Scot's broom (*Cytisus scoparius*), Himalayan blackberry, and purple loosestrife (*Lythrum salicaria*). Observations of these species on-site will trigger maintenance actions.

In addition to the above, the created, enhanced, and restored compensatory mitigation areas will, at a minimum, be saturated through the majority of the root zone for 12.5% of the growing season. The spring monitoring should demonstrate hydrology within 12 inches of the ground surface through the end of March in each monitoring year, and that the intended hydroperiods are provided.

EXHIBIT 1

Sensitive Area Overlay Site Plan

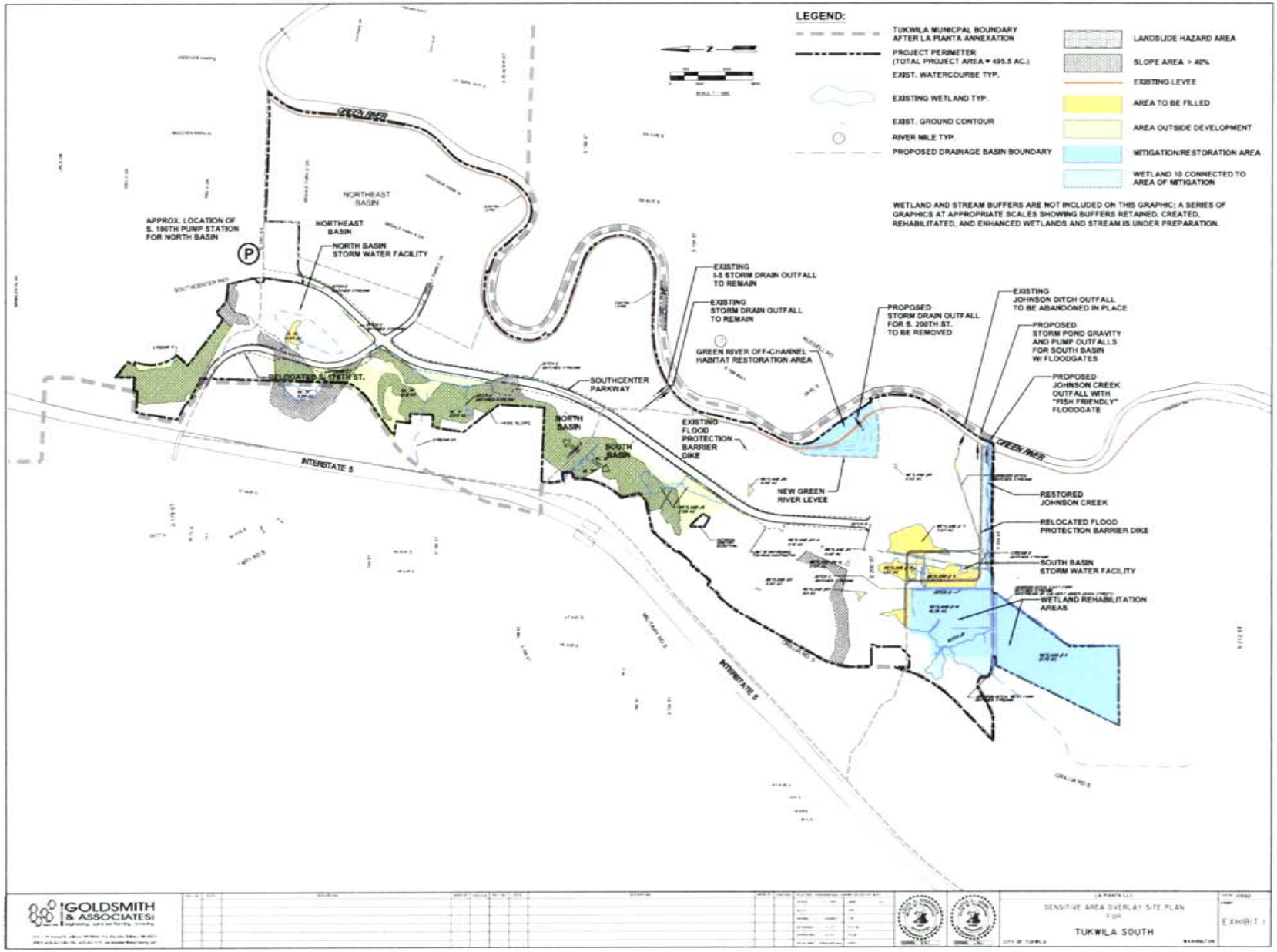
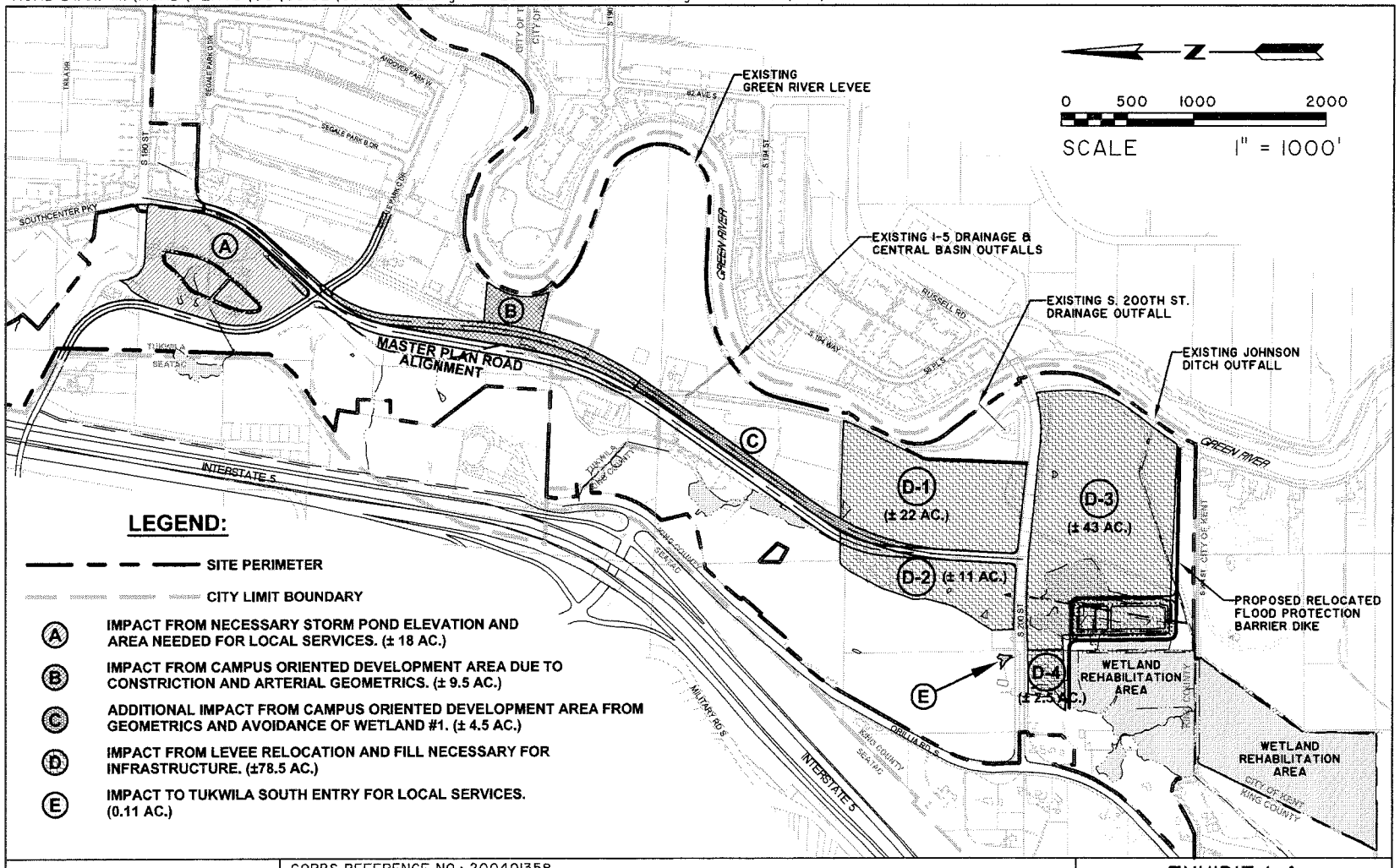

LEGEND:
TUKWILA MUNICIPAL BOUNDARY AFTER LA PIANTA ANNEXATION
PROJECT PERIMETER (TOTAL PROJECT AREA = 495.5 AC.)
EXIST. WATERCOURSE TYP.
EXISTING WETLAND TYP.
EXIST. GROUND CONTOUR
RIVER MILE TYP.
PROPOSED DRAINAGE BASIN BOUNDARY
LANDSLIDE HAZARD AREA
SLOPE AREA > 40%
EXISTING LEVEE
AREA TO BE FILLED
AREA OUTSIDE DEVELOPMENT
MITIGATION/RESTORATION AREA
WETLAND 10 CONNECTED TO AREA OF MITIGATION
WETLAND AND STREAM BUFFERS ARE NOT INCLUDED ON THIS GRAPHIC; A SERIES OF GRAPHICS AT APPROPRIATE SCALES SHOWING BUFFERS RETAINED, CREATED, REHABILITATED, AND ENHANCED WETLANDS AND STREAMS IS UNDER PREPARATION.
GREEN RIVER
NORTHEAST BASIN
APPROX. LOCATION OF S. 196TH PUMP STATION FOR NORTH BASIN
NORTHEAST BASIN
NORTH BASIN STORM WATER FACILITY
RELOCATED S. 178TH ST.
SOUTHCENTER PARKWAY
NORTH BASIN
SOUTH BASIN
INTERSTATE 5
EXISTING I-5 STORM DRAIN OUTFALL TO REMAIN
EXISTING STORM DRAIN OUTFALL TO REMAIN
GREEN RIVER OFF-CHANNEL HABITAT RESTORATION AREA
EXISTING FLOOD PROTECTION BARRIER DIKE
NEW GREEN RIVER LEVEE
PROPOSED STORM DRAIN OUTFALL FOR S. 208TH ST. TO BE REMOVED
EXISTING JOHNSON DITCH OUTFALL TO BE ABANDONED IN PLACE
PROPOSED STORM POND GRAVITY AND PUMP OUTFALLS FOR SOUTH BASIN W/ FLOODGATES
PROPOSED JOHNSON CREEK OUTFALL WITH "FISH FRIENDLY" FLOODGATE
GREEN RIVER
RESTORED JOHNSON CREEK
RELOCATED FLOOD PROTECTION BARRIER DIKE
SOUTH BASIN STORM WATER FACILITY
WETLAND REHABILITATION AREAS
INTERSTATE 5
GOLDSMITH & ASSOCIATES
LA PIANTA LLC
SENSITIVE AREA OVERLAY SITE PLAN FOR
TUKWILA SOUTH
CITY OF TUKWILA
EXHIBIT 1

EXHIBIT 1-A

Explanation of Unavoidable Wetland and Stream Impacts Figure

ACAD DWG.: M:\ACAD\PLATS\03\03102\03102e322.dwg PLOTTED: 03102e322.dwg LADAMS 05/04/05 09:40



LEGEND:

- SITE PERIMETER
- CITY LIMIT BOUNDARY

(A) IMPACT FROM NECESSARY STORM POND ELEVATION AND AREA NEEDED FOR LOCAL SERVICES. (± 18 AC.)

(B) IMPACT FROM CAMPUS ORIENTED DEVELOPMENT AREA DUE TO CONSTRICTION AND ARTERIAL GEOMETRICS. (± 9.5 AC.)

(C) ADDITIONAL IMPACT FROM CAMPUS ORIENTED DEVELOPMENT AREA FROM GEOMETRICS AND AVOIDANCE OF WETLAND #1. (± 4.5 AC.)

(D) IMPACT FROM LEVEE RELOCATION AND FILL NECESSARY FOR INFRASTRUCTURE. (±78.5 AC.)

(E) IMPACT TO TUKWILA SOUTH ENTRY FOR LOCAL SERVICES. (0.11 AC.)

GOLDSMITH & ASSOCIATES INC
Engineering - Land Use Planning - Surveying

CORPS REFERENCE NO.: 200401358
PROJECT: TUKWILA SOUTH PROJECT
DESCRIPTION: EMERGING TECHNOLOGY MASTER PLANNED COMMUNITY
DATUMS: HOR: NAD 83/91 VER: NGVD 1929
LOCATION: CITY OF TUKWILA, KING COUNTY, WA
DATE: NOVEMBER 30, 2004
APPLICATION BY: LA PIANTA LLC
PO BOX 88028
TUKWILA, WA 98138

REVISED: 5/4/05

EXHIBIT I-A

EXPLANATION OF UNAVOIDABLE WETLAND AND STREAM IMPACTS

EXHIBIT 2

Fisheries Mitigation Plan
(Cedarock Consultants, Inc., June 2005)

Green River Off-Channel Habitat Restoration and Johnson Creek Restoration Mitigation Plans

FISHERIES MITIGATION PLAN

TUKWILA SOUTH PROJECT

Tukwila, Washington

Prepared for:

La Pianta LLC
P.O. Box 88028
Tukwila, WA 98138

Prepared by:
Cedarock Consultants, Inc.
19609 244th Avenue NE
Woodinville, Washington 98077

June 30, 2005

CONTENTS

FIGURES

APPENDIX

1.0 INTRODUCTION

1.1 Project Location

The Tukwila South project fisheries mitigation sites are located within a portion of the southeast quarter of Section 3 and the western half of Section 2, Township 22 North, Range 04 East south of the City of Tukwila in King County, Washington (Figure 1). The sites are on the Green River valley floor generally bounded by S. 204th Street on the south, 1,000 feet north of S. 200th Street on the north, and the Green River on the east.

1.2 Existing Site Description

The mitigation sites consist of flat to gently sloped farmland adjacent to the Green River between River Mile (RM) 17.0 and 17.4. The area is mostly undeveloped and in agricultural use. Existing site elevations within the farmlands range between approximately 15 and 30 feet above sea level. The bed of the Green River adjacent to the site ranges from about 4 to 5 feet above sea level.

1.3 Mitigation Concept

Two major fish habitat enhancement projects will be created as part of the project. About 7.0 acres of land will be reconfigured to create 4.5 acres of new open water habitat and 2.5 acres of riparian buffer (Green River Off-channel Habitat Restoration Area). Another 0.34 acres of new Johnson Creek stream channel will be created to replace the existing Johnson Ditch alignment. The mitigation plan is a work in progress. Further details will be provided as the project receives input from agency, tribal, and other biologists.

The conceptual designs were based on a regional salmonid habitat study conducted by the Army Corps of Engineers; King County; local, state, federal, and tribal agencies; and various private organizations. This study, known as The Green/Duwamish River Ecosystem Restoration Study, together with the Salmon and Steelhead Habitat Limiting Factors Analysis for the Cedar River (WRIA 9) (Kerwin and Nelson 2000) identified a number of issues affecting regional salmonid populations.

Two of the key recommendations identified during the study provided the basis for the proposed mitigation:

> *Fish passage and habitat values along the leveed portion of the Green River (between Auburn and Tukwila) should be improved consistent with flood protection goals in this reach. A program to revegetate and add woody debris in this reach is recommended in this study.*
>
> *Productive tributaries…should be protected through acquisition and land use regulations, and disturbed habitats along these tributaries should be restored for salmon spawning and rearing and other fish and wildlife use.*

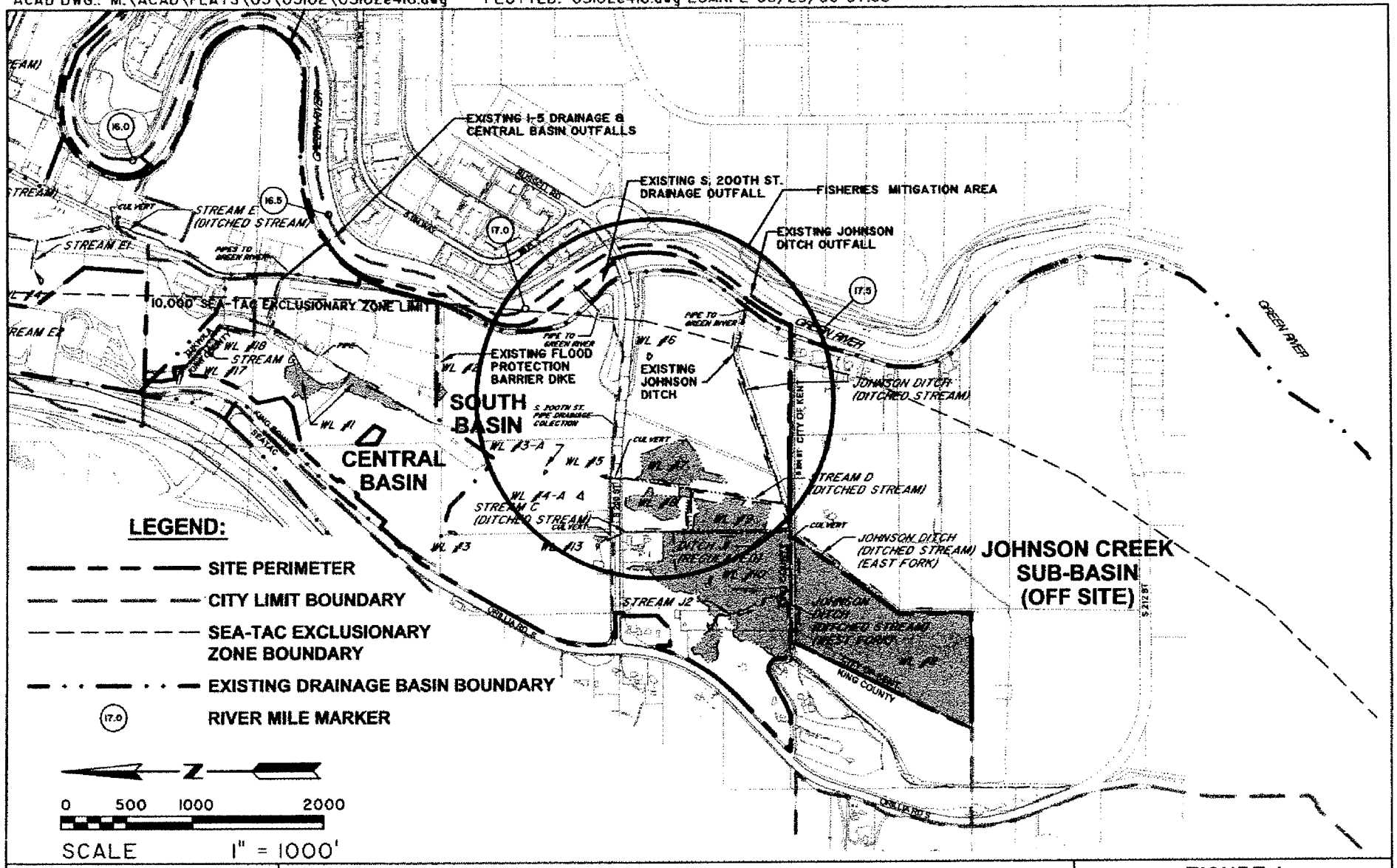
The mitigation plan was designed to improve the functions and values of fish habitat in this section of the Green River system. The following table provides a comparison of existing conditions with those expected to be created following full implementation of the mitigation program.

Fish Habitat Functions and Values
Comparison of Existing versus Proposed Conditions

Habitat Function	Existing Conditions	Proposed Actions
Summer Rearing	Moderate to very low quality based on warm temperatures, low dissolved oxygen, shallow depths, livestock use, and exotic vegetation in Johnson Ditch channel.	Enhanced riparian conditions, addition of woody debris, and livestock absence will result in improved water quality, increased pool frequency, and more diverse habitat. Access to habitat in Johnson Creek will be enhanced by new flood gate.
Winter Rearing	Channelized character of the lower Green River between RM 11 and 32 has resulted in the loss of most winter rearing habitat (Kerwin and Nelson 2000).	Approximately 4.5 acres of new off-channel rearing habitat and 0.34 acres of new tributary habitat will provide rare high quality rearing opportunities in the lower Green River. Johnson Creek will be accessible under most flow conditions.
Winter Refuge	Refuge habitat in the lower Green River is scarce due to levees, silt substrate, limited LWD, and absence of off-channel holding locations. Turbulent, high velocity streamflow is common.	Approximately 4.5 acres of new off-channel rearing habitat will provide new high quality, calm-water refuge location in the lower Green River. Benefits to juvenile Chinook, coho, steelhead, and resident trout.
Spawning Habitat	Neither the project site nor the Green River adjacent to the site provide habitat suitable for use by salmon or resident trout for spawning.	No change to spawning habitat quality is proposed or anticipated.
Adult Migration (Upstream) [a]	On-site channels not currently used by adult salmon to migrate upstream. Access to Johnson Ditch blocked by flood gate. Green River diked along entire project site with no off-channel resting habitat available.	Approximately 4.5 acres of new off-channel rearing habitat, 0.34 acres of enhanced mainstem tributary habitat, and new fish-passable flood gate will provide critical resting areas and overall net benefit to adult salmonid migration habitat.
Juvenile Migration (Downstream) [b]	Only Johnson Ditch might currently be used by juvenile salmonids during outmigration. Habitat in the ditch is poor and access is normally blocked by flood gate. Green River diked along entire project site with no off-channel holding or refuge habitat available.	Approximately 4.5 acres of new off-channel rearing habitat, 0.34 acres of enhanced mainstem tributary habitat, and new fish-passable flood gate will provide critical areas for juvenile salmonids to smoltify on migration to estuary. Habitat meets critical need identified in Salmonid Limiting Factor Analysis.

[a] Upstream migrants are adult salmon returning to spawn.
[b] Downstream migrants are juvenile salmonids heading to saltwater to rear.

ACAD DWG.: M:\ACAD\PLATS\03\03102\03102e416.dwg PLOTTED: 03102e416.dwg LCARPE 03/29/05 07:53



GOLDSMITH & ASSOCIATES
Engineering · Land Use Planning · Surveying

FIGURE 1

TUKWILA SOUTH PROJECT
VICINITY MAP

2.0 GREEN RIVER

2.1 Existing Condition

The Green River (WRIA 09-0001) begins in the Cascade Mountains approximately 30 miles northeast of Mount Rainier and flows west and northwest over 93 miles to the Puget Sound where it enters at Elliot Bay near Seattle. Between RM 33.8 to RM 11.0 is considered the lower reach of the Green River. This relatively low-gradient reach meanders through open hills and across historic lacustrine (lake bed) and glacial deposits. Much of the channel has been diked to protect adjacent residential, agricultural, and industrial development from flooding. The lower reach is used by fish predominately for migration and rearing purposes.

Instream flows and sediment transport characteristics of the lower Green/Duwamish River system are influenced by Howard Hanson Dam operations and water withdrawal at the Tacoma Headworks. The dam is operated to control flooding downstream and, since its construction in 1961, has eliminated most high flows above about the 2-year event. Excess water volumes are released over time, which results in a higher frequency of moderate flows. Filling of the reservoir during the late spring temporarily reduces flows and can affect downstream migration of juvenile salmonids. The City of Tacoma intercepts water downstream of the dam and diverts it for use as domestic water. This water use has historically represented approximately 12 percent of the average annual flow at the point of diversion (Kerwin and Nelson 2000).

Howard Hanson Dam prevents delivery of coarse sediment from the upper basin to downstream reaches. The upper basin is believed to have formerly supplied over 90 percent of the alluvial gravel deposited in the Green River floodplain downstream of RM 45 (Kerwin and Nelson 2000). Landslides in the Middle Green River sub-watershed contribute material that is predominantly sand size or smaller. Thus, elimination of the sediment supply from the upper basin has a significant effect on habitat conditions downstream. An analysis of floodplain deposits suggest that the White River formerly supplied approximately 75 percent of the sediment to the Green River downstream of RM 32 (Mullineaux 1970). When the White River was permanently diverted to the Puyallup system in 1906, this supply was eliminated. As a result of these changes, substrate sizes in the lower Green River have become increasingly finer over time. Sands and silts now dominate the substrate, and gravel bars suitable for salmonid spawning are almost non-existent.

The entire mainstem of the Green River downstream of RM 32 has been channelized with the concomitant loss of side-channel and off-channel habitat. Winter refuge habitat is now limited for the most part to tributaries such as Mill Creek and Mullen Slough. Levees and revetments commonly line both banks of the river throughout virtually the entire reach downstream of RM 32 (Kerwin and Nelson 2000). In the Green/Duwamish estuary, over 97 percent of the historic estuarine mudflats, marshes, and forested riparian swamps have been eliminated by channel straightening, draining, dredging, and filling. All of the tidal swamps bordering the Duwamish River were filled by 1940. The remaining shortened channel has been simplified and is currently used by commercial shipping operations. This has dramatically reduced the quantity and quality of habitat types preferred by many juvenile anadromous fish as they make the conversion from freshwater to saltwater habitat.

Chinook, coho, chum, pink, and sockeye salmon; steelhead; and coastal cutthroat trout are currently found at various times of the year in the Green/Duwamish River System. Native char may be present though not considered likely (Kerwin and Nelson 2000). Native resident salmonids include rainbow and cutthroat trout and mountain whitefish. Other native resident fish species are also present, including lamprey and various minnow, sculpin, and sucker species.

2.2 Proposed Mitigation

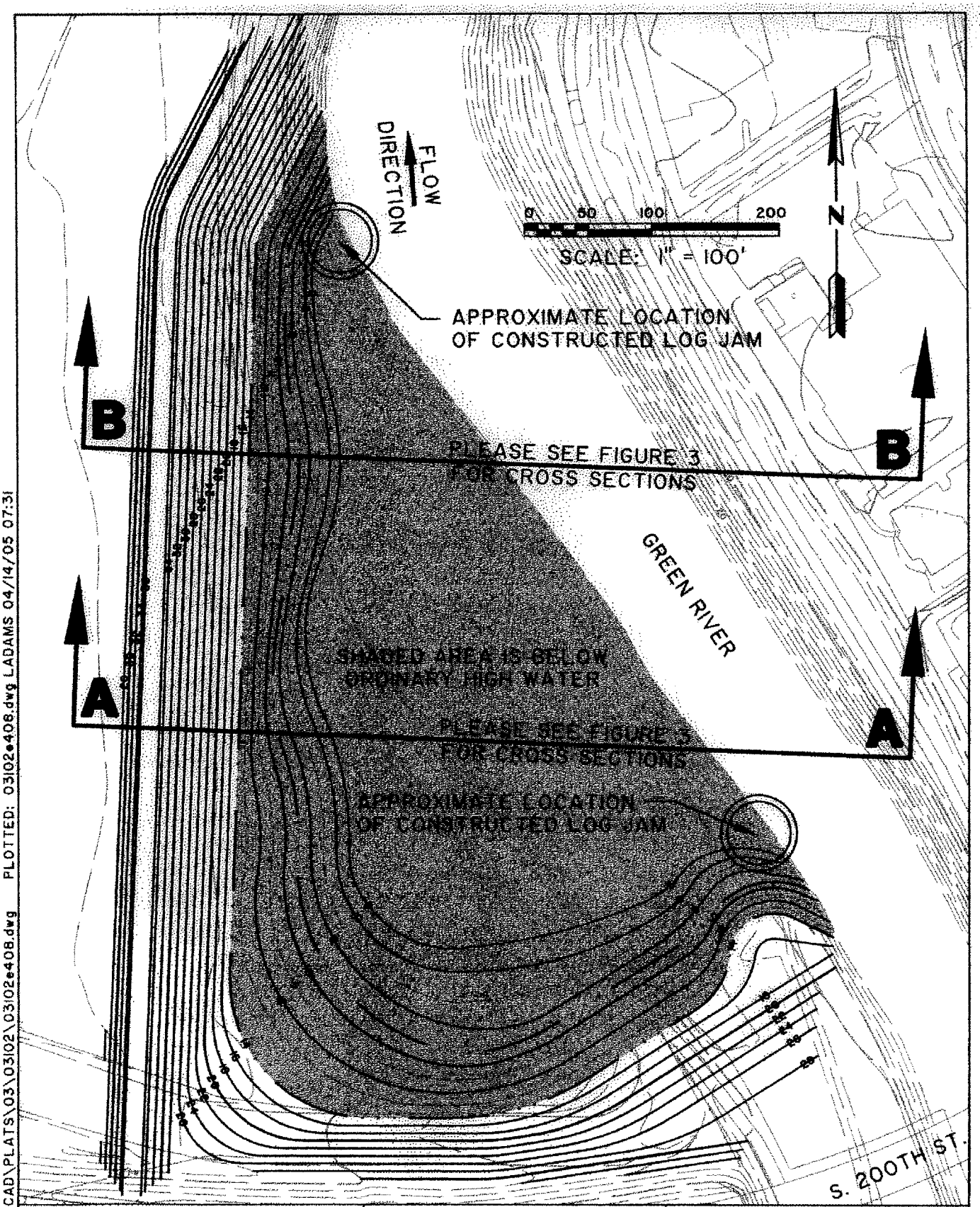
The Green River Off-channel Habitat Restoration Area will be created as mitigation for impacts to the presumed fish-bearing agricultural ditches (Figures 2 and 3). Mitigation will be provided at a minimum ratio of 4:1 for impacted surface area of open water channels [1].

