

FINAL ENVIRONMENTAL ASSESSMENT

Levee Rehabilitation Projects
Green River, King County, Washington

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1.0 INTRODUCTION

Sections 1500.1(c) and 1508.9(a)(1) of the National Environmental Policy Act of 1969 (as amended) require federal agencies to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the federal government to insure such actions adequately address "environmental consequences, and take actions that protect, restore, and enhance the environment". This environmental assessment (EA) evaluates environmental consequences for the implementation of management actions carried out by the U.S. Army Corps of Engineers (Corps) in cooperation with the City of Tukwila and King County Flood Control Zone District, Washington in response to the described flood event at 6 projects (10 sites) along the lower Green River.

1.1 Background

Historically the Green River has been prone to regular flooding and inundation of surrounding lands. Many of the levees in existence today were constructed in the late 1800s and early 1900s by local landowners using any materials available. In 1961 the Howard Hanson Dam (HHD) went into operation and, accompanied by an extensive and continuous system of levees, major flooding in the area was moderated.

In November 2006, flow rates of 12,200 cfs were recorded in the Green River near Auburn, Washington. This is considered by King County to be a Phase 4 Flood Stage; Flood Stage 4 can result in significant flooding due to levee weakening from saturation and/or seepage (King County Flood Information, 2008). During this event several sections of the Green River levee system were damaged. The flood event of 2006 resulted in damage to six projects at 10 sites along the levee system on the lower Green River from river mile 12.6 to 30.8, totaling about 11,000 linear feet. Saturated soils during high peak flow resulted in toe scour, sink holes and rotational failure in some instances. The damaged levees are constructed of earthen material and armored with riprap on the riverward side. All damaged levees are in highly urbanized areas of King County and protect significant infrastructure and/or life. (Estimates regarding property and life being protected by each project is set out in the Project Information Reports (PIRs) for the particular projects and updated memoranda. These documents are available from the U.S. Army Corps of Engineers upon request.) Prior to the flood the Green River levees offered greater than 100-year level of protection (LOP). In the current state, the six projects (10 damaged sites) offer between 5 and 15 year LOP.

1.2 Project/Site Locations

The proposed repairs are located along the lower Green River between river miles 12.6 and 30.8. The repairs will take place on six projects at 10 sites totaling about 11,000 linear feet. The six projects are located in or near the cities of Auburn, Kent and Tukwila, King County, Washington. Each project has a stand alone independent utility in that it protects separate areas. A general location map can be found in Figure 1 and additional site locations details are in Table 1. All of the levees proposed for repair are eligible for repair under the PL84-99 program.

Figure 1: Locations of the Green River Projects