As proposed, the Green River Off-channel Habitat Restoration Area mitigation project will create new summer rearing, winter refuge, and upstream migration holding habitats. Approximately 800 feet of the existing Green River levee will be eliminated and a new levee constructed to the west away from the existing river to create a 7-acre off-channel habitat area. An approximately 4.5 acre area (acreage below OHWM) will be excavated down to the bed elevation of the Green River to create open water habitat. The bed of the off-channel area will be graded to provide a variety of water depths and slope grades. Large woody debris will be added as jams and individual pieces for habitat diversity. All of the wood will be anchored to prevent migration.

The 2.58 acres of upland area will be graded at slopes ranging from 3:1 to about 8:1 and planted. The planting plan has been designed to accommodate the proposed development and provide significantly enhanced functionality based on Best Available Science. Plantings will consist of native species including groundcovers, shrubs, and small trees as allowed by landscaping constraints such as the levee, flood control dike, and existing roads. The plants have been selected and located to provide a dense vegetated thicket of native species that fringe and overhang water's edge during normal flows. A mixture of palustrine emergent species and scrub-shrub species are proposed including rushes, sedges, willow, dogwood, salmonberry, thimbleberry, and hazelnut among others (Raedeke 2005). During unusually high flows, the plants will slow the water's velocity along the shoreline, providing refuge habitat for fish and helping to protect the banks from erosion. During low flows, emergent species will continue to provide fringing vegetation and habitat for nearshore species. Complete planting details are provided in Raedeke 2005.

Under existing conditions very little native buffer exists near the Green River and Johnson Creek with one exception. Following construction of the S. 200th Street Bridge, an area on the west bank of the Green River that had been graded and used as an equipment storage and staging area was revegetated (see Appendix). The revegetation work was not completed as part of any required mitigation or enhancement project (Mike Mactutis, City of Kent, e-mail conversation,

[1] Approximately 1.2 acres of area below the ordinary high water mark of the Green River will qualify as wetland creation and is being credited as mitigation for wetland impacts in addition to qualifying as fish habitat mitigation. Wetlands adjacent to instream habitat provide excellent juvenile fish rearing and refuge habitat. For accounting purposes, if these created wetlands are removed from fish habitat credit, the overall fish habitat mitigation ratio is approximately 3.4:1.

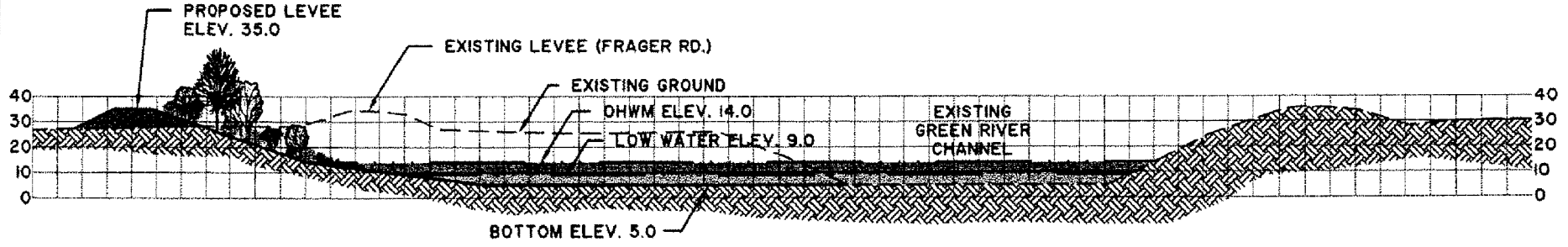


GOLDSMITH & ASSOCIATES INC
Since 1958 Engineering - Land Use Planning - Surveying
1215 114th Avenue SE, Bellevue, WA 98004, P.O. Box 3565, Bellevue, WA 98009
OFFICE: (425) 462-1080, FAX: (425) 462-7719, staff@goldsmithengineering.com

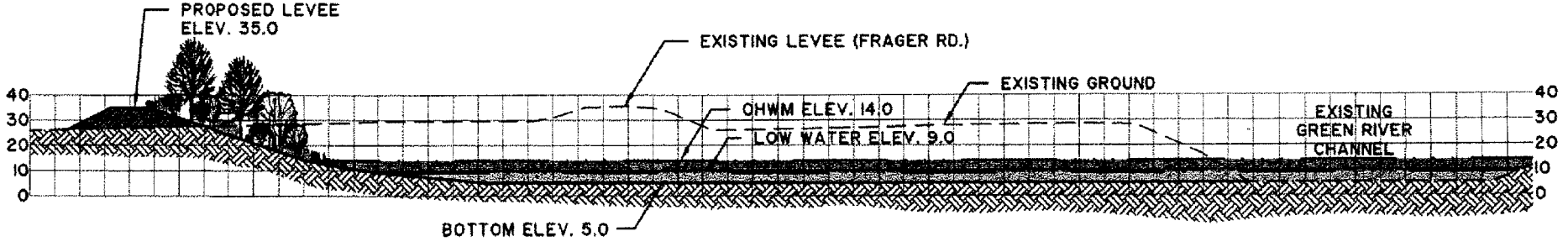
FIGURE 2

TUKWILA SOUTH PROJECT
GREEN RIVER
OFF-CHANNEL HABITAT
RESTORATION AREA

ACAD DWG.: M:\ACAD\PLATS\03\03102\03102e409.dwg PLOTTED: 03102e409.dwg LCARPE 03/28/05 15:49



SECTION B - B



SECTION A - A

0 30 60 120

SCALE 1" = 60'

GOLDSMITH & ASSOCIATES INC.
Since 1958 HUGH G.
Engineering - Land Use Planning - Surveying
1215 114th Avenue SE, Bellevue, WA 98004, P.O. Box 3565, Bellevue, WA 98009
OFFICE: (425) 462-1080, FAX: (425) 462-7719, staff@goldsmithengineering.com

FIGURE 3

TUKWILA SOUTH PROJECT
GREEN RIVER
OFF-CHANNEL HABITAT
RESTORATION AREA

March 24, 2005). Sections of the bank approximately 250 feet long on either side of the bridge were replanted with native shrubs and trees (City of Kent and King County 1997). The revegetated area to the north of the bridge will be eliminated during construction of the Green River Off-channel Habitat Restoration Area. The newly created levee banks will be replanted with a mix of species similar to what was planted by the City with the exception of the spruce which grows too large to plant on the levee under Army Corps regulations (Raedeke 2005).

The proposed habitat restoration will create a rapid expansion of river width downstream of the S. 200th Street Bridge, from the current channel width of about 200 feet to about 600 feet. The restoration will widen the river for about 800 lineal feet, or about 4 channel widths, before reconnecting to the existing channel bank, just before the apex of the next bend downstream. Based on a qualitative analysis of the proposed action, the project hydrologist (Ken Rood, Northwest Hydraulics, personal conversation) expects changes to flow patterns will generally consist of the following:

- Flows at the upstream end of the habitat restoration area will separate from the main flow and consist of slack or standing water at low flows and, potentially, a slowly circulating eddy at high flows. This area will extend downstream along much of the habitat area.
- The flow in the main channel will expand and higher velocities may be directed at the downstream end of the excavated bank, where it transitions back to the existing bank. This is a potential erosion site and a smooth transition and bank protection is proposed to prevent erosion here (see the following section).
- The flow expansion is expected to reduce the potential for erosion along the right bank and may result in formation of a small bar opposite the downstream end of the habitat restoration area. Bar formation may contribute to bank erosion on the opposite bank.
- The changes in flow patterns are also expected to cause channel adjustments through deposition of bedload and suspended sediment. Bedload sediments (coarse sand) will be deposited along the left side of the river, forming a long ridge or bar starting at the top of the opening and extending downstream. The bar may ultimately reach elevations of 8 to 10 feet (3 to five feet above the bed; based on observed point bar heights nearby in the river) and may join to the bank at the downstream end of the habitat area, potentially isolating the habitat area at low flows. Measures to prevent formation of an isolated pool are proposed (see the following section). Relatively slow development of the bar is anticipated based on the predicted low rates of bedload transport. In the absence of a large flood it may take several years to form.
- Suspended sediments will likely be carried into the slack water zone and deposited. Fine sand will likely initially deposit at the downstream end of the habitat area with silt and clay deposited along the left bank towards the head of the habitat area. Initial deposits are likely to occur well below ordinary high water, on the shallow lower bank and on the flat bottom of the habitat area. The rates of deposition are not known and cannot be easily calculated, as they depend upon sediment concentrations and the rate of influx. However, it is thought that it will take many years to fill the off-channel area to the elevation of the bar formed along the edge of the area.

Changes in stream hydraulics resulting from development of the off-channel habitat area may subject the left (west) bank near the downstream end of the project to increased scour potential. To prevent erosion along this bank, bioengineering bank treatments and construction of a logjam to deflect flows away from this section of bank is proposed, and are expected to prevent the need for rock riprap or other hard protection (Northwest Hydraulics, Ken Rood, personal communication). Given the low mean water velocities in the Green River, bioengineering is a practical erosion treatment. Dense vegetative plantings and appropriate placement of large woody debris are expected to be fully protective of the new shoreline when combined with appropriate sloping of the banks.

Deposition is predicted to occur in the habitat area and on the right (east) bank opposite the downstream end of the habitat area. Due to existing limited habitat quality and minimal expected deposition, sediment depositing on the right bank is of limited concern and does not require treatment. Deposition in the habitat area could reduce its functional value over time. Potential isolation of the habitat area by bar formation and gradual filling of the habitat area by suspended sediment deposition could eventually affect summer rearing habitat were it left unmitigated.

To prevent formation of a continuous sediment bar across the mouth of the habitat area during low flows construction of logjams at the upstream and downstream end of the habitat area are proposed to cause local scour and maintain low bed elevations (Figure 2). This is typical bioengineering practice for this type of situation. The two logjams would be positioned so they project into the flow, cause velocities to dive over the structures, and scour the local streambed. Spur-type features are commonly constructed at water intake sites to help prevent deposition and maintain local bed levels and are expected to be successful in this application.

The logjams would provide a “natural” solution to prevent formation of an isolated pool and can provide other aquatic habitat benefits such as overhead cover and a nutrient source. The logjams would maintain sediment in suspension through the hydraulic energy of water spilling over and around the jams, maintaining openings through a developing sand bar. While sediment deposition will occur, the design will ensure that pathways are maintained so that fish can enter and exit nearshore habitat without the need for manual sediment removal. A numeric hydraulic model will be developed to predict velocities, depths and water levels after construction of the proposed habitat area and to finalize design features such as jam placement, size, and orientation. Though widening the river at this location should mitigate any effect the log jams may have on flood levels, the model will also be used to confirm this assumption.

Monitoring together with adaptive management will ensure the design functions as expected in the future. To avoid the need for extensive maintenance, the log jams will be overbuilt under the assumption that it will require less disturbance to move, shorten, or eliminate logs from the existing jam, if needed by observation of sediment accumulations during the monitoring period, than it would to install new logs.

3.0 JOHNSON DITCH (CREEK)

3.1 Existing Condition

Johnson Ditch (WRIA 09-0038) is currently maintained by King County Drainage District #2 as an agricultural drainage ditch. The ditch was constructed sometime before 1917 to drain area wetlands and carry drainage from hillside seeps to the Green River. Meeting records from the Board of Drainage Commissioners show maintenance expenditures underway in the fall of 1917[2]. General Land Office (GLO) survey maps from 1863 show pre-settlement floodplain in this area was primarily wetland with numerous natural springs and no defined tributary to the Green River (Collins and Sheikh 2004). The area was described as "an extensive cranberry marsh" in 1863 by GLO surveyors.

Under existing conditions, perennial drainage is collected along S. 204th Street from adjacent agricultural fields and pastures off-site, from seeps on the hillside to the west on either side of S. 200th Street, and from the Johnson Ditch watershed extending southward off-site (Daley Design 2001). The ditch currently angles northeast away from S. 204th Street on its path to the Green River where it enters via piped outfall near RM 17.4. Two consecutive culverts, a 150-foot long by 24-inch pipe followed by a 65-foot long by 36-inch pipe (215 feet of total culvert) currently carry flow from the ditch under the levee to an outfall located near elevation 15-feet.[3] There is an approximately The outfall has been fitted with a gate to prevent flooding. The gate is often blocked by debris or vandalized and remains in a partially open position. Under these conditions fish are believed to migrate upstream into the ditch under some flow conditions (Daley Design 2000).

The on-site channel at the OHWM ranges from about 5 feet to about 20 feet wide and from 6 inches to about 2 feet deep. It is unconfined where adjacent to S. 204th Street but drops into a highly confined ditch between the culvert under S. 204th Street and the Green River. Channel gradient is approximately 0.1 percent, and substrates consist of fine silts and sands. No habitat suitable for spawning was observed during surveys to describe pre-project conditions. The reach provides some winter and summer rearing opportunities in shallow runs and pools. Water quality in the stream is considered to be poor relative to fish use requirements due to low dissolved oxygen and low pH.

The presence of riparian vegetation depends on the last time the ditch was cleaned and dredged. The most recent maintenance by King County Drainage District No. 2 was primarily for removal of reed canarygrass and took place in September 2001. Currently, several years' growth of willow, Himalayan blackberry, and dense reed canary grass cover most of the banks in a narrow corridor between two crop fields. South 204th Street immediately abuts the right bank of the creek for about 1,100 feet along the western end.

[2] Resolutions passed at the November 1, 1917 special meeting of the Board of Drainage Commissioners of Drainage District Number Two included $960 for construction funding and $1,000 for a maintenance fund. Claims allowed at the December 7, 1917 board meeting include four amounts to three different people for "cleaning ditch."

[3] There is an approximately 10-foot gap between the two end to end culverts. A third culvert only conveys flood flows from a "pressure" box structure and discharges to the Green River four feet in elevation above the 36-inch culvert,

Few fish surveys have specifically targeted the project site. No salmon or trout were recorded in surveys by the City of Tukwila (Jones and Stokes 1990) or the applicant (Daley Design 2000), though agency habitat biologists from King County and WDFW have reportedly observed salmonids in Johnson Ditch in the past. The Priority Habitat and Species database shows no known use of the site but this only indicates no confirmed sightings (WDFW 2004). Electrofishing surveys have recorded observations of threespine stickleback and sculpin (Daley Design 2000). A local resident reported capturing trout from the stream when he was a child some 20 to 30 years ago. Under current conditions, it is likely that salmonids occasionally access Johnson Ditch and its tributaries during suitable flows when the flood gate is stuck open. Johnson Ditch is assumed to be fish-bearing.

3.2 Proposed Mitigation

The Johnson Ditch mitigation project will create a meandering stream channel designed to provide good quality summer rearing and winter refuge habitats. Approximately 1,350 feet of the current ditch will be abandoned in favor of a newly constructed channel and associated floodplain (Figures 4 and 5).

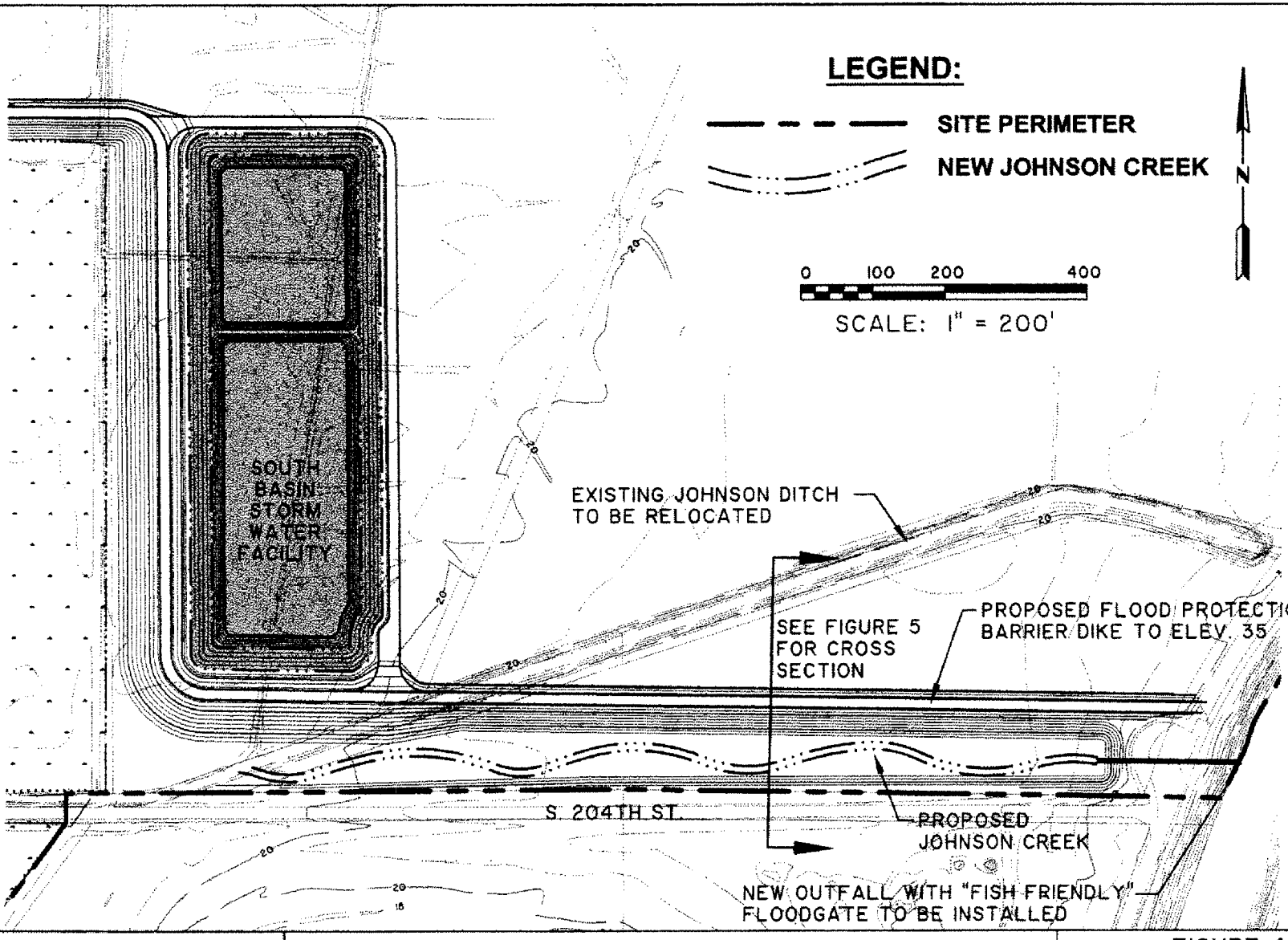
The riparian area will be planted with native species including emergents, herbs, shrubs, and large trees to enhance riparian habitat functions and values. The plants have been selected and located to provide a dense overhanging cover of native species over time. A mixture of palustrine emergent species, scrub-shrub species, and trees are proposed including rushes, sedges, willow, dogwood, salmonberry, western red cedar, and big leaf maple among others (Raedeke 2005). When the channel floods, the plants will slow the water's velocity along the shoreline, providing refuge habitat for fish and help protect banks from erosion. Runoff from S. 204th Street will work its way through the vegetation which will help remove sediment and pollutants. The dense plantings will fully shade the corridor over time helping to eliminate potential infestations of non-native species such as reed canary grass and Himalayan blackberry. Complete planting details are provided in Raedeke 2005. Large woody debris will be anchored to the banks to provide instream structure, water velocity modification, macroinvertebrate substrate, and amphibian shelter.

A new 200-foot long by 48-inch culvert will be located at a flat grade through the Green River levee at an elevation of 13-feet. The new culvert would be approximately 15 feet shorter than the existing culverts, and could be less if the emergency turn-around off of South 204th Street can be eliminated. A fish-passable flood gate will be installed at the confluence to the Green River to allow fish to migrate through the culvert and into the tributary under most flow conditions. The new Johnson Creek channel will connect back into the existing channel near the proposed Wetland 10 and 11 enhancements.

Potential sedimentation of Johnson Creek in the future will be a function of stream velocity, channel profile, and sediment supply. The proposed Johnson Creek layout includes a larger outfall culvert through the Green River levee and a slightly higher gradient. Thus velocities in the new channel are expected to be similar to or slightly higher than existing channel velocities (Larry Karpack, Northwest Hydraulics, personal communication). Under existing conditions, sedimentation of the channel has not generally been an issue. Ditch cleaning was last carried out in 2001 and very little additional sediment has accumulated in the interim. Past cleaning

activities have reportedly been undertaken primarily to remove clogging vegetation (reed canarygrass) rather than sediment (Mark Segale, Segale Properties, personal communication). The Tukwila South project will not lead to an increase in sediment input to Johnson Creek, and may in fact result in reduced sediment loads due to the elimination of existing farmlands bordering the channel, elimination of steep banks now along the ditch that periodically slough sediment into the channel, and a slight increase in the hydraulic energy passing through the channel. Runoff from the proposed site development will be treated and ordinarily discharge to the Green River by a separate outfall; discharging to Johnson Creek only during overflow conditions when the Creek area will be flooded due to high Green River flow elevations. Given (1) that sediment input potential to the Johnson Creek system will be reduced, (2) hydraulic energy increased somewhat, and (3) there has been no adverse collection of sediment in the existing ditched channel in the 4 ½ years since the last ditch maintenance, it is reasonable to conclude the proposed Johnson Creek restoration project will not have sedimentation problems.

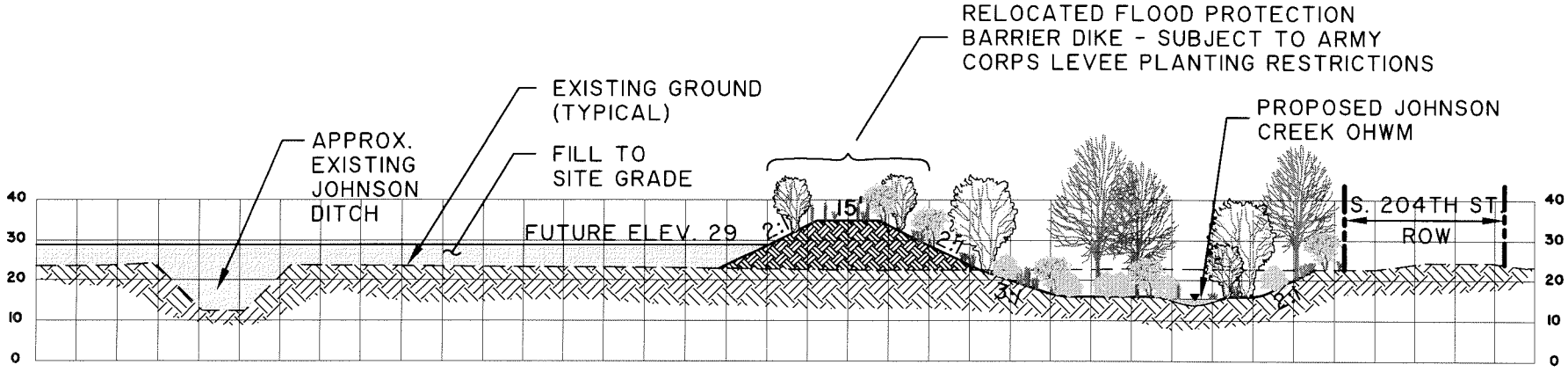
Enhancement, rehabilitation, and creation of approximately 35 acres of wetland tributary to Johnson Creek, and elimination/modification of some of the agricultural ditches dug historically to drain these wetlands will also indirectly benefit fish. The wetland mitigation plan is described by Raedeke (2005). Replacement of the ditches and crop/pasture lands with functional wetlands will re-establish a more natural hydrologic flow regime. Native plants re-introduced to replace the former agricultural crops and exotic pasture grass species will provide temperature modification and nutrient benefits.



GOLDSMITH & ASSOCIATES INC
Since 1958
Engineering · Land Use Planning · Surveying
1215 114th Avenue SE, Bellevue, WA 98004, P.O. Box 3565, Bellevue, WA 98009
OFFICE: (425) 462-1080, FAX: (425) 462-7719, staff@goldsmithengineering.com

FIGURE 4

TUKWILA SOUTH PROJECT
JOHNSON CREEK
REALIGNMENT



TYPICAL CROSS-SECTION

0 20 40 80 120

SCALE 1" = 40'

GOLDSMITH & ASSOCIATES INC.
HUGH G. Since 1958
Engineering - Land Use Planning - Surveying
1215 114th Avenue SE, Bellevue, WA 98004, P.O. Box 3565, Bellevue, WA 98009
OFFICE: (425) 462-1080, FAX: (425) 462-7719, staff@goldsmithengineering.com

FIGURE 5

TUKWILA SOUTH PROJECT
JOHNSON CREEK
RESTORATION PLAN
TYPICAL CROSS-SECTION

4.0 MONITORING

The purposes of the instream habitat monitoring program are: (1) to document physical and biological characteristics of the newly created stream and off-channel habitat; and (2) to ensure that design goals and objectives along with applicable permit specifications are met. Riparian buffer monitoring will be carried out in conjunction with the wetland plant monitoring. Details are provided by Raedeke (2005).

The monitoring process will consist of three distinct phases: (1) construction monitoring; (2) compliance monitoring; and (3) long-term monitoring. The following sections describe elements of an effective monitoring program and outline conceptual features of the various detailed monitoring programs that will be developed for the Tukwila South Project.

4.1 Construction Monitoring

Aquatic habitat monitoring during construction is separated into two components. The first deals with noise, visual, and direct instream disturbances created as work takes place in or adjacent to fish-bearing waters. These types of disturbances can significantly reduce habitat quality and potentially prevent fish from completing critical parts of their normal life-history phase (e.g. upstream migration). The second component deals with construction of new aquatic habitat designed to provide fish habitat.

Two potential construction disturbance issues have been identified for the Tukwila South Project: (1) filling of ditches, and (2) noise and visual disturbances to upstream migrants in the Green River.

No watercourse filling will proceed until all available instream habitat has been thoroughly electroshocked or seined to remove as many fish and amphibians as practicable. These actions will be conducted under terms of the Scientific Collection Permit required by WDFW. Each end of the watercourse to be filled will be blocked off with netting. Fish and amphibians will be removed following standard WDFW protocols and quickly transported to the nearest suitable habitat (normally downstream). Once aquatic biota have been removed, the channel will be permanently blocked, any flow will be diverted around the site, and the channel filled. Water quality will be monitored downstream of the construction area. The fisheries biologist will conduct fish removal actions after first receiving appropriate permits and be on-site as necessary during construction to ensure adjacent habitat was adequately protected. If any signs of fish distress or mortality are observed, construction will be halted until appropriate preventative measures can be undertaken. WDFW will be contacted to discuss these measures as required in the HPA permit.

During all in-water work activities in the Green River[4] the adult Chinook population will be monitored to ensure actions on the bank are not inhibiting upstream migration for substantial numbers of fish. Once a day, during the middle of the day, a trained fisheries biologist will check

[4] Instream construction will be limited to the USFWS and NMFS approved work period between August 1 and August 31.

the river downstream of the work area for several hundred feet. Should an unusually large number of fish be observed waiting downstream of the site (numbers to be determined in conjunction with tribal and WDFW fisheries biologists), construction will be temporarily halted to allow fish an opportunity to swim past the site with less disturbance. Once the majority of fish have moved upstream, or if the fish did not move upstream after 60 minutes, work will be allowed to proceed. Fish movement during non-working hours will never be blocked.

Prior to filling of any watercourses or construction within 50 feet of the Green River we recommend a pre-construction meeting to include the contractor, fisheries biologist, water quality biologist, and agency representatives. The purpose of the meeting will be to review permitting requirements, discuss the mitigation plan requirements, establish a pathway of communication during construction, agree upon the construction sequence, and address and resolve any questions.

The second component of instream habitat monitoring deals with ensuring new habitat construction meets all goals of the design and permits. Again, we recommend a pre-construction meeting of the personnel responsible for the design and those responsible for establishment of instream habitats. The purpose of the meeting will be to review the intent of the mitigation plan, establish a pathway of communication during construction, agree upon the construction sequence, and address and resolve any questions.

The project fisheries biologist will be present on-site during the various stages of project implementation. Duties will be to: (1) assist in laying out the bounds of the new stream channel; (2) inspect the material to be used for large woody debris and identify their final placement locations; (3) assist equipment operators with precise construction of habitat features as designed in the plans; (4) make field adjustments to the designs as necessary to conform to field conditions; and (5) resolve problems that arise during restoration, thus lessening problems that might occur later during the long-term monitoring phase.

4.2 Compliance Monitoring

Compliance monitoring consists of evaluating streams and buffers immediately after construction. The objectives will be to verify that all design features, as agreed to in the various plans, have been correctly and fully implemented, and that any changes made in the field are consistent with the intent of the design. Evaluation of the planting areas after restoration will be done by the landscape architect and project wetland biologist and is described further by Raedeke (2005). Evaluation of the instream work will be completed by the project fisheries biologist. Evaluation standards and criteria are discussed below.

The compliance monitoring phase will conclude with the preparation of a brief compliance report from the project biologists. The report will verify that all design features have been correctly, fully, and successfully incorporated, and if not, detail what is required to ensure that successful incorporation of all design features are constructed.

Substantive changes made in the plans will be noted in the compliance report and on the drawings for use during the long-term monitoring phase. Information on changes will include what was done, where, why, at whose request, and the result of the change. Locations of

monitoring stations established for the compliance monitoring will be identified on the as-built plans. The planting and instream habitat design plans together with the compliance report will document "as-built" conditions at the time of construction compliance.

The instream habitat compliance report will detail the final physical characteristics of new habitat including stream lengths, widths, and depths (average and range at ordinary high water mark). Large woody debris pieces will be counted and an average size reported. Log jams will be described in terms of number of logs, range and average of log size used, center of pile, and anchoring details. Representative monitoring stations will be established for photo-documentation over the long-term monitoring program.

The compliance report and as-built drawings will be submitted to the City of Tukwila, the Washington Department of Ecology (DOE), Washington Department of Fish and Wildlife (WDFW), and the U.S. Army Corps of Engineers (COE).

4.3 Long-Term Monitoring

Monitoring to evaluate the success of instream habitat creation shall take place once each summer for the first five years after completion of the work. Monitoring shall evaluate each of the following factors:

- Channel and Bank Erosion
- Fish Access
- Habitat Suitability
- Fish Stranding
- Riparian Vegetation

Channel and Bank Erosion

The purpose of the plan is to restore Johnson Creek and the Green River off-channel area to a relatively natural condition, thus a certain amount of erosion is to be expected as the channels adjust to the new configuration. During years with unusually heavy flows, bank erosion may be considerable. However, overall habitat stability will be assessed to ensure construction efforts have resulted in a relatively stable environment with no unusually slide-prone or erosive features. Problem areas could be those that are slumping or eroding due to misguided stormwater runoff or where reconfiguration of the channel has resulted in flows being increased along a bank for example. Erosion of areas adjacent to the channels is expected to abate somewhat as vegetation matures. Those areas that still show unusually high erosion after 5 years will be noted in the report and discussions with permitting agencies undertaken to identify any appropriate additional mitigation work. Bed erosion (and or deposition) is expected to be continuous and will not be evaluated except in the case where fish access or stranding becomes an issue (discussed below).

Fish Access

Fish access to the new off-channel refuge and holding area in the Green River, and from the Green River into Johnson Creek will be evaluated each year to ensure passage into the new habitat is maintained. While some sediment deposition in the new Green River habitat area is

expected, the deposition patterns are not expected to result in the off-channel rearing area becoming isolated to fish. Deposition will be evaluated and mapped each year during the low flow period. If isolation of significant portions of habitat becomes a concern, it will be noted in the report and discussions with permitting agencies undertaken to identify any appropriate additional mitigation work. This mitigation might consist of placement of bed roughness material (e.g. boulders, LWD) to change flow patterns. The new flap gate installed on the culvert outlet from Johnson Creek to the Green River will be periodically evaluated to assess flood protection and fish access functions. Any adjustments will be noted in the report.

Habitat Suitability

Design goals require creation of off-channel rearing and holding habitat in Johnson Creek and the Green River. A qualitative assessment of select areas of both sites will be made each year to describe habitat suitability in terms of average channel depths, widths, and flow velocities. As instream habitat conditions are expected to remain in a state of natural and constant flux, habitat descriptions will be qualitative in nature and be used only to determine whether overall habitat goals are being met. Any concerns will be addressed in the annual report. Riparian vegetation will be assessed for expected development of shade, bank stability, overhead cover, and other functions. Photos will be taken each year to record conditions and document any changes. These will also be included in the report.

Fish Stranding

Final design considerations for new and restored channels and wetlands shall include features to ensure that “attractive nuisances” such as isolated ponding areas or channels are not intentionally created. Monitoring shall include evaluation of any potential stranding hazard locations that might develop over time and observations of any stranded fish or carcasses.

Riparian Vegetation

Vegetation planted adjacent to the Green River and Johnson Creek habitat creation areas will be monitored in conjunction with the wetland vegetation monitoring. The vegetation monitoring plan is described in detail by Raedeke (2005).

5.0 PERFORMANCE STANDARDS

The overall evaluation criteria will be whether or not aquatic features created by the project provide usable fish habitat rather than try to quantify changes in the habitat. Aquatic habitat quality and use by fish is dependent on a variety of factors, many of which are out of control of the project designers and owners (flow, sediment movement, ocean conditions, etc.). Aquatic habitat quality in any system changes constantly and fish use varies in response. Monitoring data will be gathered which will allow resource agencies to judge whether or not the habitat continues to function in a manner conducive to use by regional fisheries resources for rearing and refuge as dictated by the seasons. Riparian vegetation performance standards are provided in Raedeke 2005.

5.1 Channel and Bank Erosion

Channel banks should be relatively stable with no unusually large erosive features. Unacceptable conditions will include any areas that are slumping or eroding due to actions directly related to construction of the project, or large areas of erosion where no manmade cause is evident. Small areas of bank erosion are to be expected as the stream settles into its new channel. If erosion leads to a significant loss of planted material, it may be allowed to continue if deemed part of a natural process. However, an equivalent number of plants will be replanted in any new depositional areas created as a result of channel movements.

5.2 Fish Access

The new Green River off-channel habitat area and Johnson Creek should remain accessible to fish in the Green River at all times except during summer low flows when water depths may be inadequate to allow fish to move through the new flap gate. Should deposition appear to hinder access to the habitat area, an hydraulic engineer will be called for further inspection. The new flap gate should operate as designed to prevent flooding and stay open during non-flooding periods. Any adjustments should be worked out during the five years of monitoring.

5.3 Habitat Suitability

The Green River off-channel habitat area should continue to provide off-channel rearing area for juvenile fish, especially during the winter and spring migration periods. Minimum depths over 50 percent or more of the created habitat area should not diminish below 2 to 3 feet during this period in the normal water year. Key pieces of large woody debris should remain in the vicinity of where it was originally anchored. Pieces that move should be evaluated for function and if found lacking (i.e. no longer in the channel or not available for future recruitment), should be moved back to the channel. Much of the habitat diversity (channel meanders, LWD, etc.) built into Johnson Creek should remain though some channel changes are inevitable.

5.4 Fish Stranding

Attractive nuisances such as isolated ponding areas or cut-off channels should not develop over time. These could occur in the mainstem Green River as new gravel bars develop in the channel or in the newly created wetlands tributary to Johnson Creek. Monitoring shall include evaluation of any potential stranding hazard locations that might develop and observations of any stranded fish or carcasses. Corrective measures shall be identified as necessary.

6.0 CONTINGENCY PLAN

Failure to meet performance standards will result in implementation of contingency measures. Contingency measures will generally consist of:

- Developing a plan in conjunction with the appropriate agencies,
- Carrying out the plan, and
- Additional monitoring to ensure repairs have corrected the problem and led to a reasonable expectation that performance standards will be met in the future.

Due to an inability to anticipate all possible problems and their solutions at this time, it is not possible to develop a detailed contingency plan until specific problems that need to be addressed are known. However, issues of bank erosion will generally be dealt with using bioengineering techniques; fish access problems in the Green River will be solved by moving existing large woody debris as necessary to provide scouring in suitable locations; fish access into Johnson Creek will require additional coordination between the gate manufacturer and maintenance personnel; habitat suitability issues will be worked out with WDFW and generally involve installation of additional habitat features such as LWD, boulders, or plantings; fish stranding involving minor configuration changes to instream habitat will also be coordinated with WDFW.

The contingency plan may require extension of the monitoring phase of the project, especially if major changes in the plan are required. Recommendations for identified problems should be made by the project biologist representative in consultation with the project managers and civil engineers.

7.0 LITERATURE CITED

City of Kent and King County. 1997. West bank shelf conceptual revegetation plan, S. 200th Street, Green River Bridge. City of Kent Engineering Department, Kent, WA., and King County Dept of Transportation. (provided as appendix to this document).

Collins B. and A. Sheikh. 2004. Historical aquatic habitats in the Green and Duwamish River Valleys (May 17, 2004 Draft). Report to King County Dept. of Nat. Res. and Parks, Seattle, WA. 77p.

Daley Design. 2000. Habitat assessment of Johnson drainage ditch. Consultant's report prepared for Mario Segale. August 12, 2000. 2pp plus appendix.

Daley Design. 2001. Amended report and habitat assessment of Johnson Creek drainage system. Consultant's report prepared for Mario Segale. February 14, 2001. 3pp plus appendix.

Jones and Stokes Associates. 1990. City of Tukwila watercourse ratings data sheets. Consultant's report prepared for the City of Tukwila. October 29, 1990.

Kerwin, J. and T.S. Nelson. (Eds.). 2000. Habitat limiting factors and reconnaissance assessment report, Green/Duwamish and Central Puget Sound watersheds (WRIA 9 and Vashon Island). Washington Conservation Commission and the King County Department of Natural Resources.

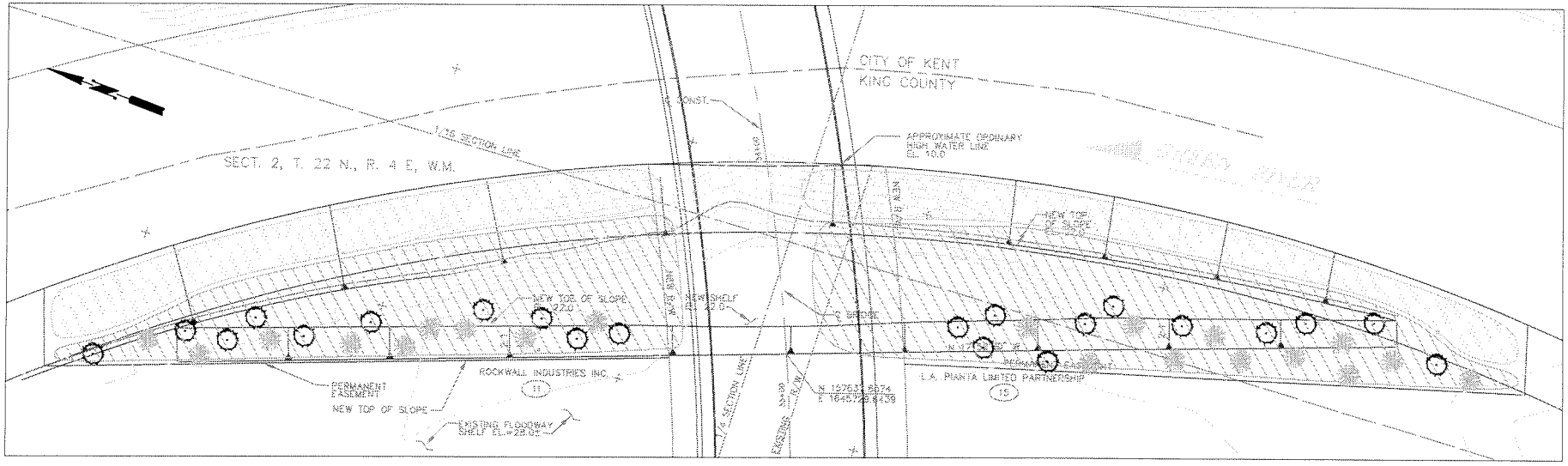
Mullineaux, D.R. 1970. Geology of the Renton, Auburn and Black Diamond quadrangles, King County, WA. USGS Professional Paper 672. 92 p.

Raedeke. 2005. Wetland mitigation plan, Tukwila South Development. Consultants report prepared for Mark Segale, La Pianta LLC. Tukwila, WA. 25 pp plus appendices.

Washington State Department of Fish and Wildlife (WDFW). 2004. Priority habitats and species database search, April 12, 2004. Olympia, Washington.

APPENDIX

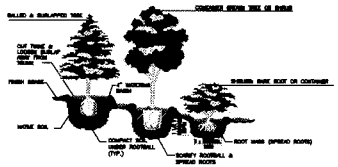
S. 200TH Street Planting Plan for West Bank Shelf
(City of Kent and King County 1997)



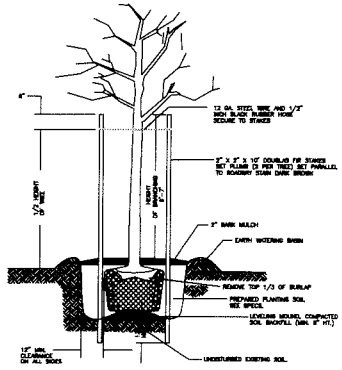
WEST BANK SHELF – CONCEPTUAL REVEGETATION PLAN

PLANT LEGEND

KEY	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE	CONDITION	SPACING
		CONIFEROUS TREES				
	20	Picea sitchensis	Sitka Spruce	3-4'	B&B	as shown
		DECIDUOUS TREES				
	10	Malus fusca	Western Crabapple	4-5'	B&B, cont.	as shown
	10	Fraxinus latifolia	Oregon Ash	4-5'	B&B, cont.	as shown
		SHRUBS				
	50	Corylus conuta	Western Hazelnut	1 gal.	container	6' o.c.
	60	Lonicera involucrata	Black Twinberry	1 gal.	container	5' o.c.
	100	Physocarpos capitatus	Pacific Ninebark	1 gal.	container	6' o.c.
	50	Ribes bracteosum	Stink Currant	1 gal.	container	5' o.c.
	100	Rosa Nutkana	Nootka Rose	1 gal.	container	6' o.c.
	80	Rubus spectabilis	Salmonberry	1 gal.	container	6' o.c.
		LIVE CUTTINGS				
	200	Cornus stolonifera	Red Osier Dogwood	2-3'	1"diam. stakes	24" o.c.
	100	Salix lasiandra	Pacific Willow	2-3'	1"diam. stakes	24" o.c.
	100	Salix scouleriana	Scouler's Willow	2-3'	1"diam. stakes	24" o.c.
	100	Salix sitchensis	Sitka Willow	2-3'	1"diam. stakes	24" o.c.



TYPICAL PLANTING DETAIL N.T.S.



TYPICAL TREE STAKING DETAIL N.T.S.

PLANTING SPECIFICATIONS:

A. Soil

1. Amend existing soil by incorporating 2" organic material into each planting hole, mixing well with existing soil. Product shall be 100% composted hardwood bark, free of all noxious weed, chemicals, or toxic materials. Particle size shall be fine with 100% passing through a 7/16" screen. Cedar Grove Compost (or equivalent) is recommended.

B. Planting

1. Do not disturb existing native vegegation.
2. Excavate plant hole twice as wide in diameter than the diameter of the rootball.
3. Set plant in it's normal up-right growing position and at the same depth as originally grown. Pull burlap back from top 1/3 of root ball on B&B material. Backfill completely around roots with existing soil as amended under A. Soil above, eliminating all voids. Adjust the plant to a vertical position. Form 2" soil berm around shrubs and trees to form a water basin.
4. Staking: Stake all trees with three 2x2 stakes per tree staking detail. Drive stake securely into firm soil below plant hole. Place stake 12" from trunk of tree, do not drive through rootball. Tie trunk to stake with 12 gauge aluminum wire encased in rubber hose and twisted into a figure eight between trunk and stake. Wire must not be in contact with trunk (only rubber hose).
5. Mulch: All planted areas shall receive a two inch layer of organic material as specified under A. Soil.

C. Maintenance

1. Hand water until ground is saturated once per week through first growing season.

NO.	REVISION	BY	DATE
1	ADDENDUM NO.1	MPM	5/14/97

DESIGNER: MPM | CHECKED: | PROJECT NO.: 91-3024/91-3028 | SCALE: HORIZ. 1"=20' | VERT. NA
DRAWN: WJM | PROJECT ENGR.: MPM
APPROVED: CITY ENGINEER | DATE: 4-29-97

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES ACCORDINGLY. 0" 1"

CITY OF KENT
ENGINEERING DEPARTMENT
220 4TH AVE. S.
KENT, WA. 98032

KING COUNTY
DEPT. OF TRANSPORTATION

WEST BANK SHELF
KING COUNTY/CITY OF KENT
S. 200TH ST./GREEN RIVER BRIDGE

SHEET: OF
FILE NO.

E-mail chain showing source and purpose of preceding drawing:

-----Original Message-----
From: Mactutis, Mike [mailto:MMactutis@ci.kent.wa.us]
Sent: Thursday, March 24, 2005 1:12 PM
To: Jay Babcock
Subject: RE: S. 200th Bridge

Jay,

I don't have a letter stating that. There would be letters, reports, permits and other correspondence if this was a mitigation or enhancement project, but since it was simply revegetating the riverbank that was graded during the bridge construction, the vegetation plan is all the documentation I have.

Mike

> -----Original Message-----
> **From:** Jay Babcock [mailto:jbabcock@segalebp.com]
> **Sent:** Thursday, March 24, 2005 9:05 AM
> **To:** Mactutis, Mike
> **Subject:** RE: S. 200th Bridge
>
> Thank you!
>
> Mike, could you email me a note or a copy of the letter you have to King Co. stating that this was a re vegetation project and not a wetland enhancement or mitigation area.
>
> Thanks
>
> Jay
>
> > -----Original Message-----
> > **From:** Mactutis, Mike [mailto:MMactutis@ci.kent.wa.us]
> > **Sent:** Thursday, March 24, 2005 8:28 AM
> > **To:** Jay Babcock
> > **Subject:** FW: S. 200th Bridge
> >
> > > -----Original Message-----
> > > **From:** Nopp, Fauna [mailto:Fauna.Nopp@METROKC.GOV]
> > > **Sent:** Wednesday, March 23, 2005 4:36 PM
> > > **To:** Mactutis, Mike
> > > **Subject:** FW: S. 200th Bridge
> > >
> > > Hi Mike,
> > > Attached is the planting plan you requested in an ACAD file. Let me know if you have any problems opening it. I can also send you a hard copy if you'd like. I just need your mailing address.
> > >
> > > <<BRIDGE.ZIP>>

FAUNA G. NOPP
Landscape Architect, Capital Projects & Open Space
Water and Land Resources Division
King County Department of Natural Resources & Parks
201 S. Jackson St., Suite 600
Mail Stop - KSC NR-0600
Seattle, Wa 98104
206-296-8499 fauna.nopp@metrokc.gov

EXHIBIT 3

Wetland Mitigation Plan
(Raedeke Associates, Inc., June 2005)

WETLAND MITIGATION PLAN

Tukwila South Development
Tukwila, Washington

April 20, 2005
Revised June 29, 2005

RAEDEKE ASSOCIATES, INC.

Prepared for:	Mr. Mark Segale LaPianta, LLC P.O. Box 88028 Tukwila, Washington 98138-2028
Title:	Wetland Mitigation Plan for the Tukwila South Property Tukwila, Washington
Project Number:	2001-014-003
Prepared by:	RAEDEKE ASSOCIATES, INC. 5711 Northeast 63rd Street Seattle, Washington 98115 (206) 525-8122
Date:	April 20, 2005 Revised June 29, 2005

Principal:	Kenneth J. Raedeke, Ph.D. Certified Senior Ecologist, ESA
Project Manager:	Christopher W. Wright, B.S. Soil and Wetland Scientist
Project Personnel:	G. Emmett Pritchard, B.S. Ecologist
	Gail W. Livingstone, B.S.L.A. Natural Resource Planner
	Claude McKenzie, B.A Landscape Architect
	Lisa Danielski, B.A. Wetland Ecologist/Botanist

TABLE OF CONTENTS

Page

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

1.0 INTRODUCTION

This report describes the wetland mitigation measures to be implemented to replace wetland habitat losses resulting from the proposed development of the Tukwila South Property.

This report and attached drawings outline proposed plans for enhancement of existing degraded wetlands, rehabilitation of previously altered wetlands, and creation of new wetland habitats to compensate for impacts to approximately 9.45 acres of wetland habitat on-site.

1.1 PROJECT LOCATION

The project area occurs west of the Green River between S. 178th Street and S. 204 Street, east of Orillia Road in Tukwila Washington (Figure 1). The proposed compensatory wetland mitigation areas are located in the southern and eastern portions of the Tukwila South project area (Figure 1).

The Tukwila South Property is an approximately 500 acre property located in Section 3, Township 22 North, Range 4 East, W.M., in the City of Tukwila, Washington (Figure 1). The property lies east of Orillia Road and west of the Green River between S. 178th Street and S. 204 Street. A portion of the property that is included in the compensatory mitigation planning area extends south of S. 204th Street. Project area boundaries are depicted on maps prepared by Hugh G. Goldsmith and Associates, Inc.

1.2 EXISTING CONDITIONS – WETLAND DELINEATION

Seventeen wetlands with a total area of nearly 49 acres were identified and delineated on the property. Wetland descriptions are found in the Wetland Assessment (Raedeke Associates, Inc. 2005b) report prepared for the Tukwila South draft EIS. Vegetation in the rehabilitation mitigation wetland is dominated by reed canarygrass. Scrub-shrub vegetation occurs along the western portions of the rehabilitation mitigation site and includes a mixture of red alder, Scouler's willow, and black cottonwood trees. Johnson Ditch conveys water east from the mitigation site. The proposed off-channel wetland mitigation area and Johnson Creek wetland mitigation area are currently farmed agricultural fields and do not support wetlands at their existing elevations.

Wetland portions of the site receive surface water runoff from higher ground to the west of the property as well as seasonally high groundwater. Agricultural drainage ditches convey drainage through or around Wetlands 5, 7, 8, 9, and 10 in the portion of the property between S. 200th Street and S. 204th Street. The East Fork Johnson Ditch conveys drainage along the east edge of Wetland 11, south of S. 204th Street.

Continuous groundwater aquifer static water level data from three monitoring wells in the rehabilitation wetlands area are attached as an appendix to this document (October 2003 through March 2005). Groundwater monitoring of the shallow aquifer will continue through the spring and early summer 2005 prior to implementation of the mitigation plan. Data from this monitoring will be used to revise the grading and planting plans if necessary. Shallow piezometers are installed in the compensatory mitigation areas where rehabilitation is proposed. Eight piezometers are in Wetland 11, south of S. 204th Street, six are installed in Wetland 10 between S. 200th Street and S. 204th Street. Water levels in these piezometers will be read and recorded approximately every five days from April 11, 2005 through the early summer, or until they are dry.

1.3 IMPACTS – PROJECT DESCRIPTION

The Tukwila South development project is intended to create a viable employment and emerging advanced technology commercial hub in a large-scale campus setting on the 498-acre site. Fundamental components of the site development concept are the extension and expansion of Southcenter Parkway through the site, and relocation of the flood barrier dike from South 196th Street to the southern boundary of the site (north of South 204th Street).

Proposed development of the property would result in alteration of approximately 9.45 acres of existing wetland habitat. Approximately 7.4 acres of the wetlands to be altered are degraded agricultural fields that are annually tilled and planted. The proposed mitigation sites have been used to graze livestock or grow crops and livestock forage for many years.

The wetland mitigation plan would remove reed canarygrass and expand the area of scrub-shrub and forested wetland vegetation on the site. Grading of the existing degraded wetlands would alter the hydrologic regime in portions of the mitigation area by varying elevation within a relatively low range (less than 2 feet). Hydrology would be rehabilitated in most of Wetlands 10 and 11 by breaking all drainage tiles and by either plugging and dispersing drainage ditch water through the rehabilitated wetland areas, or excavation into a (largely) offsite drainage ditch at the point where it enters the property to allow drainage flow to disperse through a rehabilitated wetland area. These activities, in combination with soil scarification, cessation of mowing, removal of invasive species, removal of grazing, establishment of native plant communities, and monitoring to prevent invasive re-establishment and ensure native plant success, are proposed to establish wetland plant communities and habitat functions and values that do not currently occur on the site.

Excavation to allow the East Fork of Johnson Ditch to flow into the wetland rehabilitation area will restore hydrology to large portions of the mitigation area previously altered by ditching and tilling of the agricultural field. A natural flow regime

will be restored to Wetland 11 by breaching a portion of the west bank of East Fork Johnson Ditch. The establishment of natural flows and establishment of a native plant community is anticipated to rehabilitate 21.7 acres of Wetland 11.

Water that currently flows from Wetland 13, north of S. 200th Street will be routed to the northern portion of the wetland rehabilitation area to restore hydrologic regimes in the wetlands and restore previously affected flow paths. Two linear drainage ditches in the northern portion of the wetland rehabilitation area that now drain Wetland 10 would be blocked and dispersed through the rehabilitated wetland. A drainage ditch conveying flow around Wetland 10 would be plugged and dispersed into the eastern portion of Wetland 10. Drainage tiles would be broken in Wetland 10. These activities are anticipated to rehabilitate the eastern and southern 6.1 acres of Wetland 10.

Wetland enhancement would involve excavation and grading, removal of invasive species, breaking drainage tiles, and establishment of native plant communities in areas within Wetlands 10 and 11 that are degraded by invasive plants, mowing, and livestock grazing. The portion of Wetland 10 with forested scrub-shrub native plant community characteristics and the small stream J-2 would be retained within the compensatory mitigation plan, but invasive plant species would be removed, and native plant communities would be re-established.

Wetland creation would involve excavation and grading of three existing upland areas in order to establish elevations that will support wetland hydrology. The three areas of wetland creation are: (1) conversion of upland to wetland within the northwest portion of Wetland 10; (2) creation of wetland along the Green River within an Off-Channel Habitat Restoration Area by relocation of the Green River levee and excavation on the river side of the relocated levee; and (3) creation of wetland associated with a restored Johnson Creek channel, a tributary to the Green River which conveys drainage from the Wetland 10 and 11 compensatory mitigation areas to the Green River. The newly graded areas will be planted with species adapted to the hydrologic regimes determined by measurements from: (1) shallow groundwater monitoring wells since October 2003, for the purposes of wetland creation adjacent to the new Johnson Creek channel, and wetland rehabilitation, enhancement, and creation in Wetlands 10 and 11; and (2) Green River stage height flow duration data for wetland creation adjacent to the Green River.

All wetland mitigation areas will, at a minimum, have wetland hydrology within the majority of the root zone (saturation within 12 inches of the ground surface) for at least 12.5% of the growing season.

2.0 MITIGATION OVERVIEW

Mitigation has been defined by the State Environmental Policy Act (SEPA) (WAC 197-11-768; cf. Cooper 1987), and more recently in a Memorandum of Agreement between the Environmental Protection Agency and the COE (Memorandum 1989). In order of desirability, mitigation may include:

1. ***Avoidance*** - avoiding impacts by not taking action or parts of an action;

2. ***Minimization*** - minimizing impacts by limiting the degree or magnitude of the action and its implementation;

3. ***Compensatory Mitigation*** - which may involve:

   a) repairing, rehabilitating, or restoring the affected environment;

   b) replacing or creating substitute resources or environments;

   c) mitigation banking.

2.1 MITIGATION APPROACH AND SEQUENCE

2.1.1 Avoidance of Impacts

Direct impacts (i.e., fill or excavation) to on-site wetlands and their buffers would be largely avoided under the proposed plan. Direct impacts are limited to 20% of wetlands on the property. Thus, 80% of the existing wetland acreage on-site would be retained under the proposed development. Additionally, the majority (7.47 acres of 9.45 acres) of the proposed fill will be to farmed wetlands that are annually tilled and planted with corn. The relationship between the Project's Purpose and Need and explanation for the causes of all wetland impacts is described in the *Explanation of Unavoidable Wetland and Stream Impacts*, which is attached to the JARPA application for the project in Section 7b. Since the JARPA application, a summary table specifically identifying impacts and their causes to each wetland and stream has been added to the Explanation. The Explanation and summary table are attached as appendix to this document.

2.1.2 Minimization of Impacts

The site plan incorporates a number of design features that would minimize or limit impacts to the wetlands and wildlife, including:

- retaining the majority (80 percent) of the existing wetland habitat;

- providing functional buffers along the upland edges of the rehabilitated and created

wetlands on the site;

- clearly marking the limits of wetland buffers or setbacks prior to construction activities to prevent inadvertent or unnecessary encroachment; and

- installing and maintaining temporary and permanent soil erosion control measures for Wetlands 1, 10, and 11 during and after construction, consistent with Best Management Practices, as required by the City of Tukwila to limit the potential for sediment deposition or erosion in the retained wetlands.

2.1.3 Compensatory Mitigation Overview

The Washington Department of Ecology, U.S. Army Corps of Engineers, and U.S. Environmental Protection Agency *Guidance on Wetland Mitigation in Washington State – Part 1* (2004) defines wetland rehabilitation as "actions which provide greater gains in a whole suite of functions both at the site- and landscape-scale." Wetland enhancement is defined as "actions often focused on structural or superficial improvements to a site and generally do not address larger scale environmental processes." (Washington Department of Ecology 2004.)

The 2004 Guidance states that the distinction between rehabilitation and enhancement is difficult to define, however, on a specific project, mitigation actions that are determined to be more effective in improving wetland functions would be considered rehabilitation while actions that are less effective in improving wetland functions are considered enhancement. Table 5 in the 2004 Guidance contains examples of site alterations and their relative effectiveness as wetland compensation actions. This portion of the guidance identifies removal of dikes, breaking drainage tiles, and plugging of ditches as actions generally considered rehabilitation. The project cannot feasibly propose removal of the Green River levees to restore flooding to portions of the lower Green River valley, however it is able to break drainage tiles, and wholly plug drainage ditches where they are contained within the property, or excavate to partially breach a significant off-site drainage ditch at the point where it passes into and out of the property. Other actions to counter site alterations from prior activities identified by Table 5 and proposed as part of the wetland rehabilitation and enhancement compensation include cessation of tilling and mowing, scarification, establishment of native plant communities and removal of invasive species (including monitoring to prevent reintroduction), and removal of grazing.

This mitigation plan proposes to enhance, rehabilitate, and create wetland habitats on the Tukwila South project site. Enhancement of wetlands would involve removing existing invasive plant species and replanting with native plants. Approximately 4.35 acres of existing wetland would be enhanced. Rehabilitation of wetlands would involve restoring previously present hydrologic regimes to the wetlands by re-routing previously ditched flow paths to the wetland areas and revegetating with plant species associated with

riparian wetland communities. Approximately 27.8 acres of wetland would be rehabilitated. Creation of wetlands entails excavation of existing uplands in order to establish wetland hydrologic conditions and planting with wetland vegetation species. The mitigation plan intends to create 3.05 acres on new wetland on the Tukwila South property. As proposed, the compensatory wetland mitigation plan provides approximately 2.5 more acres of wetland creation than is required. This area is reserved as a contingency for unanticipated impacts or lack of success in other portions of the mitigation areas.

Compensatory mitigation for the impacts to 9.45 acres of wetlands on the Tukwila South Property includes enhancement, rehabilitation, and creation of 35.47 acres of wetland on-site. These actions would provide functional replacement of 12.25 acres of wetland in accordance with the City of Tukwila (2004) Municipal Code:

- Enhancement of 4.35 acres of existing on-site wetland at a ratio of 3:1, resulting in 1.45 acres of compensatory mitigation.
- Rehabilitation of 27.8 acres of existing on-site wetland at a ratio of 3:1, resulting in 9.27 acres of compensatory mitigation.
- Creation of 3.05 acres of new wetland at a ratio of 2:1, resulting in 1.53 acres of compensatory mitigation.

The Washington Department of Ecology recommends specific standard mitigation ratios to compensate for wetland impacts. Ecology explains the rationale behind the standard mitigation ratios in its August 2004 draft *Wetlands in Washington State, Volume 2: Guidance for Protecting and Managing Wetlands* (Volume 2 Guidance). *Appendix 8-C, Guidance on Buffers and Ratios – Western Washington*, lists the basic assumptions for using Ecology's guidance on ratios. These include the following:

- The ratios assume compensatory mitigation does not create, restore, or enhance an "atypical" wetland (one that does not naturally fit within the landscape situation). In this case, the project proposes to compensate by constructing wetland communities likely to have been historically present in the lower Green River valley prior to human interventions including White River re-routing, levee construction, dam building, and agricultural fill and ditching.
- The ratios are for a concurrent compensatory mitigation project. The compensatory mitigation is concurrent with project construction and on the same site.
- The ratios are based on the assumption that the hydrogeomorphic (HGM) class of the wetland proposed as compensation is the same as the impacted wetland. The project largely proposes to create, rehabilitate, and enhance wetlands of the same HGM class, with the exception of wetland creation along the Green River. Direct riverine-associated wetlands are now largely missing along the Green River

because of the levees constructed early last century; however that type of wetland was historically present in the lower Green River valley

- Ratios for projects in which the HGM class of wetlands is not the same as that of the impacted wetland should be determined on a case-by-case basis using the recommended ratios as a starting point. The project proposes to use the recommended ratios for the Green River associated wetland creation.

- The recommended ratios for compensatory wetland mitigation are based on replacing an (Ecology classification system) Category I or II wetland with a Category II wetland, and replacing a Category III or IV wetland with a Category III wetland. The project proposes to replace impacts to Ecology Category II, III, and IV impacts through the creation, rehabilitation and enhancement of wetlands to Category II criteria.
- The ratio for using enhancement alone, without any replacement of wetland area, is 4 times that for restoration or creation. The project proposes a combination of enhancement, creation, and rehabilitation.
- If the area of impacted wetland is replaced at a 1:1 ratio through restoration or creation, the remainder of the area needed to meet the required total ratio for restoration or creation can be replaced by enhancement at a 2:1 ratio. The project proposes to create, rehabilitate, and enhance wetlands at ratios which vary by impact wetland Category, as shown in Table 1, and generally exceed the guidance provided in this bullet.

Ratios are higher for higher quality wetland impacts because the risk of achieving function and values replacement is higher, and are lower for lower quality wetland impacts because the risk of achieving function and values replacement is lower (*Appendix 8-F, Rationale for Draft Guidance on Ratios*). Similarly, when replacement wetlands will have fewer functions and values or perform functions at a lower level than the impacted wetlands, then mitigation ratios must be higher to compensate. Conversely, when replacement wetlands will have more functions and values and perform functions at a higher level than the impacted wetlands, then mitigation ratios can be lowered and still compensate. The project proposes to compensate with higher and more functions and values for most of the impacted wetlands, and thus proposes lower than standard mitigation ratios for those degraded wetlands. Where impacts are proposed to non-degraded wetlands, the project proposes to use Ecology's standard mitigation ratios to compensate for wetland impacts.

For the purposes of this project, it is proposed that compensatory mitigation ratios for impacts to the farmed wetlands be two times the recommended standard creation ratio for enhancement and 1.25 times the recommended standard creation ratio for rehabilitation. The Department of Ecology Volume 2 Guidance allows for reduction of mitigation ratios provided that certain criteria are met. *Appendix 8-C, Guidance on Buffers and Ratios – Western Washington*, indicates that reductions in replacement ratios are appropriate when *"documentation by a qualified wetland specialist demonstrates that the proposed*

mitigation actions have a very high likelihood of success based on prior experience," and when *"documentation by a qualified wetland specialist demonstrates that the proposed actions for compensation will provide functions and values that are significantly greater than the wetland being impacted."* Clarification of what constitutes high likelihood of success also can be found in the section of Appendix 8-C that describes when increases in replacement ratios are appropriate. Where these situations do not exist, then either standard ratios or potentially smaller ratios may be warranted. The circumstances that could lead to increases in replacement ratios are the following:

1. *"Uncertainty exists as to the probable success of the proposed restoration or creation."* In this case, wetland hydrology will be provided by baseflow springs from the western hillslopes to the Wetland 10 area, from the regional shallow aquifer as demonstrated by the groundwater static water level data (late 2003 through present) from three wells surrounding the wetland compensatory mitigation area for the entire Wetland 11 and Johnson Creek wetland compensatory mitigation areas, and by stage height data for the Green River for the Green River compensatory mitigation areas. For these reasons, the hydrology to support the proposed vegetation communities and functions and values is assured with extremely low risk of failure.
2. *"A significant period of time will elapse between impact and establishment of wetland functions at the mitigation site."* In this case, the wetland impacts are proposed to occur during the 2006 construction season. The compensatory wetland mitigation south of S. 204th Street and the Johnson Creek wetland creation would be constructed and planted during the 2006 construction season. The wetland creation associated with the Green River habitat creation would be largely excavated during the 2006 construction season, and completed and planted during the 2007 construction season. The compensatory wetland mitigation north of S. 204th Street would be constructed and planted during the 2007 construction season. Wetland compensation would be completed in stages of approximately 6 months and 18 months after wetland impacts. In addition, because the degraded wetlands where lower than standard mitigation ratios are proposed have such low functions and values, relative to the compensatory mitigation proposed, that little time is reasonably expected for the compensatory mitigation to mature enough to provide higher functions and values than the wetlands they have replaced.
3. *"Proposed Mitigation will result in a lower category wetland or reduced functions relative to the wetland being impacted."* In this case, higher category wetlands with higher functions and values relative to the impacted wetlands are being proposed for every degraded wetland where less than standard mitigation ratios are proposed.

The rational for the proposed ratios that vary from standard Ecology recommendations for the degraded wetlands include:

1. The high success potential of the mitigation proposed in replacing lost wetland functions due to the supporting hydrologic data;
2. The high success potential of the mitigation proposed in replacing lost wetland functions due to the low functions and values of the impacted wetlands relative to the higher functions and values of the proposed compensatory wetlands,
3. The relatively short period of time between impact (lost function) and compensated function at higher levels for the degraded wetland impacts, and
4. The demonstrable success of the project proponent and their consultants in implementing the types of compensatory mitigation proposed. Examples of this success include: *Members Club at Aldarra* (COE #95-04-00177) creation of 14.43 acres and enhancement of 13.94 acres of wetland as compensation for 4.06 acres of wetland impact; *Emerald Corporate Park* (aka Goedeke South, COE #97-04-01228) enhancement of 6.3 acres of wetland as compensation for 2.17 acres of wetland impact; and *Baydo Pit* (City of Auburn MDNS SEP #0009-96) creation of 0.5 acres of wetland as compensation for 0.47 acres of wetland impact.

Table 1 outlines the proposed mitigation ratios and their application to the Tukwila South project. For impacts to degraded wetlands 2, 3A, 4A, 5, 6, 7, 8, and 9, the proposed mitigation ratios for enhancement and rehabilitation are 50% lower than the standard ratios for each Category, because of the very low risk to rapid and full replacement of impacted wetlands functions and values. The proposed mitigation ratios for creation and all non-degraded wetlands (1, 3, 10, 13, and 16) are equal to the standard guidance by Ecology. As shown in Table 1, the mitigation plan provides over 2.5 acres of wetland creation more than the minimum required to compensate for the proposed impacts.

In addition to the application of compensatory mitigation ratios reasonable for this project and consistent with 2004 Guidance from the Washington Department of Ecology, a wetland functional assessment was conducted for the project using *Methods for Assessing Wetland Functions Volume I: Riverine and Depressional Wetlands in the Lowlands of Western Washington* (WAFAM; Hruby et al. 1999). A comparison of the anticipated functional scores of the rehabilitated and enhanced compensatory mitigation area to the functional scores from the wetlands to be altered as a result of the proposed development yielded a net gain in wetland hydrologic and biological functions. Table 2 contains a summary of the functional losses resulting from the proposed development and the functional replacement provided by the proposed mitigation. A complete description of the wetland functional analysis is contained in the *Draft Environmental Impact Statement for the Tukwila South Project* (City of Tukwila 2005). Table 3 contains functional scores for the wetlands to be altered as well as the anticipated functional scores of the mitigation wetlands.

This mitigation plan presents the design features and their locations, monitoring plan outline, evaluation criteria and performance standards, and a discussion of contingency plans intended to meet the stated goals and objectives.

The proposed plantings are designed to simulate native Pacific Northwest plant communities and provide enhanced function in the enhanced, rehabilitated, and created wetland.

2.2 MITIGATION GOALS AND OBJECTIVES

The overall goal of the mitigation plan is to compensate for impacts to 9.45 acres of wetland through enhancement and rehabilitation of previously degraded wetland habitats on the site and through creation of new wetland on the site. The overall goal of the mitigation plan is to increase habitat diversity, improve wetland habitat functions, and establish contiguous wetlands similar to those that occurred in the Green River Valley prior to agricultural activities and construction of flood control dikes on the river.

The specific objectives of the mitigation plan are:

- Enhancement of about 4.35 of existing degraded wetland on the Tukwila South Property;
- Rehabilitation of about 27.8 acres of existing degraded emergent wetland to establish diverse native plant communities;
- Creation of about 3.05 acres of new emergent, scrub-shrub, and forested dominated wetland communities in areas currently upland; and
- Establishment of 5.24 acres of functional vegetated buffer along the upland edges of the compensatory wetland mitigation areas.

Achieving these goals and objectives would result in no net loss of wetland functions by increasing the biologic and hydrologic functions of the wetlands to greater than current site conditions. Standards for achieving these goals are found in Performance Standards (Section 5.0).

3.0 MITIGATION PLAN

The City of Tukwila, The Washington Department of Ecology, and the U.S. Army Corps of Engineers require compensation for wetland habitat functions lost or degraded because of development.

To compensate for approximately 9.45 acres of fill in primarily low-value wetlands, this wetland mitigation plan proposes to enhance, rehabilitate, and create 35.47 acres of functionally higher wetland on-site in the southern and eastern portions of the property.

Excavation, grading, and shaping of the rehabilitation and enhancement mitigation site will establish a permanently ponded hydrologic regime in the lower portions of the mitigation site, supported by groundwater and by plugging or partial excavation of drainage ditches. Soil excavated to form the lower troughs would be mounded at other locations in the mitigation area in order to create suitable planting locations for wetland plant species that do not require prolonged ponding. Drainage tiles would be broken throughout the wetland mitigation area.

Excavation, grading, and shaping of the wetland creation areas would establish hydrologic regimes capable of supporting wetland plants in portions of the site that are currently upland.

The mitigation is designed to provide habitat features and hydrologic regimes that would replace the wetland functions lost through the filling of other wetland habitats on the site.

Vegetated buffers would be provided along the margins of the enhanced, rehabilitated, and created wetlands where they abut uplands. The slopes of the new flood protection levee (north and east of Wetland 10, north of Johnson Creek, and south and west of the Green River Off-channel habitat area) would be planted with low shrubs and small trees in order to provide screening and intrusion prevention functions. The southern border of the Johnson Creek mitigation area would be planted with deciduous and coniferous trees to provide shading and screening functions to the creek and riparian wetland habitat. Additional buffering function would be provided to the Johnson Creek and Wetland 10 mitigation areas by the presence of the stormwater ponds along their northern and eastern boundaries. These stormwater ponds will provide additional intrusion prevention and screening to the mitigation areas by separating them from the development area by over 300-feet. The Green River Off-channel habitat mitigation area also would be functionally buffered by development restrictions within the shoreline management zone of the Green River.

Where the compensatory mitigation wetlands abut existing wetland (i.e., the western edge of Wetland 10, the southern, eastern, and western perimeter of Wetland 11) no additional buffer is proposed. Existing farmed wetland extends south, east and west from Wetland 11 for several hundred feet. Compensatory mitigation in Wetland 11 will be

protected by development restrictions and buffer requirements for the Class 1 wetland that extends offsite in City of Kent jurisdiction. The existing buffer along the western edge of Wetland 10 is comprised of 50- to greater than 100-feet of forested hillside extending westerly to Orillia Road. The western buffer of Wetland 10 will be protected by development restrictions and buffer requirements for Class 1 wetlands in the City of Tukwila. The existing buffers for these wetlands would be retained in their current condition.

3.1 SITE PREPARATION AND EARTHWORK

Wetland mitigation would occur in the southern and eastern portions of the Tukwila South Property (Figure 1). The portions of the existing wetland proposed for mitigation is comprised almost exclusively of dense monotypic stands of reed canarygrass. The majority of the mitigation area supports a mixture of reed canarygrass and willow shrubs. Wetlands to the west of the mitigation site contain areas of deciduous trees and shrubs.

Rehabilitation of the wetland would require re-grading and shaping of the site. Grading and shaping of the site would establish areas approximately 1.5 feet higher and 1.5 feet lower than current site elevations. Clearing and grading of the areas to be rehabilitated will be accomplished in the dry season when the soils are not saturated and the potential for erosion and sedimentation is minimized. Installation of sediment and erosion control devices (such as silt fences and/or hay bales) between the graded areas and the retained wetland will be included in the Stormwater Pollution Prevention Plan (SWPPP) for the project. Soil logs from well installation in the wetland rehabilitation areas are attached as an appendix to this document. The existing soil conditions in the rehabilitation areas indicates that adequate soil with adequate moisture retention properties is present to support the vegetation communities proposed.

Existing reed canarygrass would be mowed, bailed, and removed from the site. Grading in the wetland creation areas would require removal of existing material and establishing elevations that support wetland hydrology.

3.2 ESTABLISHMENT OF WETLAND PLANT COMMUNITIES

The wetland mitigation plan has been designed to establish forested, scrub-shrub, and emergent plant communities. These communities would be established through a combination of planting and natural succession. The enhancement and rehabilitation plantings would use native species characteristic of the wetland cover-types in the region. Dense shrub communities would be placed in areas currently dominated by invasive species such as reed canarygrass. A list of the plant species proposed for the site is contained in Table 3 and Figure 8. Figures 2, 4, and 6 show the proposed grading for the mitigation sites. Planting plans for the proposed mitigation areas are shown on Figures 3, 5, and 7. Planting details and typical planting layouts are shown on Figure 9.

Species selected for planting are based on their availability and potential to provide nesting, resting, and feeding opportunities for passerine birds, small mammals, and amphibian species. Plant species have been specified for locations within the rehabilitated and enhanced wetland in order to provide a diversity of habitats and in response to anticipated hydrologic regimes.

Planting in the mitigation area would occur in the late fall or early spring (November 1 through March 1) to maximize establishment and survival of the various plant species. Planting at other times of the year may be allowed, provided that adequate hydrology is available to the plant material. Replanting and control of various invasive species may be required during the duration of the monitoring period. Construction and installation notes are found on Figure 10.

Installation of the plantings would be supervised by the landscape contractor and project biologists. Locations for the plantings will be identified in the field and the quality and quantity of the plants would be verified by the project biologist and/or landscape contractor.

Description of the plant communities proposed for the site and the methods of establishment are described in the following sections.

Palustrine Forest (PFO): Clearing and grading of the rehabilitation and enhancement mitigation site will result in mounded areas on the site. Forest vegetation comprised of small trees and tall shrubs such as Pacific willow, Scouler's willow, Sitka willow, western crabapple, western red cedar, and Oregon ash would be planted atop the mounded areas. Mounded soils will be covered with erosion or weed-control matting in an effort to control reed canarygrass. Trees and shrubs would be planted through the matting material.

Excavation to establish the restored Johnson Creek also would result in areas appropriate for forest vegetation plantings. Trees and shrubs would be planted along the higher areas on both sides of new stream channel.

The species selected for these areas tolerate a wide range of hydrologic conditions as well as provide a greater diversity of species than is currently found on site. The mitigation plan is designed to establish 14.62 acres of PFO communities on site. An existing PFO and PSS wetland along the western site boundary would be retained.

Palustrine Scrub-Shrub (PSS): Scrub-shrub vegetation would be planted on the lower slopes of the mounded areas, along the edges of the excavated channel areas in the rehabilitated wetlands. The shrub vegetation community would be comprised of red-osier dogwood, Sitka willow, western hawthorn, clustered wild-rose, nootka rose, black twinberry, and salmonberry. As with the forested vegetation, the shrubs would be planted through erosion or weed control matting.

Scrub-shrub plantings also would be installed along the Green River Off-channel habitat mitigation area and along the restored Johnson Creek. Woody species would be planted along the newly graded slope of the flood levee, above the ordinary high water elevation of the Green River and along the edges of the Johnson Creek channel.

The mitigation plan is designed to establish 10.65 acres of PSS habitat on site.

Palustrine Emergent Seasonally Saturated (PEMA): The upper margins of the excavated areas in the rehabilitated wetlands, the Green River Off-channel habitat area, and along Johnson Creek would be seeded and planted with grasses, sedges, and rushes such as meadow foxtail, creeping bentgrass, red fescue, tall mannagrass, slough sedge, and dagger-leaf rush. The mitigation plan intends to establish 2.71 acres of PEMA habitat on site.

Palustrine Emergent Seasonally Flooded (PEMC): The mid-elevation portions of the newly excavated channels in the rehabilitated wetlands and the Green River Off-channel habitat area would be planted with a mixture of slough sedge, small-fruited bulrush, common spike rush, American three-square, wooly sedge, and dagger-leaf rush. The intent of the mitigation design is the establishment of 4.33 acres of PEMC habitat on the site.

Palustrine Emergent Semi-Permanently Flooded (PEMF): The portions of the mitigation sites excavated to the greatest depth, approximately two feet below existing grades in the rehabilitated wetlands would be planted with emergent species adapted to flooded conditions. The lowest portions of the Green River Off-channel Habitat area also would be planted with flood adapted wetland plant species. Species specified for these areas include hard-stem bulrush, simple stem burreed, and water plantain. It is anticipated that species such as cattail (*Typha latifolia*) would colonize this area; however, the proposed plantings should preclude the establishment of a monoculture. A total of 3.16 acres of PEMF habitat are designed for the mitigation area.

3.3 LANDSCAPE MAINTENANCE AND PROTECTION

The enhanced, rehabilitated, and created wetland areas are designed to be self-sustaining. To ensure success of the plantings, some additional replanting and control of undesirable plant species may be necessary. Invasive species would be controlled by methods that would not compromise the rest of the plantings. Manual removal is preferred, but does require early detection and action to be effective. Control of reed canarygrass may include cutting the grass before it can flower (topping) in areas where it occurs on site. If monthly visits indicate that mowing is necessary to control reed canarygrass, the mowing should occur monthly from March through October. In addition to mowing, other maintenance activities to suppress reed canarygrass may be implemented after consultation with the project biologist and representatives of the appropriate regulatory

agencies. If cutting and hand removal are not effective in controlling undesirable species, other maintenance activities, including herbicide applications, may be employed. These maintenance activities are designed to allow desired plant species to become established and to keep invasive species at reasonable levels of occurrence.

The time frame most effective for control of invasive species is during the first few years after installation. During the first three years, while desired species are becoming established, it is important to eliminate or limit the development of invasive plant species to prevent them from becoming re-established. The proposed maintenance and monitoring is intended to detect and control invasive species when their recurrence is low and more easily controlled.

4.0 MONITORING PLAN

The purposes of the monitoring program are: (1) to document physical and biological characteristics of the wetland and fisheries mitigation areas, and (2) to ensure that the goals and objectives comply with permit specifications (Josselyn et al. 1990).

The monitoring process would consist of three distinct phases: (1) construction monitoring; (2) compliance monitoring; and (3) long-term monitoring. The "time-zero" or baseline composition, structure, and cover abundance would be documented during the compliance monitoring phase. The long-term monitoring program would document the survival of planted vegetation and rates of colonization by other plants (i.e., in bare soil areas) over a ten-year period after enhancement activities had been completed.

The following sections describe the elements of an effective monitoring program.

4.1 CONSTRUCTION MONITORING

It has been our experience that the success rate of constructed and/or restored wetlands is increased through the coordination and communication between appropriate parties before and during the construction/implementation phase. Coordination meetings would include the biologist, landscape architect, project engineers, regulatory agency representatives, and contractors.

We recommend a pre-construction meeting of the personnel responsible for the design and those responsible for establishment of the wetland and fisheries habitats. The purpose of the meeting would be to review the intent of the mitigation plan, establish a pathway of communication during construction, agree upon the construction sequence, and address and resolve any questions.

The landscape architect and project biologists should be present on-site during the various stages of implementation. Their duties would be to: (1) assist in identifying and marking the limits of clearing and grading, where applicable; (2) inspect the plant materials and recommend their final placement before planting; (3) determine the correct type and application rate of amendments to the soil, if needed; (4) make adjustments in planting plans, as needed, in response to field conditions; (5) ensure that construction activities are conducted per the approved plan; and (6) resolve problems that arise during restoration, thus lessening problems that might occur later during the long-term monitoring phase.

4.2 COMPLIANCE MONITORING

Compliance monitoring consists of evaluating the wetland and fisheries mitigation and buffer areas immediately after planting is completed. The objectives would be to verify that all design features, as agreed to in the planting plan, have been correctly and fully

implemented, and that any changes made in the field are consistent with the intent of the design. Evaluation of the planting areas after restoration would be done by the landscape architect and project biologist using evaluation standards and criteria discussed below.

After grading and planting of the wetlands and buffers is completed, fixed sampling stations would be established within areas representative of the plant communities being sampled. The same points would be monitored each monitoring session. These points may be located randomly or along specific transects, depending upon-site conditions. A quantitative assessment of the plants established in the wetland and buffer (including plant counts and cover-abundance, as appropriate) would be recorded in representative sample plots for baseline data. This information would be used to document "time-zero" conditions from which the long-term monitoring period would begin.

At each point, fixed-point photos would be taken during each monitoring visit to provide physical documentation of the condition of the mitigation areas. Photographs would be taken from all sample plot locations established during the first monitoring site visit (compliance) and thereafter each visit of the monitoring period from the established location points.

The compliance monitoring phase would conclude with the preparation of a compliance report from the project biologists. The report would verify that all design features have been correctly, fully, and successfully incorporated.

Substantive changes made in the planting plans would be noted in the compliance report and on the drawings for use during the long-term monitoring phase. Information on changes should include what was done, where, why, at whose request, and the result of the change. Locations of monitoring stations established for the compliance monitoring would be identified on the as-built plans.

The planting plans, with the compliance report, would document "as-built" conditions at the time of construction compliance. The compliance report and as-built drawings would be submitted to the City of Tukwila, the Washington Department of Ecology (DOE), and the U.S. Army Corps of Engineers (COE).

4.3 LONG-TERM MONITORING

Long-term monitoring would begin only after acceptance of the compliance report and acknowledgment that the construction is complete by the City of Tukwila. Long-term monitoring would be conducted for ten growing seasons. Monitoring would evaluate the establishment and maintenance of the plant communities in the created, enhanced, and rehabilitated wetlands and their planted buffers to determine if the goals and objectives of the mitigation plan have been met.

Monitoring would be conducted semi-annually (twice yearly) in the first, second, fourth, sixth, and eighth year during the ten-year monitoring period. A final site check and

summary report would be prepared in the tenth year of monitoring.
At each sample station, plant species would be identified, individual shrubs and trees counted (where appropriate) to document survival, and an estimate of cover and abundance made by appropriate means, such as the Braun-Blanquet methods (Mueller-Dombois and Ellenberg 1974). Plant identifications would be made according to standard taxonomic procedures as described in Hitchcock and Cronquist (1976), with nomenclature as updated by Pojar and MacKinnon (1994), Hickman (1993), and Cooke (1992). The plantings would be examined to document the survival rate of species planted, signs of stress, damage, or disease as well as signs of vigor, and rates of colonization by other plants (i.e., in bare soil areas). Special attention would be paid to species considered to be invasive (e.g., reed canarygrass, Himalayan blackberry [*Rubus discolor*]).

Hydrologic conditions of the wetland sites would be noted at each sample point either by observation of inundated conditions or excavation of shallow pits near the sampling point to determine soil saturation. Separate site visits during the late spring or early summer of each monitoring year may be necessary to document site hydrology in the growing season.

All wildlife observed during the monitoring would be recorded, with notes made regarding habitat use patterns and activities. Any evidence of breeding or nesting activities would be noted.

Monitoring reports would be prepared for submittal to the appropriate regulatory agencies at the end of each monitoring year. The monitoring report would document the changes occurring within the mitigation areas and make recommendations for improving the degree of success or correcting any problems noted during monitoring. Monitoring reports would document how the mitigation is meeting the goals and objectives of the plan.

5.0 PERFORMANCE STANDARDS

The overall evaluation criteria would be whether or not the created, enhanced, and rehabilitated wetlands meet the COE 1987 wetland criteria (Environmental Laboratory 1987) and intended hydroperiods after grading and establishment, and the success of the plant community types proposed to provide a net gain in wetland functions and values. Monitoring is proposed to show the key elements of the plan are present, they have the desired functions, and meet the overall mitigation goals for functions and values. Evaluation criteria for success of the vegetation monitoring portion of the mitigation plan should not be 100% survival of individual plant materials over the monitoring period, but the establishment of desirable plant communities within the enhanced, rehabilitated, and created wetlands. Evaluation criteria are:

Year 1: Evidence that the desired plant communities are developing: survival of the planted trees and shrub species and evidence of colonization by desirable non-planted species. At the end of the first growing season after installation is complete, the plantings should demonstrate good health and vigor, and plant coverage of all areas should be sufficient to control erosion. Any planted material that has not survived the first year because of transplant shock should be noted and replaced at this time. If plant material mortality is a result of site conditions, appropriate measures should be taken to ensure plant survival.

Year 2: Evidence that the desired plant communities continue to develop. Evidence of reproduction or new sprouting by the plantings, and expansion of the coverage of desirable plants colonizing the area. Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the first-year monitoring.

Year 4: Evidence that the desired plant communities continue to develop. Evidence of continuing reproduction or new sprouting by the plantings, and expansion of coverage of desirable plants colonizing the area. Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the second-year monitoring. Desirable plant species communities should be out-competing undesirable plant species throughout the site. Undesirable plant species represent less than 15% of cover within the plant communities.

Year 6: Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the fourth-year monitoring. Desirable plant species communities should be out-competing undesirable plant species throughout the site. Undesirable plant species represent less than 15% of cover within the plant communities.

Year 8: Evidence that the desired plant communities have developed. Plant community structure, diversity, and wildlife habitat function should be greater than that documented during the sixth-year monitoring. Undesirable plant species represent less than 15% of cover within the plant communities.

Specific performance standards to be used in the long-term monitoring are as follows:

- 100% survival of all planted shrubs and trees in wetlands and buffers for one year after planting and at least 85% survival after eight years.
- Coverage by shrub and tree species in planted areas of wetlands and buffers:
- at least 20% after one year;
- at least 40% after four years;
- at least 60% after six years; and
- at least 80% after eight years.
- At the end of the first growing season after installation (Year 1), herbaceous cover in the planted areas should be sufficient to minimize erosion and discourage establishment of undesirable plant species.
- Establishment of three plant strata (trees, shrubs, and herbs) within the wetlands after six years.
- no more than 15% cover of undesirable or invasive species within the mitigation area after 10 years.

Undesirable or invasive plant species would include reed canarygrass, Scot's broom (*Cytisus scoparius*), Himalayan blackberry, and purple loosestrife (*Lythrum salicaria*). Observations of these species on-site would trigger maintenance actions.

The created, enhanced, and restored compensatory mitigation areas would, at a minimum, be saturated through the majority of the root zone for 12.5% of the growing season. The spring monitoring should demonstrate hydrology within 12 inches of the ground surface through the end of March in each monitoring year, and that the intended hydroperiods are provided

6.0 CONTINGENCY PLAN

Contingency plans are needed if long-term monitoring shows that objectives and performance standards have not been met. It should be noted, however, that it is not possible to develop a detailed contingency plan until the specific problems that need to be addressed are known. It would be unproductive to try to anticipate all possible problems and their solutions at this time.

Common problems, both human and natural, that might arise can be identified and general recommendations for remedy proposed. For example, after the second year, plant communities within the mitigation areas may not be established at acceptable levels. It may be necessary to replant with new or different stock, provide additional watering or irrigation during critical seasons, or augment the soil. Table 4 lists components important to restoration, factors that might adversely affect wetlands, and contingencies to ensure the success of the project.

The contingency plan may require extension of the monitoring phase of the project, especially if major changes in the plan are required. Recommendations for identified problems should be made by the project biologist representative in consultation with the project managers and civil engineers.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of LaPianta, LLC and their consultants. No other person or agency may rely upon the information, analysis, or conclusions contained herein without permission from them.

The determination of ecological system classifications, functions, values, and boundaries is an inexact science, and different individuals and agencies may reach different conclusions. With regard to wetlands, the final determination of their boundaries for regulatory purposes is the responsibility of the various agencies that regulate development activities in wetlands. We cannot guarantee the outcome of such determinations. Therefore, the conclusions of this report should be reviewed by the appropriate regulatory agencies.

We warrant that the work performed conforms to standards generally accepted in our field, and was prepared substantially in accordance with then-current technical guidelines and criteria. The conclusions of this report represent the results of our analysis of the information provided by the project proponent and their consultants, together with information gathered in the course of the study. No other warranty, expressed or implied, is made.

8.0 LITERATURE CITED

Anderson, J., E. Hardy, J. Roach, and R. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geological Survey Professional Paper 964. 28 pp.

Azous, A. and R. Horner, eds. 1997. Wetlands and urbanization: implications for the future. Final report of the Puget Sound Wetlands and Stormwater Management Research Program. Washington State Department of Ecology, Olympia, WA, King County Water and Land Resources Division, and University of Washington., Seattle, WA. 255 pp.

Brinson, M. M. 1993. A Hydrogeomorphic Classification for Wetlands. Technical ReportWRP-DE-4. US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Cooke, S. 1997. A field guide to common wetland plants of Western Washington and Northwestern Oregon. Seattle Audubon Society. Seattle, Washington.

Cooper, J.W. 1987. An overview of estuarine habitat mitigation projects in Washington State. Northwest Environmental Journal 3(1): 112-127.

Cowardin, L., F. Golet, V. Carter, and E. LaRoe. 1992. Classification of wetlands and deepwater habitats of the United States. U.S.D.I. Fish and Wildlife Service Publ. FWS/OBS-79/31. 103 pp.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, US Army Engineers Waterways Experiment Station, Vicksburg, Mississippi. 100 pp.

Federal Register. 1986. 40 CFR Parts 320 through 330: Regulatory programs of the Corps of Engineers; final rule. Vol. 51. No. 219. pp. 41206-41260, U.S. Government Printing Office, Washington, D.C.

Franklin, J.F., and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. U.S. Department of Agriculture, Forest Service General Technical Report PNW-8. 417 pp.

Hickman, J. 1993. The Jepson manual: higher plants of California. Univ. of Cal. Press, 1400 pp.

Hitchcock, C., and A. Cronquist. 1976. Flora of the Pacific Northwest. Univ. of

Washington Press, Seattle, Washington. 730 pp.

Hruby, T., T. Granger, K. Brunner, S. Cooke, K. Dublanicia, R. Gersib, L. Reinelt, K. Richter, D. Sheldon, E. Teachout, A. Wald, and F. Weinmann. July 1999. Methods for Assessing Wetland Functions, Volume I: Riverine and Depressional Wetlands in the Lowlands of Western Washington. WA State Department of Ecology Publication #99-115.

Josselyn, M., J. Zedler and T. Griswold. 1990. Wetland mitigation along the Pacific Coast of the United States. Pages 3-36 *in* J. Kusler and M. Kentula, editors. Wetland creation and restoration: The status of the science. Island Press, Covelo, CA.

Memorandum. 1989. Memorandum of Agreement between the U.S. Environmental Protection Agency and the Department of Army Concerning the Determination of Mitigation under the Clean Water Act, Section 404 B1 Guidelines. Effective 7 November 1989.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York. 547 pp.

Pojar, J., and A. MacKinnon. Plants of the Pacific Northwest Coast, Washington, Oregon, British Columbia, and Alaska. B.C. Ministry of Forests; B.C. Forest Service; Research Program.

Raedeke Associates, Inc. 2005b. Wetland Assessment for the Tukwila South Property, City of Tukwila, Washington. March 2005 Draft EIS Report to Ms. Sue Carlson, La Pianta LLC. Tukwila, Washington.

Reed, P., Jr. 1988. National list of plant species that occur in wetlands: Northwest (Region 9). U.S.D.I. Fish and Wildlife Service. Biological Report 88 (26.9). 89 pp.

Reed, P., Jr. 1993. 1993 Supplement to list of plant species that occur in wetlands: Northwest (Region 9). U.S.D.I. Fish and Wildlife Service. Supplement to Biological Report 88 (26.9) May 1988.

Tukwila, City of. 2004. Tukwila Municipal Code Title 18 – Zoning, Chapter 18.45, Environmentally Sensitive Areas. Draft of November 23, 2004.

U.S. Army Corps of Engineers. 1991a. Special notice. Subject: Use of the 1987 wetland delineation manual. U.S. Army Corps of Engineers, Seattle District. August 30,

1991.

U.S. Army Corps of Engineers. 1991b. Memorandum. Subject: Questions and answers on the 1987 manual. U.S. Army Corps of Engineers, Washington D.C. October 7, 1991. 7 pp. including cover letter by John P. Studt, Chief, Regulatory Branch.

U.S. Army Corps of Engineers. 1992. Memorandum. Subject: Clarification and interpretation of the 1987 methodology. U.S. Army Corps of Engineers, Washington D.C., March 26, 1992. 4 pp. Arthur E. Williams, Major General, U.S.A. Directorate of Civil Works.

U.S. Army Corps of Engineers. 1994. Public Notice. Subject: Washington regional guidance on the 1987 wetland delineation manual. May 23, 1994, Seattle District. 8 pp.

U.S. Army Corps of Engineers. 2002. Special Public Notice. Final Regional Conditions, 401 Water Quality Conditions, Coastal Zone Management Consistency Responses, for Nationwide Permits for the Seattle District Corps of Engineers for the State of Washington. U.S. Army Corps of Engineers, Seattle District. July 23, 2002. 138 pp.

Washington Department of Ecology. 2004a. Guidance on Wetland Mitigation in Washington State – Part 1: Laws, rules, policies, and guidance related to wetland mitigation. Draft. Publication #04-06-013A. April 2004.

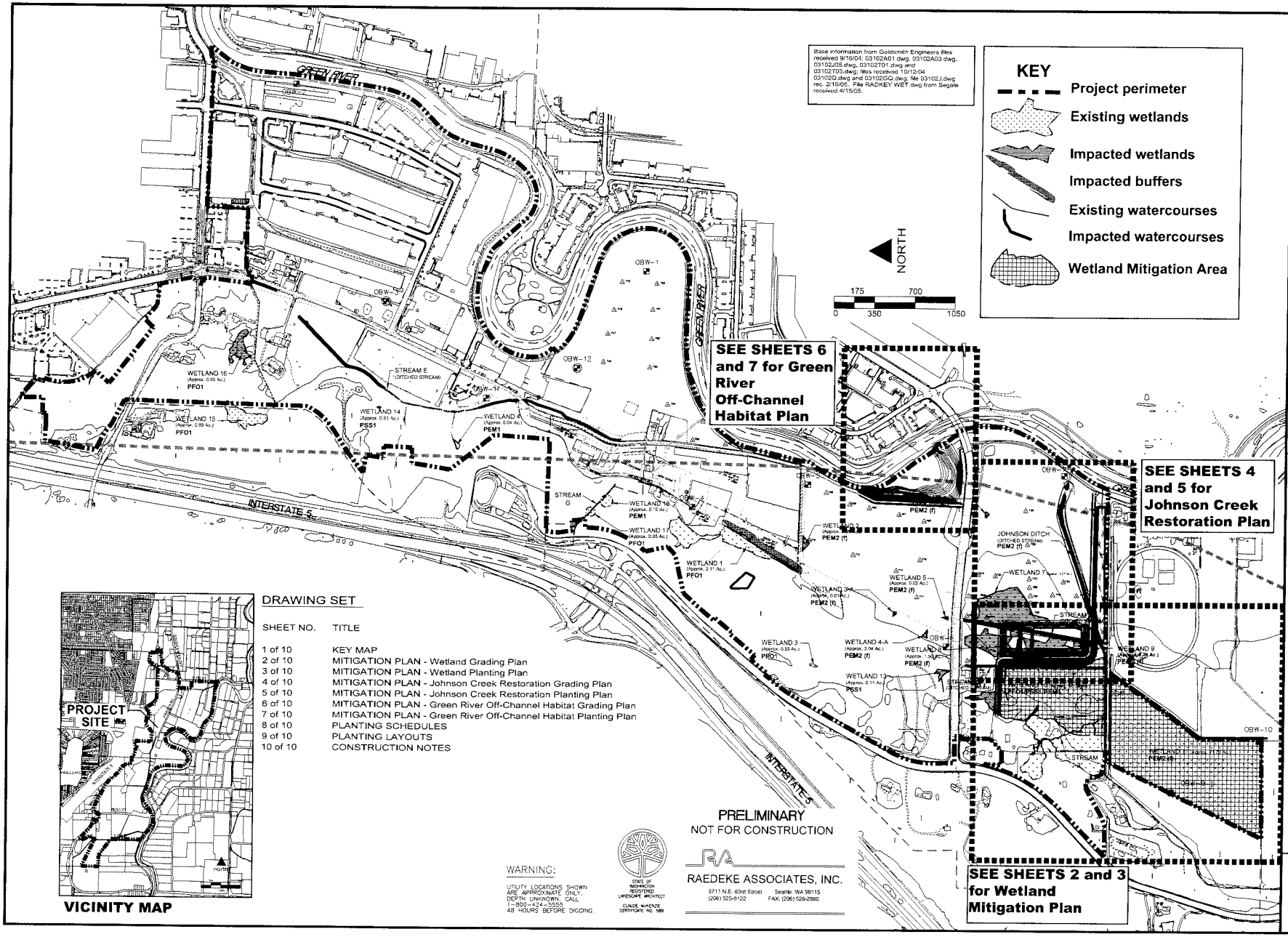
Washington Department of Ecology. 2004b. Washington state wetlands rating system, western Washington. Third edition. Publication #93-74. August 2004.

Washington Department of Ecology. 2004c. Wetlands in Washington State. Volume 2: Guidance for Protecting and Managing Wetlands. Draft. Publication #04-06-024. August 2004.

Washington State Department of Ecology. 1997. Washington state wetlands identification and delineation manual. March 1997. Publication No. 96-94. 88 pp. plus appendices.

Wentworth, T. and G. Johnson. 1986. Use of vegetation in the designation of wetlands. Final report to USDI Fish and Wildlife Service. North Carolina Agricultural Service and N.C. State University, Raleigh. 107 pp.

FIGURES AND TABLES



DRAWING SET

SHEET NO.	TITLE
1 of 10	KEY MAP
2 of 10	MITIGATION PLAN - Wetland Grading Plan
3 of 10	MITIGATION PLAN - Wetland Planting Plan
4 of 10	MITIGATION PLAN - Johnson Creek Restoration Grading Plan
5 of 10	MITIGATION PLAN - Johnson Creek Restoration Planting Plan
6 of 10	MITIGATION PLAN - Green River Off-Channel Habitat Grading Plan
7 of 10	MITIGATION PLAN - Green River Off-Channel Habitat Planting Plan
8 of 10	PLANTING SCHEDULES
9 of 10	PLANTING LAYOUTS
10 of 10	CONSTRUCTION NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

WARNING:
UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAUDE McKENZIE CERTIFICATE NO. 588

RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle WA 98115
(206) 525-9122 FAX: (206) 526-2880

MITIGATION PLAN - KEY MAP

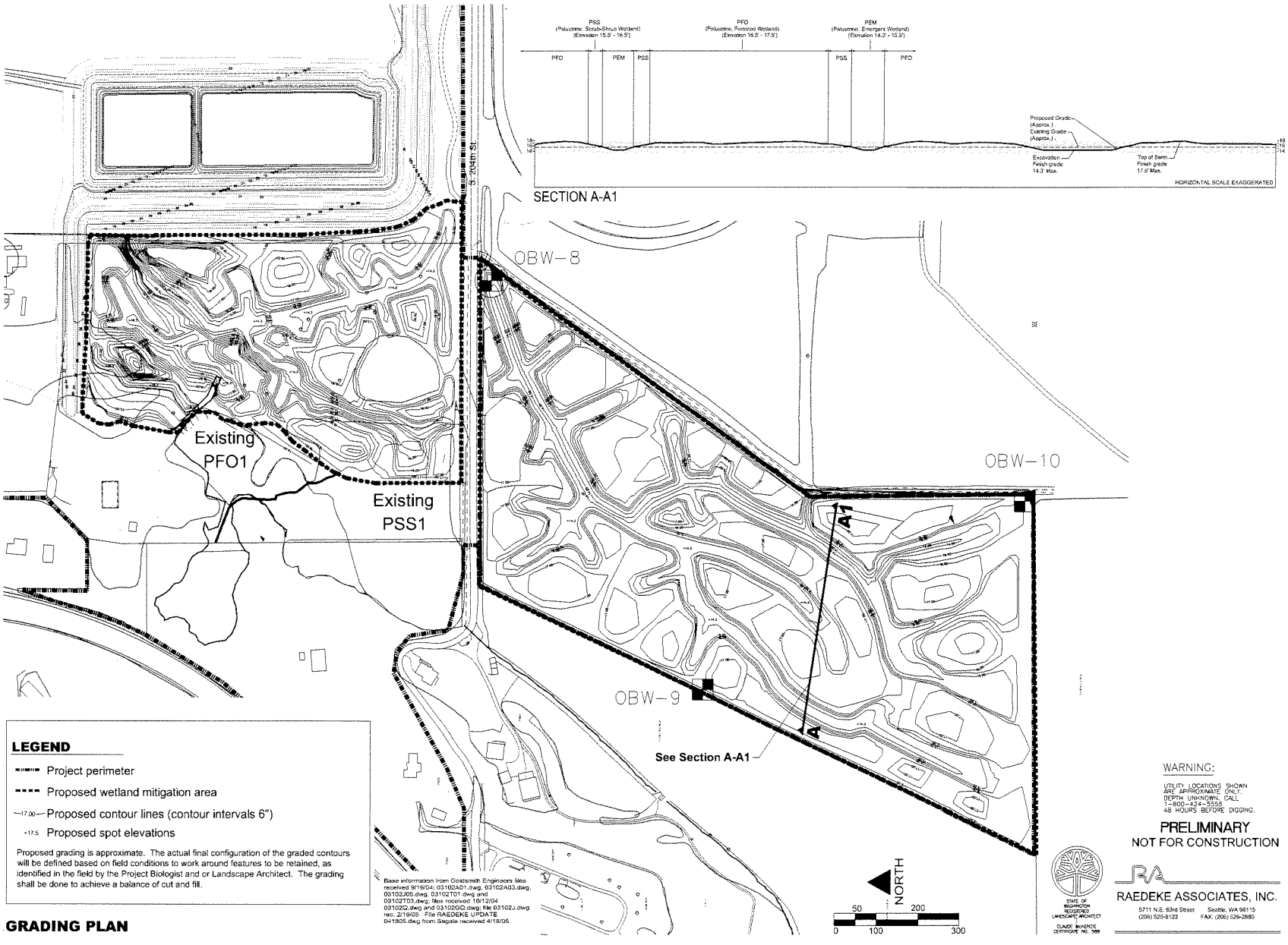
La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON

Proj. #2001-014
Date: Oct-05
Scale: Scale varies
Designed By: CW, CJM
Drawn By: CJM
Approved By: CW

Rev.	Date	By	Description

SHEET 1 of 10

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheet 1-Vicinity Map.dwg RA# 2001-014 Wetland Mitigation Plan 4/05



GRADING PLAN

MITIGATION PLAN - Wetland Grading Plan

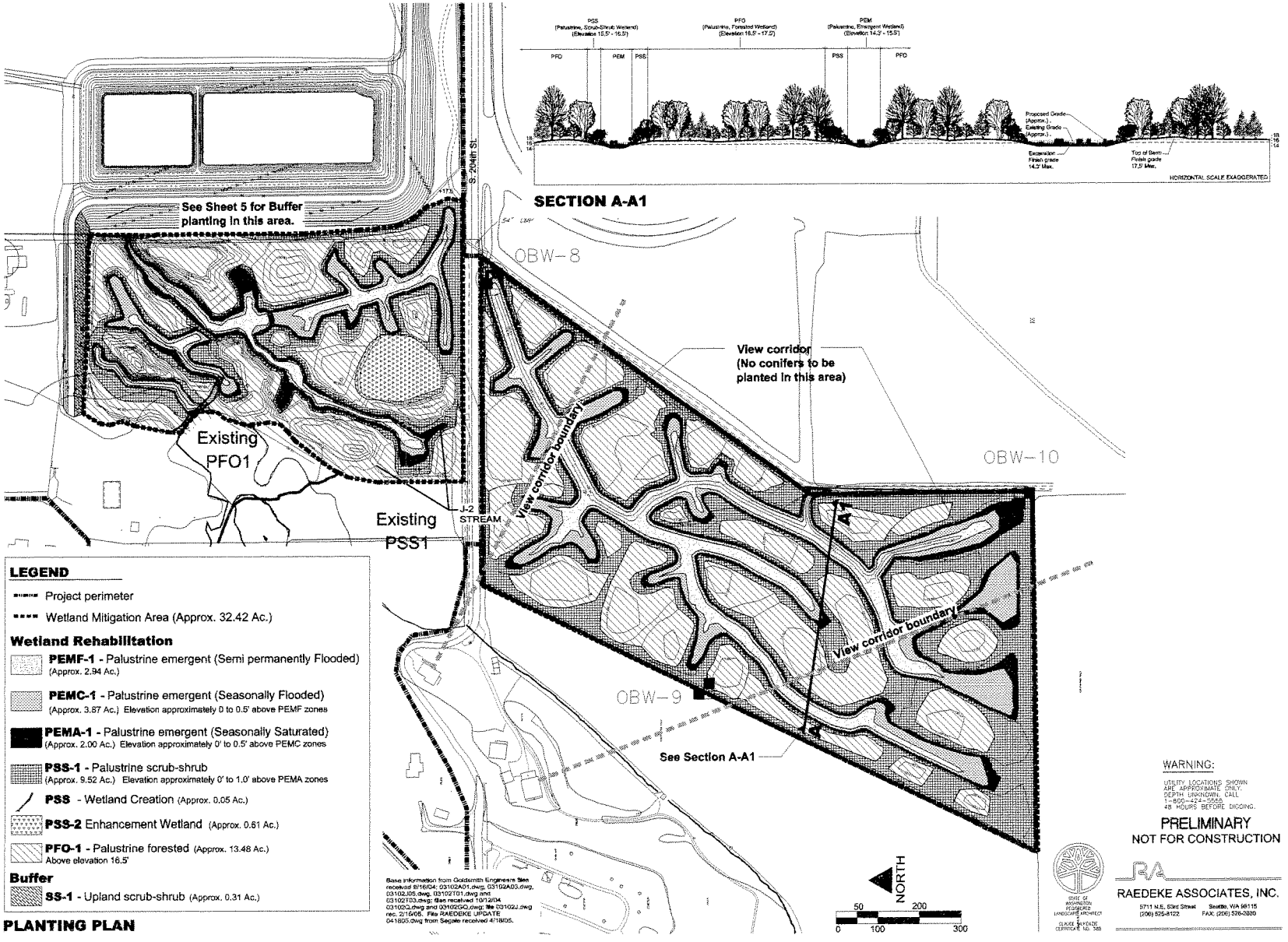
LA PIANTA, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON

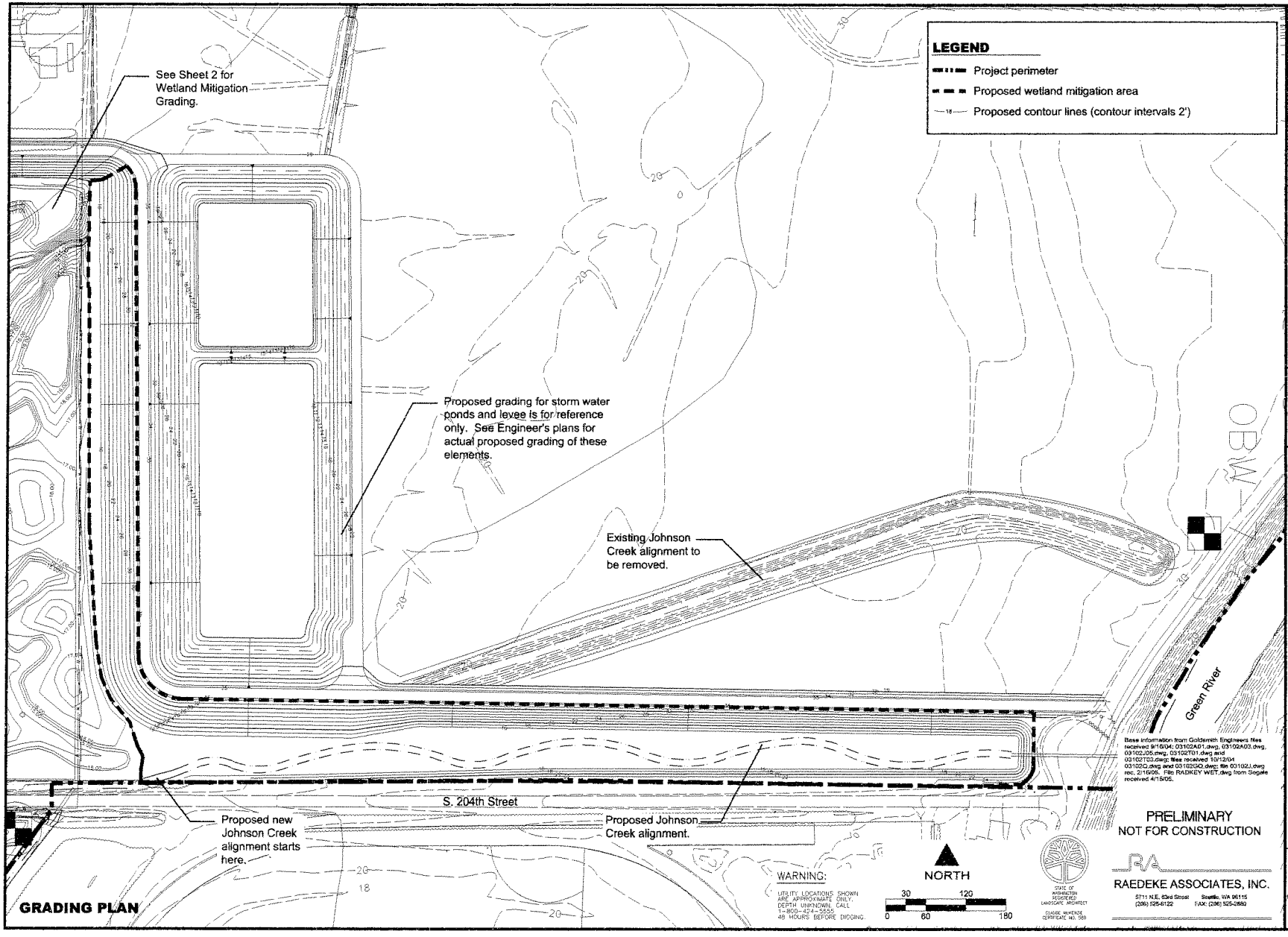
Rev	Date	By	Description

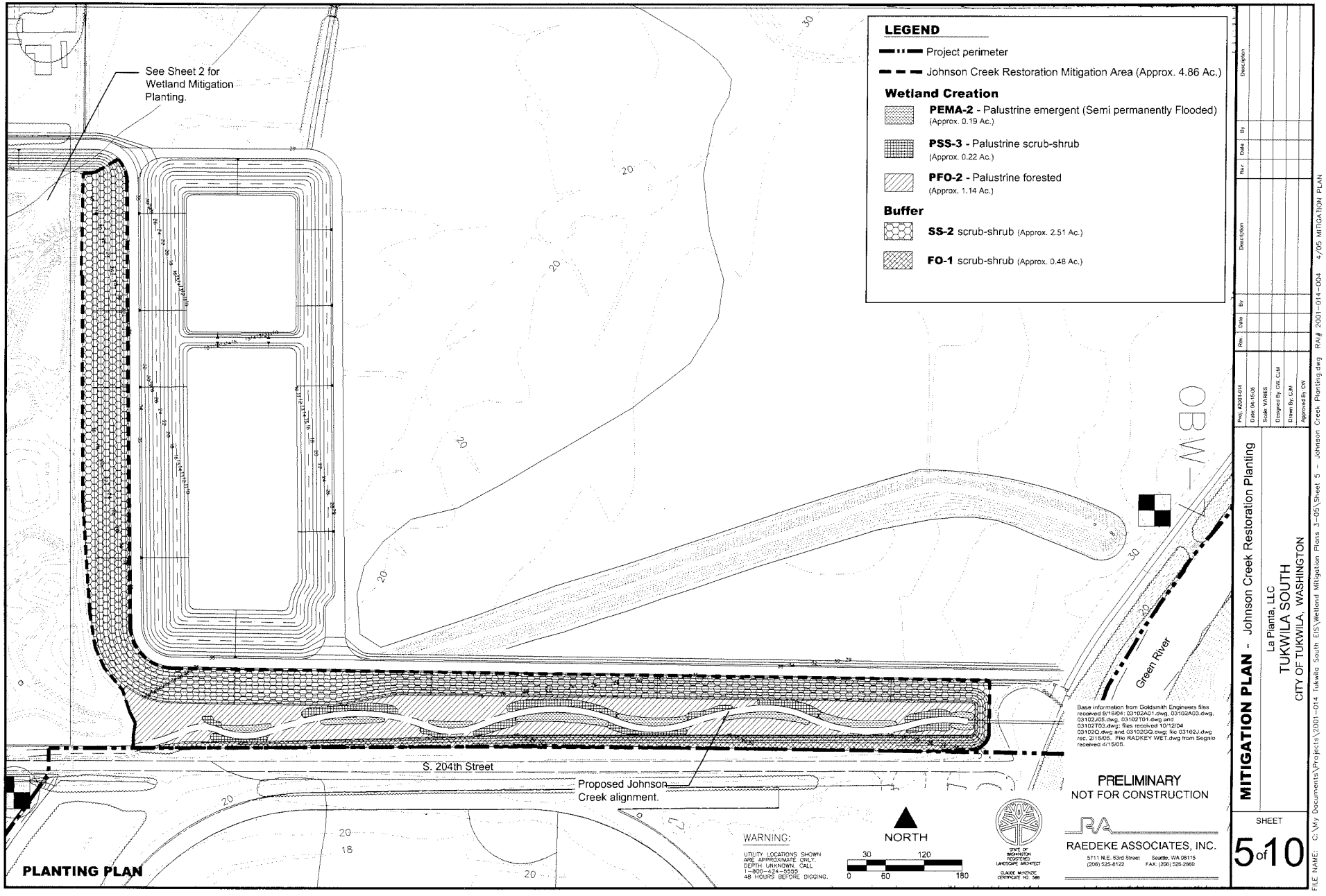
Proj #2001-014
Date: 01-19-05
Scale: 1" = 100'
Designed By: CW, CJM
Drawn By: CJM
Approved By: CW
RA/# 2001-014

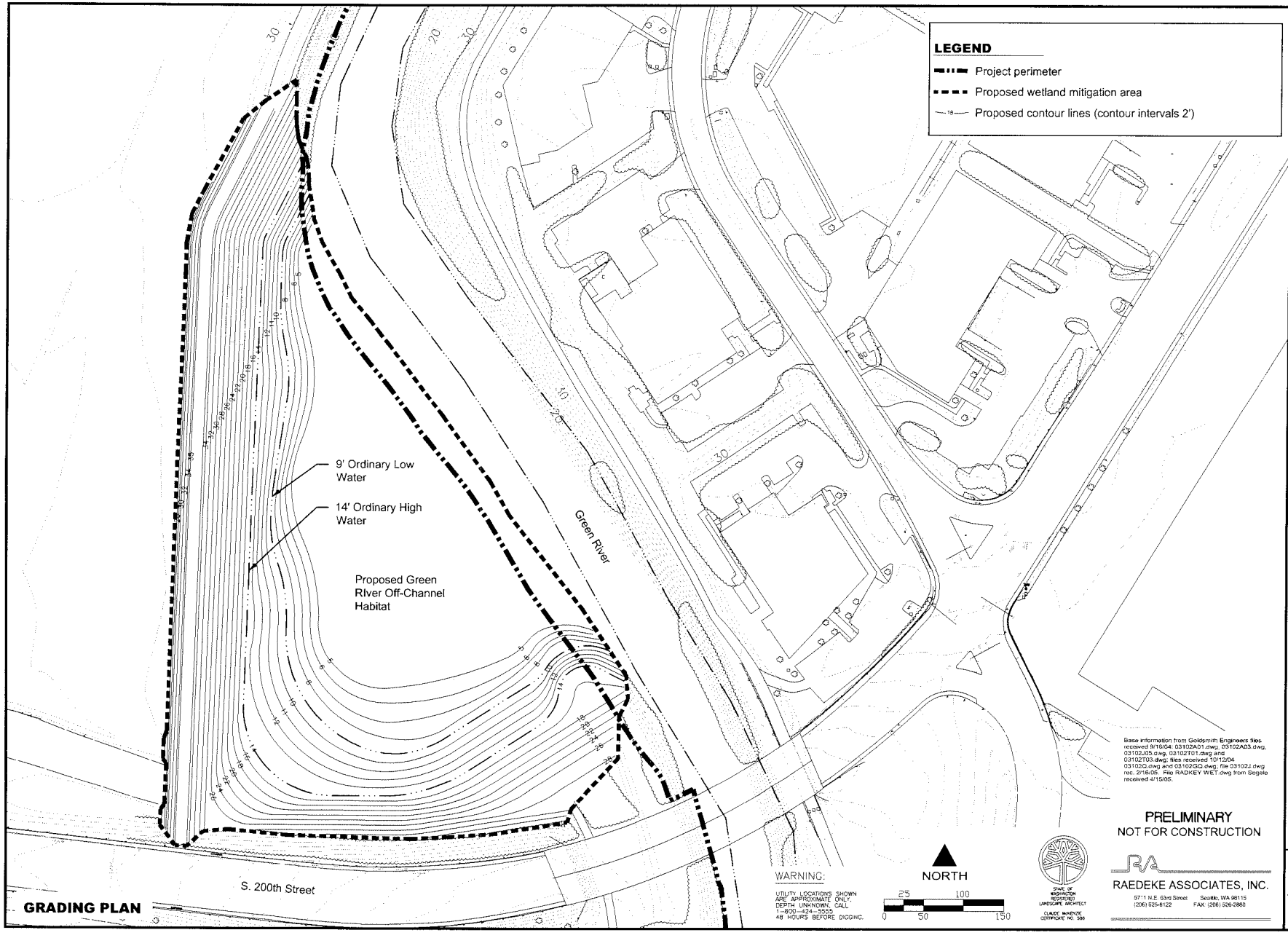
SHEET
2 of 10

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheets 2 & 3 wetland.dwg


SECTION A-A1
PSS (Palustrine, Scrub-Shrub Wetland) (Elevation 15.5' - 16.5')
PFO (Palustrine, Forested Wetland) (Elevation 16.5' - 17.5')
PEM (Palustrine, Emergent Wetland) (Elevation 14.5' - 15.5')
PFO
PEM
PSS
PSS
PFO
Proposed Grade (Approx.)
Existing Grade (Approx.)
Excavation Finish grade 14.5' Max.
Top of Berm Finish grade 17.5' Max.
HORIZONTAL SCALE EXAGGERATED
See Sheet 5 for Buffer planting in this area.
S. 204th St.
OBW-8
OBW-10
OBW-9
View corridor (No conifers to be planted in this area)
View corridor boundary
View corridor boundary
Existing PFO1
Existing PSS1
J-2 STREAM
See Section A-A1
A
A1
LEGEND
Project perimeter
Wetland Mitigation Area (Approx. 32.42 Ac.)
Wetland Rehabilitation
PEMF-1 - Palustrine emergent (Semi permanently Flooded) (Approx. 2.94 Ac.)
PEMC-1 - Palustrine emergent (Seasonally Flooded) (Approx. 3.87 Ac.) Elevation approximately 0 to 0.5' above PEMF zones
PEMA-1 - Palustrine emergent (Seasonally Saturated) (Approx. 2.00 Ac.) Elevation approximately 0' to 0.5' above PEMC zones
PSS-1 - Palustrine scrub-shrub (Approx. 9.52 Ac.) Elevation approximately 0' to 1.0' above PEMA zones
PSS - Wetland Creation (Approx. 0.05 Ac.)
PSS-2 Enhancement Wetland (Approx. 0.61 Ac.)
PFO-1 - Palustrine forested (Approx. 13.48 Ac.) Above elevation 16.5'
Buffer
SS-1 - Upland scrub-shrub (Approx. 0.31 Ac.)
PLANTING PLAN
Base information from Goldsmith Engineers files received 8/16/04: 03102A01.dwg, 03102A05.dwg, 03102J05.dwg, 03102T01.dwg and 03102T03.dwg; files received 10/12/04: 031023.dwg and 03102GQ.dwg; file 03102J.dwg rec. 2/16/05. File RAEDEKE UPDATE 041805.dwg from Segale received 4/18/05.
NORTH
0 50 100 200 300
WARNING:
UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.
PRELIMINARY
NOT FOR CONSTRUCTION
STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT CLAUDE SCHENTZ CERTIFICATE NO. 385
RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle, WA 98115
(206) 525-8122 FAX: (206) 526-2880
MITIGATION PLAN - Wetland Planting Plan
LA PIANTA, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON
Proj. #2001-014
Date: 04-19-05
Scale: 1" = 100'
Designed By: CW, CJM
Drawn By: CJM
Approved By: CW
RA# 2001-014
Rev. Date By Description
SHEET 3 of 10
FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheets 2 & 3 wetland.dwg


LEGEND
Project perimeter
Proposed wetland mitigation area
Proposed contour lines (contour intervals 2')
See Sheet 2 for Wetland Mitigation Grading.
Proposed grading for storm water ponds and levee is for reference only. See Engineer's plans for actual proposed grading of these elements.
Existing Johnson Creek alignment to be removed.
Green River
S. 204th Street
Proposed new Johnson Creek alignment starts here.
Proposed Johnson Creek alignment.
Base information from Goldsmith Engineers files received 9/16/04: 03102A01.dwg, 03102A03.dwg, 03102J05.dwg, 03102T01.dwg and 03102T03.dwg; files received 10/12/04 03102Q.dwg and 03102GQ.dwg; file 03102JJ.dwg rec. 2/16/05. File RADKEY WET.dwg from Sogaile received 4/15/05.
PRELIMINARY
NOT FOR CONSTRUCTION
WARNING:
UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.
NORTH
30 0 60 120 180
STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAUDE MCKENZIE CERTIFICATE NO. 509
RAEDEKE ASSOCIATES, INC.
5711 N.E. 82nd Street Seattle, WA 98115
(206) 525-8122 FAX: (206) 525-0880
GRADING PLAN
MITIGATION PLAN - Johnson Creek Restoration Grading
La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON
SHEET
4 of 10
FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 3-05\Sheets 4 -- Johnson Creek Grading.dwg RA# 2001-014-04 MITIGATION PLAN 4/05


See Sheet 2 for Wetland Mitigation Planting.
LEGEND
Project perimeter
Johnson Creek Restoration Mitigation Area (Approx. 4.86 Ac.)
Wetland Creation
PEMA-2 - Palustrine emergent (Semi permanently Flooded) (Approx. 0.19 Ac.)
PSS-3 - Palustrine scrub-shrub (Approx. 0.22 Ac.)
PFO-2 - Palustrine forested (Approx. 1.14 Ac.)
Buffer
SS-2 scrub-shrub (Approx. 2.51 Ac.)
FO-1 scrub-shrub (Approx. 0.48 Ac.)
OBW-1
Green River
S. 204th Street
Proposed Johnson Creek alignment.
Base information from Goldsmith Engineers files received 9/16/04: 03102A01.dwg, 03102A03.dwg, 03102J05.dwg, 03102T01.dwg and 03102T03.dwg; files received 10/12/04 03102D.dwg and 03102GQ.dwg; file 03102J.dwg rec. 2/15/05. File RADKEY WET.dwg from Segale received 4/15/05.
PRELIMINARY
NOT FOR CONSTRUCTION
WARNING:
UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.
NORTH
30 120
0 60 180
STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAIRE MACKENZIE CERTIFICATE NO. 546
RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle, WA 98115
(206) 525-6122 FAX: (206) 525-2980
PLANTING PLAN
MITIGATION PLAN - Johnson Creek Restoration Planting
La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON
Proj. #2001-014
Date: 04-15-05
Scale: VARIES
Designed By: CW, CJM
Drawn By: CJM
Approved By: CW
SHEET
5 of 10
FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 3-05\Sheet 5 - Johnson Creek Planting.dwg RA# 2001-014-004 4/05 MITIGATION PLAN



MITIGATION PLAN - Green River Off-Channel Habitat Grading

La Pianta, LLC

TUKWILA SOUTH

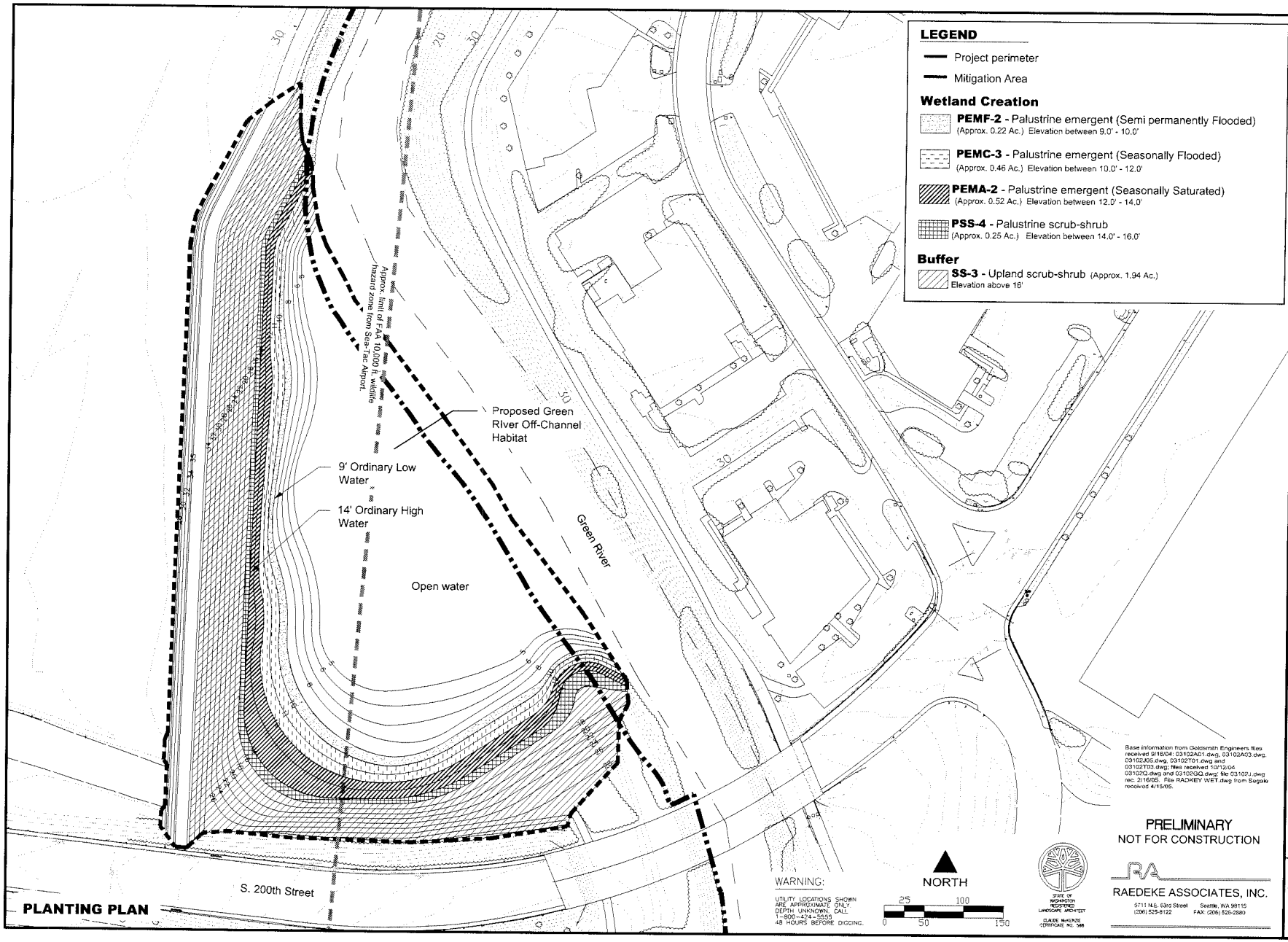
CITY OF TUKWILA, WASHINGTON

Proj # 2001-014 | Date: 04-19-05 | Scale: VARIES | Designed By: CV, CJM | Drawn By: CJM | Approved By: CV

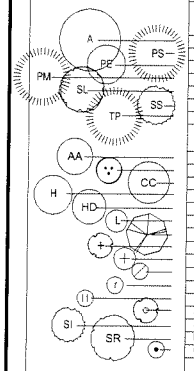
Rev.	Date	By	Description

SHEET 6 of 10

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 3-05\Sheet 6 - Green River Off-Channel Habitat.dwg RAM 2001-014-004 MITIGATION PLAN 4/05

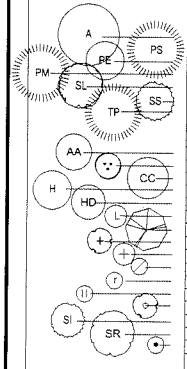

LEGEND
Project perimeter
Mitigation Area
Wetland Creation
PEMF-2 - Palustrine emergent (Semi permanently Flooded)
(Approx. 0.22 Ac.) Elevation between 9.0' - 10.0'
PEMC-3 - Palustrine emergent (Seasonally Flooded)
(Approx. 0.46 Ac.) Elevation between 10.0' - 12.0'
PEMA-2 - Palustrine emergent (Seasonally Saturated)
(Approx. 0.52 Ac.) Elevation between 12.0' - 14.0'
PSS-4 - Palustrine scrub-shrub
(Approx. 0.25 Ac.) Elevation between 14.0' - 16.0'
Buffer
SS-3 - Upland scrub-shrub (Approx. 1.94 Ac.)
Elevation above 16'
Approx. limit of FAA 10,000 ft. wildlife hazard zone from Sea-Tac Airport.
Proposed Green River Off-Channel Habitat
9' Ordinary Low Water
14' Ordinary High Water
Open water
Green River
S. 200th Street
PLANTING PLAN
WARNING:
UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.
NORTH
25 100
0 50 150
Base information from Goldsmith Engineers files received 9/16/04: 03102A01.dwg, 03102A03.dwg, 03102A05.dwg, 03102T01.dwg and 03102T03.dwg; files received 10/12/04 03102Q.dwg and 03102GQ.dwg; file 03102J.dwg rec. 2/16/05. File RADKEY WET.dwg from Segale received 4/15/05.
PRELIMINARY
NOT FOR CONSTRUCTION
STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAUDE McKENZIE CERTIFICATE NO. 588
RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle, WA 98115
(206) 525-8122 FAX: (206) 525-2880
MITIGATION PLAN - Green River Off-Channel Habitat Planting
La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON
Proj. #2001-014
Date: 04-19-05
Scale: VARIES
Designed By: CV, CJM
Drawn By: CJM
Approved By: CV
Rev. Date By Description
SHEET 7 of 10
FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 3-05\Sheet 7 - Green River Off-Channel Habitat.dwg RA# 2001-014-004 MITIGATION PLAN 4/05

PLANT SCHEDULE



COMMON NAME	SCIENTIFIC NAME	SIZE	COND.	REMARKS	WETLAND MITIGATION AREA: WETLAND (PEMF-1)	WETLAND (PEMC-1)	WETLAND (PEMA-1)	WETLAND (PSS-1)	WETLAND (PSS-2)	WETLAND (PFO-1)	WETLAND (SS-1)	JOHNSON CREEK RESTORATION AREA: JOHNSON CREEK (PEMA-2)	JOHNSON CREEK (PSS-3)	JOHNSON CREEK (PFO-2)	JOHNSON CREEK (SS-2)	JOHNSON CREEK (FO-1)
TREES																
Oregon ash	Fraxinus latifolia	1 gal.	container	18" ht. min.	-	-	-	-	-	1,409	-	-	-	119	-	-
Sitka spruce	Picea sitchensis	1 gal.	container	24" ht. min.	-	-	-	-	-	1,409	-	-	-	119	-	-
Bitter cherry	Prunus emarginata	1 gal.	container	18" ht. min.	-	-	-	-	-	1,409	-	-	-	119	-	-
Douglas fir	Pseudotsuga menziesii	1 gal.	container	24" ht. min.	-	-	-	-	-	-	-	-	-	-	-	83
Pacific willow	Salix lucida	1 gal.	container	18" ht. min.	-	-	-	4,977	-	1,409	-	-	115	119	-	-
Scouler's willow	Salix scouleriana	1 gal.	container	18" ht. min.	-	-	-	-	-	1,409	60	-	-	119	486	83
Western red cedar	Thuja plicata	1 gal.	container	24" ht. min.	-	-	-	-	-	-	-	-	-	-	-	83
SHRUBS																
Western serviceberry	Amelanchier alnifolia	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
Red-osier dogwood	Cornus sericea	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	84	2,055	-	-	43	173	-	-
Western hazelnut	Corylus cornuta	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
Western hawthorn	Crataegus douglasii	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	-	2,055	-	-	43	173	-	-
Ocean-spray	Holodiscus discolor	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
Black twinberry	Lonicera involucrata	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	84	-	-	-	43	-	-	-
Western crabapple	Malus fusca	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	-	2,055	-	-	43	173	-	-
Pacific ninebark	Physocarpus capitatus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	84	2,055	-	-	43	173	-	-
Swamp gooseberry	Ribes lucustre	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	84	2,055	-	-	-	173	-	-
Nootka rose	Rosa nootkana	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	-	2,055	60	-	43	173	486	73
Clustered wild rose	Rosa pisocarpa	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	-	-	60	-	43	-	486	73
Thimbleberry	Rubus parviflorus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
Salmonberry	Rubus spectabilis	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	84	2,055	-	-	43	173	-	-
Sitka willow	Salix sitchensis	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	1,843	-	2,055	-	-	43	173	-	-
Red elderberry	Sambucus racemosa	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
Common snowberry	Symphoricarpos albus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-	60	-	-	-	486	73
EMERGENTS																
Water plantain	Alisma plantago-aquatica	10" plugs	bareroot	well rooted, 18" on center spacing	14,286	-	-	-	-	-	-	-	-	-	-	-
Slough sedge	Carex obnupta	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	9,652	-	-	-	-	920	-	-	-	-
Common spikerush	Eleocharis palustris	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	9,652	-	-	-	-	920	-	-	-	-
Tall mannagrass	Glyceria elata	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	9,652	-	-	-	-	920	-	-	-	-
Daggerleaf rush	Juncus ensifolius	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	9,652	-	-	-	-	920	-	-	-	-
Yellow pondlily	Nuphar polysepalum	bulb	bareroot	well rooted, 18" on center spacing	14,286	-	-	-	-	-	-	-	-	-	-	-
Hardstem bulrush	Scirpus acutus	10" plugs	bareroot	well rooted, 18" on center spacing	14,286	-	-	-	-	-	-	-	-	-	-	-
Three-square bulrush	Scirpus americanus	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	-	-	-	-	-	-	-	-	-	-
Wooly sedge	Scirpus atrocinctus	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	-	-	-	-	-	-	-	-	-	-
Small-fruited bulrush	Scirpus microcarpus	10" plugs	bareroot	well rooted, 18" on center spacing	-	10,683	-	-	-	-	-	-	-	-	-	-
Simple-stem burreed	Sparganium emersum	10" plugs	bareroot	well rooted, 18" on center spacing	14,286	-	-	-	-	-	-	-	-	-	-	-

PLANT SCHEDULE (Cont.)



COMMON NAME	SCIENTIFIC NAME	SIZE	COND.	REMARKS	GREEN RIVER OFF-CHANNEL HABITAT AREA: GREEN RIVER (PEMF-1)	GREEN RIVER (PEMC-1)	GREEN RIVER (PEMA-1)	GREEN RIVER (PSS-4)	GREEN RIVER (SS-3)	TOTAL
TREES										
Oregon ash	Fraxinus latifolia	1 gal.	container	18" ht. min.	-	-	-	-	-	-
Sitka spruce	Picea sitchensis	1 gal.	container	24" ht. min.	-	-	-	-	-	-
Bitter cherry	Prunus emarginata	1 gal.	container	18" ht. min.	-	-	-	-	-	-
Douglas fir	Pseudotsuga menziesii	1 gal.	container	24" ht. min.	-	-	-	-	-	-
Pacific willow	Salix lucida	1 gal.	container	18" ht. min.	-	-	-	132	-	-
Scouler's willow	Salix scouleriana	1 gal.	container	18" ht. min.	-	-	-	-	1,017	-
Western red cedar	Thuja plicata	1 gal.	container	24" ht. min.	-	-	-	-	-	-
SHRUBS										
Western serviceberry	Amelanchier alnifolia	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
Red-osier dogwood	Cornus sericea	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Western hazelnut	Corylus cornuta	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
Western hawthorn	Crataegus douglasii	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Ocean-spray	Holodiscus discolor	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
Black twinberry	Lonicera involucrata	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Western crabapple	Malus fusca	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Pacific ninebark	Physocarpus capitatus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Swamp gooseberry	Ribes lucustre	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	-	-
Nootka rose	Rosa nootkana	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	424	-
Clustered wild rose	Rosa pisocarpa	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	424	-
Thimbleberry	Rubus parviflorus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
Salmonberry	Rubus spectabilis	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Sitka willow	Salix sitchensis	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	49	-	-
Red elderberry	Sambucus racemosa	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
Common snowberry	Symphoricarpos albus	1 gal.	container	12" ht. min., well rooted and branched	-	-	-	-	424	-
EMERGENTS										
Water plantain	Alisma plantago-aquatica	10" plugs	bareroot	well rooted, 18" on center spacing	1,067	-	-	-	-	-
Slough sedge	Carex obnupta	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	2,496	-	-	-
Common spikerush	Eleocharis palustris	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	2,496	-	-	-
Tall mannagrass	Glyceria elata	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	2,496	-	-	-
Daggerleaf rush	Juncus ensifolius	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	2,496	-	-	-
Yellow pondlily	Nuphar polysepalum	bulb	bareroot	well rooted, 18" on center spacing	1,067	-	-	-	-	-
Hardstem bulrush	Scirpus acutus	10" plugs	bareroot	well rooted, 18" on center spacing	1,067	-	-	-	-	-
Three-square bulrush	Scirpus americanus	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	-	-	-	-
Wooly sedge	Scirpus atrocinctus	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	-	-	-	-
Small-fruited bulrush	Scirpus microcarpus	10" plugs	bareroot	well rooted, 18" on center spacing	-	1,269	-	-	-	-
Simple-stem burreed	Sparganium emersum	10" plugs	bareroot	well rooted, 18" on center spacing	1,067	-	-	-	-	-

WARNING:

UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT CLAUDE MCKENZIE CERTIFICATE NO. 568

PRELIMINARY
NOT FOR CONSTRUCTION

RAEDEKE ASSOCIATES, INC.
5711 N.E. 83rd Street Seattle, WA 98115
(206) 525-8122 FAX (206) 526-2880

Rev.	Date	By	Description

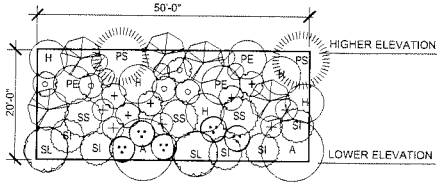
Proj. #2001-014
Date: 04-19-05
Scale: NONE
Designed By: CV, CJM
Drawn By: CJM
Approved By: CV

MITIGATION PLAN - PLANT SECTION AND SCHEDULE
La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON

SHEET 8 of 10

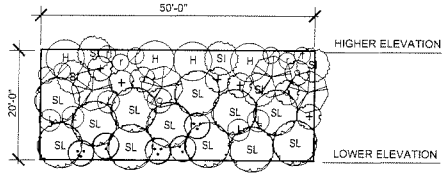
RA# 2001-014-004 MITIGATION PLAN 4/05

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheets 8 and 9 - Plant Schedules and details.dwg



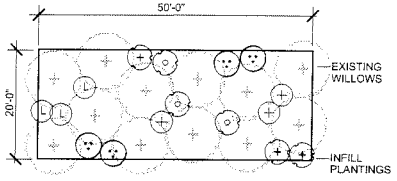
PALUSTRINE FORESTED WETLAND **(PFO-1 and PFO-2)**
TYPICAL PLANTING LAYOUT

SCALE: 1" = 10'



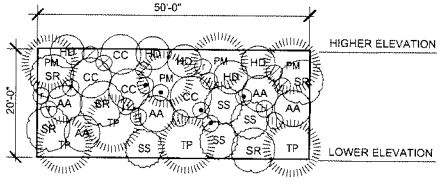
PALUSTRINE SCRUB-SHRUB WETLAND **(PSS-1, PSS-3, and PSS-4)**
TYPICAL PLANTING LAYOUT

SCALE: 1" = 10'



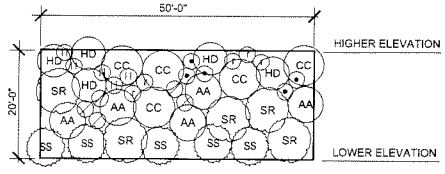
PALUSTRINE SCRUB-SHRUB WETLAND **(PSS-2)**
TYPICAL PLANTING LAYOUT

SCALE: 1" = 10'



BUFFER FORESTED **(FO-1)**
TYPICAL PLANTING LAYOUT

SCALE: 1" = 10'



BUFFER SCRUB-SHRUB **(SS-1 and SS-2)**
TYPICAL PLANTING LAYOUT

SCALE: 1" = 10'

PRELIMINARY
NOT FOR CONSTRUCTION

WARNING:

UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY. DEPTH UNKNOWN. CALL 1-800-424-5555 48 HOURS BEFORE DIGGING.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAUDE McKENZIE CERTIFICATE NO. 588

RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle, WA 98115
(206) 525-8122 FAX: (206) 526-2660

Rev.	Date	By	Description

Proj. #2001-014
Date: 04-19-05
Scale: VARIES
Designed By: CV, CJM
Drawn By: CJM
Approved By: CV

MITIGATION PLAN - PLANTING LAYOUT

La Planta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON

SHEET
9 of 10

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheets 8 and 9 - Plant Schedules and details.dwg RA# 2001-014-004 MITIGATION PLAN 4/05

GENERAL NOTES AND SPECIFICATIONS

GENERAL CONDITIONS

GENERAL DESCRIPTION

FURNISH ALL MATERIALS, TOOLS, EQUIPMENT, AND LABOR NECESSARY FOR THE COMPLETION OF GRADING, PLANTING, AND HABITAT STRUCTURE INSTALLATION AS INDICATED ON DRAWINGS AND SPECIFIED HEREINAFTER. WORK INCLUDES VEGETATION THINNING BY HAND METHODS, PLANTING, FERTILIZING, MULCHING, MAINTENANCE AND GUARANTEE OF PLANTED AREAS AS SPECIFIED HEREIN.

CONSTRUCTION OBSERVATION / QUALITY ASSURANCE / GUARANTEE

THE PROJECT BIOLOGIST (BIOLOGIST) SHALL BE INVOLVED DURING THE FOLLOWING PHASES OF CONSTRUCTION: (1) ON-SITE MEETING PRIOR TO COMMENCEMENT OF WORK (PRE-CONSTRUCTION MEETING); (2) APPROVAL OF TEMPORARY HAUL ROAD LOCATION (IF NECESSARY); (3) APPROVAL OF SUBGRADE; (4) APPROVAL OF PLACEMENT OF SALVAGED TOPSOIL AND FINISH GRADES; (5) APPROVAL OF HABITAT STRUCTURE INSTALLATION AND OF HYDROSEEDING; (6) APPROVAL OF PLANTS, PLANTING LOCATIONS AND TECHNIQUES; (7) COMPLIANCE ACCEPTANCE; (8) RESTORATION OF TEMPORARY HAUL ROADS; AND (9) FINAL INSPECTION. PRIOR NOTICE OF 48 HOURS TO THE BIOLOGIST FOR THE ABOVE ACTIVITIES IS REQUIRED.

PLANT SUBSTITUTIONS MAY BE PERMITTED BASED ON PLANT AVAILABILITY, BUT ONLY WITH THE APPROVAL OF THE BIOLOGIST.

ALL PLANT MATERIAL SHALL BE GUARANTEED FOR ONE FULL YEAR FROM THE DATE OF PLANTING. ANY PLANTED MATERIAL (WOODY OR HERBACEOUS) OTHER THAN SPECIFIED OR NOT IN VIGOROUS CONDITION WITHIN A PERIOD OF ONE YEAR FROM ACCEPTANCE OF THE WORK SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. AN 85% MINIMUM SURVIVAL RATE IS EXPECTED AFTER THREE YEARS.

SITE CONDITIONS / DAMAGE / CLEANUP

THE BIOLOGIST SHALL BE NOTIFIED IMMEDIATELY IF SITE CONDITIONS DIFFER FROM THOSE SHOWN. CARE SHALL BE TAKEN TO PROTECT THE EXISTING WETLAND DURING CONSTRUCTION ACTIVITIES. THE MITIGATION PLANTING AREAS SHALL BE CLEARLY MARKED BY CONTRACTOR AND APPROVED BY THE BIOLOGIST PRIOR TO THE INITIATION OF CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING PLANTED AREAS FREE OF DEBRIS. UPON COMPLETION OF THE CONTRACT, THE CONTRACTOR SHALL REMOVE ALL SURPLUS MATERIAL, EQUIPMENT, AND DEBRIS FROM THE SITES. ALL PLANTED AREAS SHALL BE RAKE-CLEAN.

MAINTENANCE

A THREE-YEAR MAINTENANCE PROGRAM BY CONTRACTOR SHALL INCLUDE WEEDING, SUPPLEMENTAL WATERING, AND OTHER ITEMS NECESSARY TO MAINTAIN PLANTED AREAS IN A HEALTHY CONDITION.

WEEDING SHOULD BE PERFORMED AS NECESSARY AND SHALL ONLY OCCUR IN CLEARED AND MULCHED AREAS MAINTAINED AROUND EACH WOODY PLANT AND REMOVAL OF EXOTIC SPECIES SUCH AS BLACKBERRIES, SCOT'S BROOM, REED CANARYGRASS, OR OTHERS AS DETERMINED FROM THE MITIGATION AREAS.

SUPPLEMENTAL WATER FOR ALL SHRUB PLANTINGS SHALL BE PROVIDED AS NECESSARY TO ENSURE SURVIVAL OF PLANT MATERIAL. HAND WATERING OR A TEMPORARY IRRIGATION SYSTEM RECOMMENDED BY THE CONTRACTOR AND APPROVED BY BIOLOGIST MAY BE USED. ALL WATERING SHALL SOAK ENTIRE ROOT ZONE WITHOUT CAUSING EROSION. SUPPLEMENTAL WATERING SHALL PROVIDE A MINIMUM OF 1 INCH OF WATER PER MONTH ACROSS ENTIRE WETLAND MITIGATION AND UPLAND BUFFER COMMUNITIES DURING HOT, DRY WEATHER (TYPICALLY MAY THROUGH SEPTEMBER). ANY EROSION SHALL BE RECTIFIED IMMEDIATELY.

NO PRUNING SHALL OCCUR UNLESS AUTHORIZED BY BIOLOGIST. THE MAINTENANCE PERIOD SHALL COMMENCE FOLLOWING ACCEPTANCE OF PLANTING BY BIOLOGIST.

SCHEDULE

ALL EARTHWORK SHALL OCCUR WHEN SITE CONDITIONS WARRENT UNLESS OTHERWISE APPROVED BY THE PROJECT BIOLOGIST. HYDROSEEDING SHALL BE COMPLETED PRIOR TO OCTOBER 15 UNLESS OTHERWISE APPROVED BY BIOLOGIST. ALL SUCH WORK IN SATURATED SOILS AT ANY TIME OF THE YEAR OR DURING INCLEMENT WEATHER SHALL BE APPROVED BY THE BIOLOGIST PRIOR TO EXECUTION, AND MAY REQUIRE USE OF TECHNIQUES AND EQUIPMENT DESIGNED TO MINIMIZE IMPACTS TO SATURATED SOILS OR ADJACENT AREAS OF STANDING WATER.

PLANTING OF WOODY MATERIAL SHALL OCCUR BETWEEN OCTOBER 1 AND MARCH 15 TO TAKE ADVANTAGE OF SEASONAL RAINS AND GREATER AVAILABILITY OF PLANT MATERIAL. PLANTING DURING ABNORMALLY HOT, DRY, OR FREEZING WEATHER, OR AT TIMES OTHER THAN AS NOTED, SHALL BE AUTHORIZED BY BIOLOGIST AND MAY REQUIRE PLANT SUBSTITUTIONS AND SUPPLEMENTAL IRRIGATION. SPOT SEEDING SHALL OCCUR IMMEDIATELY FOLLOWING EARTHWORK. IF SEEDING OCCURS BETWEEN OCTOBER 1 AND MARCH 31, STRAW MULCHING SHALL BE REQUIRED IMMEDIATELY AFTER SEED APPLICATION.

EXISTING VEGETATION

ALL EXISTING VEGETATION OUTSIDE LIMITS OF PLANTING SHALL BE PROTECTED UNLESS SPECIFIED. ANY EXISTING VEGETATION DAMAGED BY CONTRACTOR SHALL BE REPLACED WITH PLANTS OF EQUAL OR BETTER SIZE AND CONDITION AT CONTRACTOR'S EXPENSE.

PRODUCTS

PLANT MATERIALS

NO PLANT MATERIAL MAY BE TRANSPLANTED FROM OTHER PROTECTED WETLANDS UNLESS APPROVED BY THE BIOLOGIST. ALL PLANT MATERIAL SHALL BE LOCALLY GROWN AND BE OF ACCEPTED SIZE STANDARDS AS SPECIFIED IN "AMERICAN STANDARD FOR NURSERY STOCK - 1996" PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN (PHONE: 202-789-2900). ROOTED PLANTS SHALL BE FIRST QUALITY, WELL-FOLIATED, WITH WELL-DEVELOPED ROOT SYSTEMS, AND NORMAL WELL-SHAPED TRUNKS, LIMBS, STEMS, AND HEADS. THE BIOLOGIST SHALL INSPECT FOR QUALITY CONFORMANCE. ALL ROOTED PLANT MATERIAL SHALL BE LABELED BY GENUS, SPECIES AND VARIETY. PLANTS DEEMED UNSUITABLE SHALL BE REJECTED BEFORE OR AFTER DELIVERY. ALL PLANT MATERIAL SHALL BE FREE FROM DAMAGE, DISEASE, INSECTS, INSECT EGGS AND LARVAE.

FERTILIZER

FERTILIZER SHALL BE 21-GRAM AGRIFORM TABLETS AND CONTAIN 21 % NITROGEN, 10% PHOSPHORIC ACID AND 5% POTASH, OR EQUAL.

VEGETATION CONTROL MATTING

VEGETATION CONTROL MAT SHALL CONSIST OF PHOTO DEGRADABLE PVC OF POLYPROPYLENE PLASTIC SHEETING, MINIMUM THICKNESS 6 MILS, OR EQUAL.

EXECUTION

TEMPORARY HAUL ROADS

IF TEMPORARY HAUL ROADS ARE NECESSARY LOCATIONS SHOULD BE APPROVED BY PROJECT BIOLOGIST PRIOR TO CONSTRUCTION. ACCESS ROADS IN UPLAND AREAS SHALL BE BACKBLADED. TEMPORARY HAUL ROADS IN WETLAND AREAS SHALL BE RESTORED. HOGFUEL WILL BE REMOVED FROM ALL WETLAND AND WETLAND MITIGATION AREAS AND THE AREAS SHALL BE HYDROSEEDED WITH WETLAND SEED MIX. CULVERT CROSSINGS SHALL BE REMOVED AND RESTORED ONCE PLANT COMMUNITIES HAGE ESTABLISHED. SEEDING SCHEDULE SHALL CONFORM TO SPECIFICATION.

SITE CLEARING AND GRADING

MOW AREAS DESIGNATED FOR EARTHWORK OPERATIONS TO A HEIGHT OF 2". BAIL MOWED MATERIAL AND REMOVE FROM SITE. GRADE SITE AS SPECIFIED. IN AREAS WHERE FINISH GRADES WILL BE 16" OR GREATER BELOW ORIGINAL GRADE, PROJECT BIOLOGIST SHALL REVIEW SUBGRADE. IF SOIL IS NOT SUITABLE FOR PLANTING OVER EXCAVATION MAY BE NEEDED. IF DETERMINED TO BE NEEDED OVER EXCAVATE THE NEXT 12" AND STOCKPILE SEPARATE FROM SALVAGE TOPSOIL. PLACE 12" OF SALVAGE TOPSOIL IN OVER-EXCAVATED AREAS AND TRACK COMPACT. ALL AREAS BETWEEN ELEVATION 15.5 - 16.5 WILL BE COVERED WITH WEED CONTROL FABRIC TO MINIMIZE GERMINATION OF WEEDY GRASS SPECIES. FINISH GRADE ELEVATION IN PALUSTRINE FORESTED AREAS (PFO) SHALL NOT EXCEED ELEVATION 17.5 FEET.

VEGETATIVE CONTROL MATTING INSTALLATION

PLASTIC SHEETING SHALL BE PLACED IN SHINGLE PATTERN WITH UPPER SECTION OVERLAPPING LOWER SECTION. SHEETING SHALL BE ANCHORED WITH STAKES AT A MAXIMUM 10 FOOT GRID SPACING IN ALL DIRECTIONS. THERE SHALL BE A 12 INCH OVERLAP ON ALL SEAMS, OUTSIDE PERIMETER OF VEGETATIVE CONTROL MATTING TO BE STAKED AT A 10 FOOT SPACING.

PLANT INSTALLATION

PLANTING SHALL OCCUR ACCORDING TO PREVIOUSLY DEFINED SCHEDULE. PLANTS SHALL BE INSTALLED IN COMPLIANCE WITH DETAILS IN THE PLANS. DIG PITS FOR TREES, SHRUBS, AND GROUNDCOVER 2 TIMES AS WIDE AND 1.5 TIMES AS DEEP AS THE DIMENSIONS OF THE CONTAINER OR NATURAL ROOT SPREAD, AND CONSISTENT WITH GOOD HORTICULTURAL PRACTICE. IF CONTAINER STOCK APPEARS TO BE ROOTBOUND, SLASH ROOTS VERTICALLY WITH A SHARP KNIFE ALONG OUTSIDE OF BALL IN THREE (3) PLACES MINIMUM BEFORE PLANTING. SOAK DRIED ROOTBALLS IMMEDIATELY AFTER PLANTING. CLEANLY PRUNE BROKEN ROOTS ONE-HALF (0.5) INCH OR GREATER IN DIAMETER.

PLANTS SHALL BE INSTALLED SO FINISH GRADE IS LEVEL WITH TOP OF ROOT BALL AND IS AT THE SAME ELEVATION WITH RESPECT TO GRADE AS THE PLANT WAS GROWN IN NURSERY. PLANTS SHALL BE BACKFILLED AND WATER-SETTLED IF SOIL IS DRY. NO COMPACTION OF BACKFILL IS TO OCCUR AROUND PLANT. ALL PLANTS SHALL BE WATERED THOROUGHLY AT TIME OF INSTALLATION.

PLANTING LOCATIONS INDICATED ON THE PLAN ARE BASED ON ANTICIPATED SITE CONDITIONS. NO TREE OR SHRUB SPECIES SHALL BE PLANTED IN STANDING WATER.

SEEDING

SEEDING SHALL CONSIST OF SEED APPLICATION TO BARE SOIL WITHIN THE WETLAND MITIGATION AND UPLAND BUFFER AREAS TO BE CREATED/ENHANCED/RESTORED. SEEDING SHALL BE APPLIED IN A CONTINUOUS, UNIFORM MANNER OVER DESIGNATED AREAS AND KEPT MOIST THROUGH GERMINATION UNTIL FULLY ESTABLISHED.

WETLAND AREA SEED MIX:

AGROSTIS ALBA	REDTOP BENTGRASS	30%
ALOPECURUS PRATENSIS	MEADOW FOXTAIL	30%
FESTUCA RUBRA	RED FESCUE	30%
LOTUS CORNICULATUS	BIRDSFOOT TREFOIL	10%

APPLICATION RATE: 50 LBS. PER ACRE
FERTILIZER: NONE

UPLAND BUFFER SEED MIX:

AGROSTIS TENUIS	COLONIAL BENTGRASS	10%
FESTUCA RUBRA	RED FESCUE	40%
LOLIUM MULTIFLORUM	ANNUAL RYEGRASS	40%
TRIFOLIUM REPENS	WHITE CLOVER	10%

APPLICATION RATE: 80 LBS. PER ACRE
FERTILIZER: 12-24-24 @ 250 LBS. PER ACRE

AS-BUILT DRAWINGS

FOLLOWING COMPLETION AND APPROVAL OF PLANTINGS BY THE BIOLOGIST, CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS TO THE BIOLOGIST. DRAWINGS SHALL ADEQUATELY DESCRIBE THE CHANGES WITH NOTES, SYMBOLS, AND DIMENSIONS. BIOLOGIST WILL SUBMIT AS-BUILT DRAWINGS TO CITY OF TUKWILA.

MONITORING

AFTER ACCEPTANCE AND APPROVAL OF AS-BUILT DRAWINGS BY THE CITY OF TUKWILA LONG-TERM MONITORING OF THE SITE WOULD COMMENCE. MONITORING REPORTS ARE TO BE SUBMITTED TO THE CITY OF TUKWILA FIRST, SECOND, FOURTH, SIXTH, EIGHTH, AND TENTH YEAR AFTER CONSTRUCTION HAS BEEN ACCEPTED.

PROJECT ACCEPTANCE

AFTER COMPLETION OF THE MONITORING PERIOD, THE CITY OF TUKWILA SHALL PROVIDE WRITTEN ACCEPTANCE AND APPROVAL OF THE MITIGATION SITE PROVIDED THAT THE PERFORMANCE STANDARDS HAVE BEEN MET AS DOCUMENTED BY MONITORING.

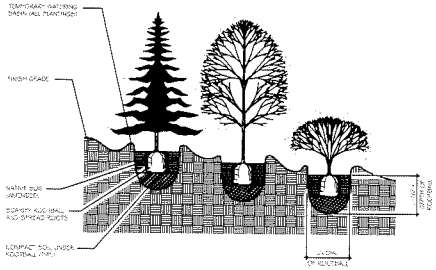
PLANT ACCEPTANCE AND GUARANTEE PERIOD

FOLLOWING COMPLETION OF PLANTING, BUT PRIOR TO FINAL APPROVAL BY THE BIOLOGIST, A PROVISIONAL PRE-WARRANTY ACCEPTANCE OF THE PLANTS WILL BE GRANTED. FROM THIS DATE FORWARD, FOR A PERIOD OF ONE YEAR, THE LANDSCAPE PLANTING WARRANTY SHALL BE IN EFFECT. A 100% SURVIVORSHIP OF NEWLY INSTALLED PLANT MATERIAL IS REQUIRED UNDER THIS GUARANTEE. IF MORTALITY EXISTS DURING THIS PERIOD, THE BIOLOGIST WILL SPECIFY WHICH PLANTS WILL BE REPLACED TO ACHIEVE 100% SURVIVAL RATE. SPECIFIED PLANTS SHALL BE REPLACED WITH PLANTS OF SPECIES, SIZES, AND CONDITIONS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY BIOLOGIST IN WRITING. ALL MAINTENANCE OF PLANTED AREAS DURING THE GUARANTEE PERIOD SHALL BE BY THE CONTRACTOR AND SHALL INCLUDE ITEMS AS INDICATED TO FULLY ESTABLISH ALL PLANTED AREAS TO A HEALTHY, VIGOROUS STATE.

EIGHT YEARS AFTER THE END OF THE GUARANTEE PERIOD, A FINAL INSPECTION OF THE WORK WILL BE COMPLETED BY THE BIOLOGIST. PLANTS INSTALLED UNDER THIS CONTRACT THAT ARE DEAD OR IN OTHERWISE UNSATISFACTORY CONDITIONS AND BELOW THE 85% SURVIVAL RATE SHALL BE REMOVED FROM THE SITE AND REPLACED AS DIRECTED BY THE BIOLOGIST. UPON COMPLETION OF THESE REQUIREMENTS, FINAL PLANT ACCEPTANCE WILL BE CERTIFIED IN WRITING BY BIOLOGIST.

CONSTRUCTION SEQUENCING

1. SCHEDULE AND ATTEND A PRE-CONSTRUCTION MEETING WITH THE CITY OF TUKWILA.
2. CONTRACTOR WILL FLAG ALL MITIGATION AREAS AND TEMPORARY HAUL ROADS (IF NEEDED) FOR BIOLOGIST APPROVAL. CONTRACTOR WILL WALK THE SITE WITH THE PROJECT BIOLOGIST TO CLARIFY LIMITS OF CONSTRUCTION AND THE WORK TO BE PERFORMED. CONTRACTOR AND PROJECT BIOLOGIST SHALL AGREE ON WORK PLAN PRIOR TO THE COMMENCEMENT OF WORK.
3. CONTRACTOR TO INSTALL TEMPORARY EROSION CONTROL MEASURES AS REQUIRED. BIOLOGIST SHALL APPROVE TEMPORY HAUL ROAD LOCATION (IF NEEDED).
4. CONTRACTOR SHALL GRADE WETLAND AREAS TO FINAL SUBGRADE ELEVATIONS. THE BIOLOGIST SHALL INSPECT FINAL SUBGRADE ELEVATION.
5. CONTRACTOR SHALL GRADE AREAS TO FINISH GRADE ELEVATIONS. BIOLOGIST SHALL INSPECT FINISH GRADE ELEVATIONS.
6. CONTRACTOR SHALL BACKBLADE AND SEED TEMPORARY HAUL ROAD IF NECESSARY.
7. CONTRACTOR SHALL LAYOUT NURSERY-GROWN PLANTS PER PLANS FOR APPROVAL BY BIOLOGIST. FOLLOWING LAYOUT APPROVAL, CONTRACTOR TO INSTALL PLANTS AS DIRECTED BY PLANS. BIOLOGIST WILL APPROVE PLANT INSTALLATION.
8. PLANT ACCEPTANCE AND GUARANTEE. SUBMIT AS-BUILT DRAWING TO BIOLOGIST.
9. COMPLIANCE ACCEPTANCE BY CITY OF TUKWILA.



NOTES

1. PLACE ROOTBALL SO TOPS ARE LEVEL WITH FINISH GRADE.
2. REMOVE ALL TAGS AND WIRE BASKETS. (SEE CONSTRUCTION NOTES FOR APPROVED SOIL USE).
3. PRUNE ALL DEAD AND BROKEN LIMBS AND ROOTS.
4. STAKE ALL DECIDUOUS AND CONIFER TREES. (SEE CONSTRUCTION NOTES FOR STAKING DETAILS).

CONIFEROUS TREE DECIDUOUS TREE SHRUB

(NOTE: PLANTS SHOWN ARE CONTAINER GROWN STOCK UNLESS NOTED OTHERWISE)

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
CLAUDE MCKENZIE
CERTIFICATE NO. 588

RAEDEKE ASSOCIATES, INC.
5711 N.E. 63rd Street Seattle, WA 98115
(206) 525-8122 FAX: (206) 525-2860

Description	By	Date	Rev.	Description	By	Date	Rev.

Proj. #2001-014-004 Rev.
Date: 04-19-05
Scale: 1" = 10'
Designed By: CJM, CHW
Drawn By: CJM
Approved By:

MITIGATION PLAN - CONSTRUCTION NOTES

La Pianta, LLC
TUKWILA SOUTH
CITY OF TUKWILA, WASHINGTON

SHEET
10 of 10

FILE NAME: C:\My Documents\Projects\2001-014 Tukwila South EIS\Wetland Mitigation Plans 4-05\Sheet 10 - Construction Notes.dwg RA# 2001-014-004 MITIGATION PLAN 4/05

Table 1: Compensatory mitigation ratios by Wetland Category and kind of mitigation provided. Based on Guidance on Wetland Mitigation – Part 1 (DOE 2004)

Wetland	Area (ac)	Wetland Impact (ac)	DOE Category	Rehab ratio	Enhance ratio	Create ratio	Rehab required	Enhance required	Creation required	Rehab provided	Enhance provided	Creation provided
1	2.17	0.26	**IV**	3	6	1.5	0.78	1.56	0.39	0.78		
2	0.09	0.09	**III**	2.5	4	2	0.23	0.36	0.18	0.23		
3	0.03	0.03	**III**	4	8	2	0.12	0.24	0.06	0.12		
3A	0.01	0.01	**IV**	1.875	3	1.5	0.02	0.03	0.02	0.02		
4	0.04	0.00	**IV**	3	6	1.5	0.00	0.00	0.00			
4A	0.04	0.04	**IV**	1.875	3	1.5	0.08	0.12	0.06	0.08		
5	0.02	0.02	**III**	2.5	4	2	0.05	0.08	0.04	0.05		
6	0.03	0.03	**IV**	1.875	3	1.5	0.06	0.09	0.05	0.06		
7	3.07	3.07	**III**	2.5	4	2	7.68	12.28	6.14	7.68		
8	1.50	1.50	**III**	2.5	4	2	3.75	6.00	3.00	6.00		
9	2.71	2.71	**III**	2.5	4	2	6.78	10.84	5.42	6.78		
10	16.38	0.91	**II**	8	12	3	7.28	10.92	2.73	3.07	4.35	0.51
11	21.70	0.00	**IV**	3	6	1.5	0.00	0.00	0.00			
13	0.11	0.11	**IV**	3	6	1.5	0.33	0.66	0.17	0.33		
14	0.01	0.00	**IV**	3	6	1.5	0.00	0.00	0.00			
15	0.08	0.00	**III**	4	8	2	0.00	0.00	0.00			
16	0.65	0.65	**III**	4	8	2	2.60	5.20	1.30	2.60		
17	0.05	0.00	**III**	4	8	2	0.00	0.00	0.00			
18	0.10	0.00	**IV**	3	6	1.5	0.00	0.00	0.00			
Totals	**48.79**	**9.43**					**29.74**	**48.38**	**19.55**	**27.80**	**4.35**	**0.51**
								Mitigation	**Provided**	**27.80**	**4.35**	**3.05**

Table 2: Wetland Functions and Values Comparison of Existing versus Proposed Conditions

Wetland Function	Existing Conditions	Proposed Actions[1]
Water Quality Functions		
Potential for Removing Sediment	Moderate to low functional scores due to small size of wetlands, lack of vegetative cover in agricultural wetlands, and depressional outflow hydrogeomorphic (HGM) classification of most wetlands impacted by proposal.	Rehabilitation and enhancement of wetlands will result in vegetated wetlands habitats providing greater opportunity to remove sediments.
Potential for Removing Nutrients	Moderate to low functional scores due to small size of wetlands, lack of vegetative cover in agricultural wetlands and depressional outflow HGM classification of wetlands to be effected by the development.	Rehabilitation and enhancement of wetlands will result in vegetated wetland habitats better suited to uptake and remove nutrients from water column. Increased residence time in long duration hydroperiod wetlands results in greater opportunity to remove nutrients.
Potential for Removing Heavy Metals and Toxic Organics	Moderate functional scores due to wetland locations in agricultural fields and nearby industrial activity.	Rehabilitation and enhancement of wetlands will result in near duplication of WAFAM acre-point scores. Discontinuation of agricultural and industrial activities on project site would eliminate existing untreated pollutant sources. DEIS concluded net project plus wetland alterations impact on water quality would be neutral to beneficial (DEIS Appendix C, Attachment A – *Wetland Water Quality Function and Impact Assessment*)
Hydrologic Functions		
Potential for Reducing Peak Flows	Moderate to low functional scores due to small size and depressional outflow HGM of most wetlands impacted.	Rehabilitation and enhancement of wetlands will result in longer duration hydroperiod within mitigation wetlands. Increased woody vegetation will slow water, reducing peak flows.
Potential for Reducing/Decreasing Downstream Erosion	Moderate to low functional scores due to small wetland size and depressional outflow HGM of most wetlands affected by development.	Rehabilitation and enhancement will establish semipermanently flooded hydrologic regimes, increasing the ability of wetlands to slow water velocities.

[1] WAFAM scores for depressional and riverine HGM classes are shown in Table 3.

Wetland Function	Existing Conditions	Proposed Actions[1]
Potential for Groundwater Recharge	Moderate to low functional scores due to depressional outflow HGM of most wetlands and lack of long duration hydroperiod.	Most impacted wetlands are rated low or moderate for this function, and overall, wetlands located on the bluff between the Green River valley and I-5 appear to be sites of seasonal or perennial groundwater discharge. Cropped wetlands in the Green River Valley may seasonally contribute recharge to the shallow groundwater table; but the dynamics of groundwater on the site are largely controlled by the Green River and its periodic flooding. Mitigation at Wetlands 10, Wetland 11, adjacent to Johnson Creek and adjacent to the Green River will provide replacement functions in proportion to estimated project impacts.
Biologic Functions		
General Habitat Suitability	Low functional scores due to small size, agricultural use, lack of connectivity to other habitats, and lack of vegetation in most wetlands proposed to be altered.	Rehabilitation and enhancement will result in increased habitat through establishment of different vegetation strata, longer duration hydroperiods.
Habitat suitability for Invertebrates	Low functional scores due to agricultural practices and lack of vegetation in wetlands to be effected by development.	Rehabilitation and enhancement will result in contiguous vegetated wetland habitats.
Habitat suitability for Amphibians	Low functional scores due to agricultural practices, short duration hydroperiod, and lack of vegetation in wetlands to be altered.	Rehabilitation and enhancement will result in contiguous vegetated wetland habitats with long duration hydroperiods.
Habitat suitability for Anadromous Fish	Low functional scores due to lack of connectivity to fish bearing waters for many wetlands proposed to be affected.	Rehabilitation and enhancement will result in improved flow to fish bearing waters. Increased vegetation diversity will improve food sources for fish
Habitat suitability for Resident Fish	Low functional scores due to lack of connectivity to fish bearing waters for many wetlands proposed to be affected.	Rehabilitation and enhancement will result in improved flow to fish bearing waters. Increased vegetation diversity will improve food sources for fish
Habitat suitability for Wetland Associated Birds	Moderate to low functional scores due to lack of vegetation in agricultural wetlands. Flooded agricultural fields do provide wintering waterfowl habitat.	Rehabilitation and enhancement will increase vegetation structure, provide greater nesting and forage opportunities for passerines. Longer duration hydroperiod portions of mitigation area provide some waterfowl habitat.

Wetland Function	Existing Conditions	Proposed Actions[1]
Habitat suitability for Wetland Associated Mammals	Moderate to low functional scores due to small wetland size. Agricultural fields do provide forage habitat for small mammals.	All filled wetlands provide relatively low habitat functions to wetland-associated mammals. They lack the surface water and vegetation conditions that these animal species require. The wetland mitigation actions will establish native vegetation in areas of perennially flowing and seasonally standing water. The new features will provide habitat benefits to beaver, muskrat, and river otter above levels provided in the filled wetland. The functional assessment indicates that the mitigation actions in the depression wetlands (Wetland 10 and Wetland 11) would not compensate for the project impact, but in combination with the riverene creation functional replacement is likely. Professional experience suggests that the increased access of wetland dependent mammals to the mitigation sites through the new seasonal and perennially flooded aquatic habitats, and the improved vegetation communities will result in improved habitat conditions for these species.
Native Plant Richness	Low functional scores due to agricultural practices.	Rehabilitation and enhancement will provide a diverse native plant community.
Primary Production and Export	Moderate functional scores due to depressional outflow HGM of wetlands to be altered.	Replacement of herbaceous vegetative cover in wetlands with woody vegetation will reduce this function in depressional wetlands, but riverine wetland creation will offset this loss.

Table 3: Summary of WAFAM Scores.

	Wetland Number													
Functions lost:	**1**	**2[a]**	**3[a]**	**3-A**	**4-A**	**5**	**6**	**7**	**8**	**9**	**10**	**13**	**16**	**TOTAL**
Removing Sediment	-2	-1	0	0	0	0	0	-20	-10	-17	-2	0	-4	-57
Removing Nutrients	-3	0	0	0	0	0	0	-15	-12	-14	-1	0	-3	-49
Removing Metals & Toxic Organics	-2	-1	0	0	0	0	0	-14	-11	-14	-2	0	-2	-47
Reducing Peak Flows	-2	-1	0	0	0	0	0	-23	-10	-18	-3	0	-3	-60
Reducing Downstream Erosion	-1	-1	0	0	0	0	0	-22	-11	-20	-6	-1	-5	-67
Groundwater Recharge	-2	-1	0	0	0	0	0	-8	-6	-11	-1	0	-1	-31
General Habitat Suitability	-1	0	0	0	0	0	0	-4	-2	-4	-5	0	-2	-18
Habitat for Invertebrates	-1	0	0	0	0	0	0	-2	-2	-2	-3	0	-2	-11
Habitat for Amphibians	-1	0	0	0	0	0	0	-2	-2	-2	-2	0	-1	-10
Habitat for Anadromous Fish	-1	0	0	0	0	0	0	-2	-1	-1	-2	0	-1	-8
Habitat for Resident Fish	-1	0	0	0	0	0	0	-4	-3	-3	-3	0	-2	-17
Habitat for Wetland Birds	-1	0	0	0	0	0	0	-6	-4	-7	-20	0	-2	-39
Habitat for Wetland Mammals	-1	0	0	0	0	0	0	-5	-3	-5	-3	0	-1	-18
Native Plant Richness	0	0	0	0	0	0	0	-1	0	-1	-4	0	-1	-7
Primary Production and Export	-3	0	0	0	0	0	0	-18	-10	-18	-5	-1	-5	-59

	Mitigation Benefits				**Impacts**	**Benefits by HGM Class**	
Functions Gained:	**WL 10**	**WL 11**	**Johnson Ck.[b]**	**Green R.[b]**	**Depression**	**Depression**	**Riverine**
Removing Sediment	22	53	8	4	**-57**	**75**	**12**
Removing Nutrients	9	75	8	4	**-49**	**84**	**12**
Removing Metals & Toxic Organics	12	33	9	8	**-47**	**45**	**16**
Reducing Peak Flows	10	51	9	4	**-60**	**60**	**13**
Reducing Downstream Erosion	14	64	6	3	**-67**	**78**	**9**
Groundwater Recharge	10	15	4	1	**-31**	**25**	**5**
General Habitat Suitability	7	110	11	7	**-18**	**117**	**18**
Habitat for Invertebrates	21	36	11	6	**-11**	**57**	**17**
Habitat for Amphibians	43	74	11	6	**-10**	**117**	**18**
Habitat for Anadromous Fish	15	63	13	8	**-8**	**78**	**21**
Habitat for Resident Fish	18	7	13	4	**-17**	**25**	**17**
Habitat for Wetland Birds	-27	86	12	9	**-39**	**58**	**20**
Habitat for Wetland Mammals	0	5	8	8	**-18**	**4**	**16**
Native Plant Richness	31	88	8	6	**-7**	**118**	**15**
Primary Production and Export	31	15	14	10	**-59**	**47**	**25**

[a]The HGM class for this wetland is Depressional Closed, all other wetlands are in the HGM Depressional Open class unless noted otherwise.

[b]The HGM class for this wetland is Riverine flow-through.

Table 4. Scientific and common names of plants with assigned Wetland Indicator Status (WIS) (Reed 1988, 1993) proposed for site. Scientific names from Hitchcock and Cronquist (1976), Pojar and MacKinnon (1994), and Hickman (1993).

Scientific Name	Common Name	WIS[1]
TREES:		
Fraxinus latifolia	Oregon ash	FAC
Picea sitchensis	Sitka spruce	FAC
Prunus emarginata	Bitter cherry	FAC
Salix lucida	Pacific willow	FAC
Salix scouleriana	Scouler's willow	FACW
SHRUBS:		
Cornus sericea	Red-osier dogwood	FAC
Crataegus douglasii	Western hawthorn	FAC
Lonicera involucrate	Black twinberry	FAC
Malus fusca	Western crabapple	FAC
Physocarpus capitatus	Pacific ninebark	FAC
Ribes lacustre	Swamp gooseberry	FAC
Rosa nootkana	Nootka rose	FAC
Rosa pisocarpa	Clustered wild rose	FAC
Rubus spectabilis	Salmonberry	FACW
Salix sitchensis	Sitka willow	FACW
HERBS:		
Alisma plantago-aquatica	Water plantain	OBL
Carex obnupta	Slough sedge	FACW-
Elocharis palustris	Common spikerush	FACW
Glyceria elata	Tall mannagrass	FACW
Juncus ensifolius	Dagger-leaf rush	FACW
Nuphar poysepalum	Yellow pondlily	OBL
Scirpus acutus	Hardstem bulrush	OBL
Scirpus americanus	Three-square bulrush	OBL
Scirpus atrocinctus	Wooly sedge	FACW
Scirpus microcarpus	Small-fruited bulrush	FACW+
Sparganium emersum	Simple-stem burreed	OBL

[1] = WIS ratings with a minus symbol are considered "drier", while the plus symbol indicates "wetter" species. Plants not identified to the species were assigned the WIS range for the genus.

Table 5. Factors that may adversely affecting wetland creation or enhancement and potential contingencies to ensure success.

Problem	Potential Remedial Action[1]
Plant Performance	
- low survival	Replant, water, weed, replant with different species
- low plant vigor	Amend soil
- noxious weeds invade	Manual weed removal
- predation by animals	Fencing to be removed once plants are established
Undesirable Plant Community	Evaluate value, remove and replant, if necessary
Vandalism	Evaluate source, whether one-time or continuing problem
- dumping of debris	Remove debris & educate public
- damaged plant material	Replant first year, post signs, fence access
- foot or bike traffic	Replant first year, post signs, fence access
Erosion	Evaluate source, cause; install appropriate erosion control measures; plant with species which have dense root systems; regrade, if necessary.
Excessive soil water	Evaluate response and adaptability of plants, communities; replant with vegetation adapted to corresponding moisture regime, if needed.

Table 5. Continued.

Problem	Potential Remedial Action[1]
Inadequate soil water	Evaluate conditions, cause; divert water to wetland, regrade, or irrigate as appropriate.
Drought	Irrigate

[1] The potential actions listed are those commonly employed. No contingency plan can foresee all problems and appropriate solutions. For each site, problems encountered need to be evaluated on a case-by-case basis. If a more effective remedy than those listed is identified, it will be considered.

APPENDIX

Hydrologic and Soil Data
Unavoidable Impacts

AESI Well Data September 2003 – March 2005

Date	OBW-7h	OBW-8h	OBW-9h	OBW-10h
9/29/2003	11.63	12.43	12.90	12.89
10/17/2003	12.05	12.81	13.07	13.04
11/18/2003	13.23	14.53	15.35	15.03
12/11/2003	14.65	16.52	16.74	16.86
1/8/2004	13.85	15.52	16.12	16.10
2/12/2004	15.75	17.21	17.34	17.70
3/17/2004	14.96	16.22	16.53	16.71
4/14/2004	14.62	15.86	16.15	16.31
5/7/2004	13.74	15.14	15.51	15.59
6/9/2004	14.21	15.80	16.06	16.11
7/14/2004	12.58	13.86	14.37	14.37
8/13/2004	11.92	13.02	13.57	13.48
9/15/2004	12.29	13.66	13.99	13.95
10/21/2004	12.90	14.54	14.83	14.73
11/22/2004	12.27	14.37	15.01	14.84
12/17/2004	15.62*	*	*	
1/28/2005	15.87	17.35	17.35	17.65
2/22/2005	13.62	15.14	15.86	15.89
3/11/2005	13.27	14.54	15.24	15.18
Ground Elevation NAVD29	30.17	17.04	16.04	17.48
TOC Elevation NAVD 29	32.36	21.51	20.09	21.59
Stickup	2.18	4.43	4.06	4.10
Total Depth	32.72	35.81	35.32	34.73

* No data recorded due to standing water at well

Soil Data from Raedeke Sample Plots in Wetland Mitigation areas

Plot Number	Soil Depth	Soil Texture
Wetland 10, SP1, Table B.25 DEIS	0-3"	Organic loam
	3-12"	Silt loam
	12-16"	Silt loam
Wetland 10, WL10SP1, Table B.24 DEIS	0-14"	Silt loam
	14-16+"	Mucky peat
Wetland 10, SP2, Table B.23 DEIS	0-14"	Organic silt loam
	14-20+"	Peaty muck
Wetland 10, SP4, Table B.22 DEIS	0-18"	Layers of silt loam and fine sandy loam
	18+"	Sandy loam
Wetland 11, WL11SP1, Table B.10 DEIS	0-16"	Silt loam
	16-20"	Peaty muck
Wetland 11, WL11SP2, Table B.11 DEIS	0-12"	Silt loam
	12-18"	Silt loam
	18+"	Peaty muck

EXPLANATION OF UNAVOIDABLE WETLAND AND STREAM IMPACTS

This Section explains why wetland and stream impacts proposed under the Tukwila South Project Master Plan are unavoidable in order to meet Purpose and Need[1] objectives. Four main categories of unavoidable impact causes are explained, along with why such categories of impacts are proposed to meet the Project's Purpose and Need. The unavoidable cause for each proposed wetland and stream impact is summarized in Table 1 of this Appendix and described in detail in the Tukwila South Project DEIS.

Categories of Unavoidable Impact

The four categories of unavoidable impact causes based on Purpose and Need for the Project are the following:

1. **Minimum contiguous area needed for a viable, large-scale campus master plan environment** attractive to national and international emerging technology industries;
2. **Campus area dimensional and circulation requirements** (pedestrian and secondary road circulation, not by use of the Southcenter Parkway);
3. **The minimum finished site elevation to provide sewer and stormwater service** throughout the Project; and the
4. **Minimum buildable area for supporting services and retail at the north and south entrances** to the Project.

1. Minimum Contiguous Large-Scale Campus Master Plan Environment

The Project is intended to create a viable employment and emerging advanced technology commercial hub. Market research shows these industries prefer large-scale campus settings that include a complementary array of companies or institutions, include a wide range of complementary retail, commercial, and residential uses, and can provide for future expansion. Individual campus environments are defined by spatially cohesive building settings with organized open spaces such as central plazas and public gathering places, where circulation is pedestrian oriented, and where vehicular circulation is simplified on secondary roads. This setting provides a contiguous secure common internal circulation that allows for very short transit times (measured in minutes) between campus areas. Large building footprints are required to accommodate research laboratories, interaction between offices, conference and meeting facilities, laboratories and associated supporting services, and close proximity between multidisciplinary

[1] For details please refer to the Tukwila South Project DEIS Purpose and Need Section of Chapter 2.

facilities. Multiple, interconnected campus settings are necessary to form the advanced technology national and international center that is the Purpose and Need for the Project. Research demonstrates the contiguous developable area needed to support the intended Project, including future expansion, is at least 250 acres plus an additional 100 acres for supporting uses, not divided into street grids. The developable portion of the 498.3-acre Tukwila South Project site under current conditions is approximately 275 acres,[2] excluding open space, critical areas, and storm control area requirements. In large measure, the developable contiguous area is limited by a flood protection barrier dike which precludes development south of its location due to unavailability of flood insurance (necessary in the event of river levee failure upstream). Relocation of the flood protection levee from South 196th Street to the southern boundary of the site (north of South 204th Street) is essential to create contiguous buildable area of sufficient size to meet the Purpose and Need. Under SEPA Alternatives 1 and 2, the developable portion of the site would rise to approximately 368 acres, excluding open space, critical areas, and storm control area requirements. Approximately 78.55 acres of the gain in buildable area are due to relocation of the flood protection barrier dike and related impacts to wetlands and streams (see "Area D" in Exhibit 1).

2. Campus Area Dimensional and Circulation Requirements

As shown in Exhibit 1, the site is long and narrow, constricted to the west by steep slopes and to the east by the Green River. The Green River meander creates one severe site constriction approximately 420 feet wide (east to west), and another sizeable area further south where the site width between the slopes and the river ranges from about 750 feet to about 1,200 feet. The City of Tukwila's planned extension of the Southcenter Parkway between South 180th Street and South 200th Street must pass through these constrictions. Through the northerly constriction, the Southcenter Parkway alignment becomes limiting to connecting campus-style development with secondary roads. Through the southerly constriction, and throughout the site, the Southcenter Parkway alignment establishes the contiguous area available for large-scale campus development between it and the river. The further to the west Southcenter Parkway is placed, the better the alignment becomes to meet the Project Purpose and Need for contiguous buildable area described above. At the northerly constriction, the Southcenter Parkway must be aligned as far west as feasible to allow room for a secondary road and campus connection from north to south along the river. Under both SEPA Alternatives 1 and 2, the minimum distance between the proposed Southcenter Parkway and the river levee would be approximately 360 feet. All of this space at the constriction

[2] Source: Goldsmith & Associates, Inc. July 23, 2004 Tukwila South Master Plan No Action Alternative Developed Site Area Table.

would be needed under Alternatives 1 and 2 for construction of an internal road that would likely require a 65-foot right-of-way, office/research campus buildings, and approximately landscaped pedestrian walkways. The north to south internal roadway, campus-style pedestrian connections, and building orientations are required by the Project's Purpose and Need

Extension of the Southcenter Parkway from South 180th Street to South 200th Street has independent utility to the City of Tukwila and is planned to occur regardless of whether the Tukwila South Project proceeds. The Southcenter Parkway extension is planned by the City to be a 5-lane road having a roadway width (fill prism) of between 80 feet and 90 feet. Design geometrics (alignment, curvature, and grade) for Southcenter Parkway must meet the requirements for a Collector Arterial in accordance with the City of Tukwila and AASHTO[3]. The Southcenter Parkway must extend south from the existing fixed intersection at Southcenter Parkway and South 180th Street, which because of minimum turning radius requirements makes impacts to stream "E" near the fixed intersection unavoidable no matter what alignment the Parkway takes further south. Under Alternatives 1 and 2, the Southcenter Parkway alignment is shifted west, relative to the no action Alternative 3, in order to meet the Purpose and Need objectives for total contiguous buildable area and minimum distance between the river and Parkway at the northerly constriction that are described above.

To provide a minimum 360-foot distance between the levee and the Parkway at the northerly constriction, the Parkway alignment must turn southwest once past the intersection's influence and then turn southerly again through the constriction area (see "Area B" in Exhibit 1). Lines of sight and maximum road curvature restrict the alignment adjustments necessary to provide the minimum 360-foot distance at the constriction, making direct impacts to stream E near Segale Park C Drive unavoidable, along with the direct impacts to stream E at the northerly constriction itself. If the Parkway alignment were to be shifted east to avoid stream E impacts near Segale Park C Drive and at the northerly constriction, then (1) the ability to connect campus development with a secondary road is lost at the constriction, and (2) approximately 9.5 buildable acres would be removed from campus-style development (see Area B in Exhibit 1) which is contrary to Purpose and Need objectives.

3. The Minimum Finished Site Elevation to Provide Sewer and Stormwater Service

[3] American Association of State Highway and Transportation Officials. These requirements include a minimum radius curvature between 850 to 1,000 feet, minimum tangent lengths between curves of approximately 200 feet to 300 feet for transition of superelevations, and Washington State Department of Transportation standards for highway intersections at South 180th Street, Segale Park C Drive, and South 200th Street.

The master plan for the site requires provision for one sewer system and three stormwater systems to serve the Project. Mass grading of the site south and west of the existing Segale Business Park is necessary to accomplish this purpose. The controlling elevation for the site sewer is determined by the City of Tukwila's planned elevation for sewer main improvements at the Southcenter Parkway and South 180th Street intersection (the current sewer main elevation at the intersection is about 5 feet higher and would require more fill throughout the site). The entire Project sewer would connect to the City's existing system at this point. Therefore, the Project grade must allow for that connection elevation, a 0.1 percent minimum sewer grade, and a minimum 4-foot cover depth. The City of Tukwila strongly prefers sewer lift stations with gravity flow for reasons of long term City benefit through enhanced reliability, and reduced operating expense. The southern portion of the site (where most fill impacts to wetlands would occur) would be served by one stormwater treatment facility located at the southern end of the site. The pond surface of the southern stormwater facility is established by (a) Green River water surface elevations under a variety of conditions and the need for the pond to discharge to the river through a floodgate, and (b) site runoff conditions. The resulting backwater elevation from the pond establishes minimum elevation site grade. Taken in combination, the site grade needed to accommodate sewer and stormwater infrastructure, given fixed control points at the Tukwila sewer connection point and the Green River for stormwater, require developed grade elevations of between about 29 feet and 30 feet. Existing elevations in the southern portion of the site to be filled range between about 16 feet to 25 feet (see "Area D" in Exhibit 1). The grade requirements for utility infrastructure are the cause of the majority of the unavoidable wetland fill impacts.

The northern portion of the site would be served by two stormwater systems, both draining north to existing connections to pump stations in the City of Tukwila. The north portion of the site, west of the existing Segale Business Park, drains stormwater to the South 180th Street pump station, and is included in its service area.[4] Water quality treatment would need to be provided at the northern end of the site prior to connection to the South 180th Street pump station. The Segale Business Park would eventually be redeveloped under the Master Plan, but that is not likely to occur during the first phases of development, and the existing business park is in the "northeast" stormwater drainage area served by the P17 pump station. Consequently the stormwater pond for the north area must be placed west of the Parkway at the north end of the site in "Area A" (see Exhibit 1). This requires grading the area of wetland 16 down to an elevation suitable for stormwater pond discharge to the off-site connection to the South 180th Street pump station, and suitable for gravity flow of stormwater from the project to the pond.

[4] Please reference the Tukwila South Project Master Drainage Plan for details.

4. Minimum Buildable Area for Supporting Services and Retail At the North and South Project Entrances

As explained above, the Project is intended to create a viable employment and emerging advanced technology commercial hub on a national and international scale. This requires that the Project include, among other features, a range of complementary retail and commercial services readily accessible to those working in, living in, or visiting the site. Retail and commercial services within the Project would benefit from drawing customers from within and outside the site boundaries, which requires that they be placed at site entrances where the trip counts are high enough to generate drive-by recognition and business. The highest trip counts at the Tukwila South Project are at the intersections of Orillia Road and South 200th Street, and at Southcenter Parkway and South 180th Street. In addition, these retail services are intended to compliment the surrounding area by forming a logical business transition between it and the Tukwila South Project. Market research indicates that an area about 100 acres in size for such retail/commercial/residential areas would serve the needs of an advanced technology center at this location.

This placement of retail/commercial services at the desired locations results in the fill of one wetland, wetland 13. Partial fill of wetland 10 and partial fill of wetland 16 is anticipated where cut for the north area stormwater pond is required (see "Area D4" and "Area A" in Exhibit 1).

Specific Wetland and Stream Impacts

The areas where the four categories of unavoidable impacts would occur are overlain with each proposed wetland and stream impact in Exhibit 1. All streams proposed for impact are currently used as irrigation drainage ditches and are regulated watercourses by the City of Tukwila. Descriptions of each affected wetland and stream and the proposed impacts are summarized in Table 1 to this Appendix. Detailed descriptions of impacts are located in the Tukwila South Project EIS and its appendices, as is the regulatory status of each affected wetland.[5]

[5] Raedeke Associates, Inc. March 28, 2005. Wetland Report and Mitigation Plan, Tukwila South; Raedeke Associates, Inc. March 29, 2005. Plants and Animals Assessment, Draft EIS Report; and Cedarock Consultants, Inc. February 16, 2005. Fisheries Technical Report, Tukwila South Project.

TABLE 1
Specific Stream and Wetland Unavoidable Impact Explanation
(Table Order is Generally North to South through the Site; see Exhibit 1)

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 16	Area A	3, 4	0.65 ac. (all of wetland)	The area would be cut down in elevation, removing the wetland.	The elevation of this area would be lowered in order to build a stormwater pond serving the north area of the project that would discharge to the S. 180th St. Pump Station immediately to the north. This portion of the site is within the pump station service area, and this specific location is nearest the pump station connection at the site boundary. A secondary reason is to develop retail/commercial services at the north entrance to the site, at the margins of the pond; however the elevation required by the stormwater pond is the reason for the impact.

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Stream E	Area B	1, 2	2,807 linear ft. 0.42 ac.	A portion of stream E would be placed in a culvert.	The proposed alignment of the Parkway is necessary to minimize the northerly constriction between the Green River levee to the east and the steep slopes to the west. A width of about 300 feet is required for a secondary road, pedestrian connections, and campus-style development objectives. Significant highway design restrictions are identified in the text above. *Note: The City's extension of Southcenter Parkway is independent of the Tukwila South Project. The extension of a 5-lane collector arterial south from the existing intersection makes impacts to Stream E in the immediate vicinity of the Southcenter Parkway and S. 180th Street unavoidable.*
Wetland 1	Area C	1, 2	0.26 ac. (portion of 2.17 ac wetland)	A portion of wetland 1 would be filled.	The alignment of the Parkway through this area is necessary to maximize space between the Green River levee to the east and the steep slopes to the west along the southerly site constriction. This space is required for campus-style development objectives to be met.

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 2	Area D (D-1)	3	0.09 ac. (all of wetland)	Filled from ~25 ft to 30-ft elev.	The elevation of these areas must be raised in order to be served by sewer and stormwater utilities. Site grades are driven by control points at the sewer main connection to the City of Tukwila and, for stormwater in the southern portion of the site, by elevations of the Green River. If some or all of these wetlands were to be retained contrary to Purpose and Need, they would exist as closed depressions within the area of fill with no ability to drain by a surface route. The severity of the hydrologic impacts from this isolation would be so great that site functions and values are better served by mitigating the entire wetlands.
Wetland 3	Area D (D-2)	3	0.03 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	
Wetland 3-A	Area D (D-2)	3	0.01 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	
Wetland 4-A	Area D (D-2)	3	0.04 ac. (all of wetland)	Filled from ~20 ft to 30-ft elev.	

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 5	Area D (D-2)	3	0.02 ac. (all of wetland)	Filled from ~16 ft to 30-ft elev.	
Wetland 6	Area D (D-3)	3	0.03 ac. (all of wetland)	Filled from ~22 ft to 29-ft elev.	
Wetland 7	Area D (D-3)	3	3.07 ac. (all of wetland)	Filled from ~16 ft to 29-ft elev.	
Wetland 8	Area D (D-3)	3	1.50 ac. (all of wetland)	Filled from ~16 ft to 29-ft elev.	
Wetland 9	Area D (D-3)	1, 3	2.71 ac. (all of wetland)	The area would be filled from about elevation 16 to 18 ft to elevation 29 ft.	Partially filled by relocated flood protection levee; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Wetland 10	Area D (D-4)	1, 3, 4	0.91 ac. (portion of wetland)	The area would be filled.	Partially filled by the relocated flood protection levee in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above. A secondary reason is to develop retail/commercial services at a south entrance to the site. If this portion of the wetland were to be retained contrary to Purpose and Need, it would exist within an area 6 to 7 feet bellow finished grade and could not drain through the flood protection levee to the remainder of Wetland 10. The severity of the hydrologic impacts from this isolation would be so great that site functions and values are better served by mitigating the entire wetland impact area.
Johnson Ck.	Area D (D-3)	1	1,346 linear ft. 0.30 ac.	The stream would be relocated	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above. The stream would be relocated south of the new flood protection levee.

Resource	Exhibit 1 Area Reference(s)	Unavoidable Impact Cause Category	Size of Impact	Description of Impact	Specific Reason(s) the Impact is Unavoidable
Stream J-1	Area D (D-3)	1	875 linear ft. 0.04 ac.	The stream would be placed in a culvert.	The stream would be filled by the relocated flood protection levee in order to have the minimum developable area.
Stream C	Area D (D-3)	1	852 linear ft. 0.10 ac.	The stream would be placed in a culvert.	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.
Stream D	Area D (D-3)	1	1,247 linear ft. 0.21 ac.	The stream would be placed in a culvert.	The stream would be partially filled by the relocated flood protection levee which would bisect it in order to have the minimum developable area; the remainder filled to the minimum grade necessary for sewer and stormwater infrastructure as described above.
Wetland 13	Area E	4	0.11 ac. (all of wetland)	The wetland would be filled.	The wetland would be filled to develop retail/commercial services at a south entrance as required by Purpose and Need.

Total wetlands fill: 9.40 ACOE-regulated wetlands fill; 9.43 total wetlands fill (48.79 ac. total wetlands on-site).

Total stream fill: 7,127 linear feet filled; 1.07 acres filled (13,338 linear feet, or 2.03 acres, total streams on-site).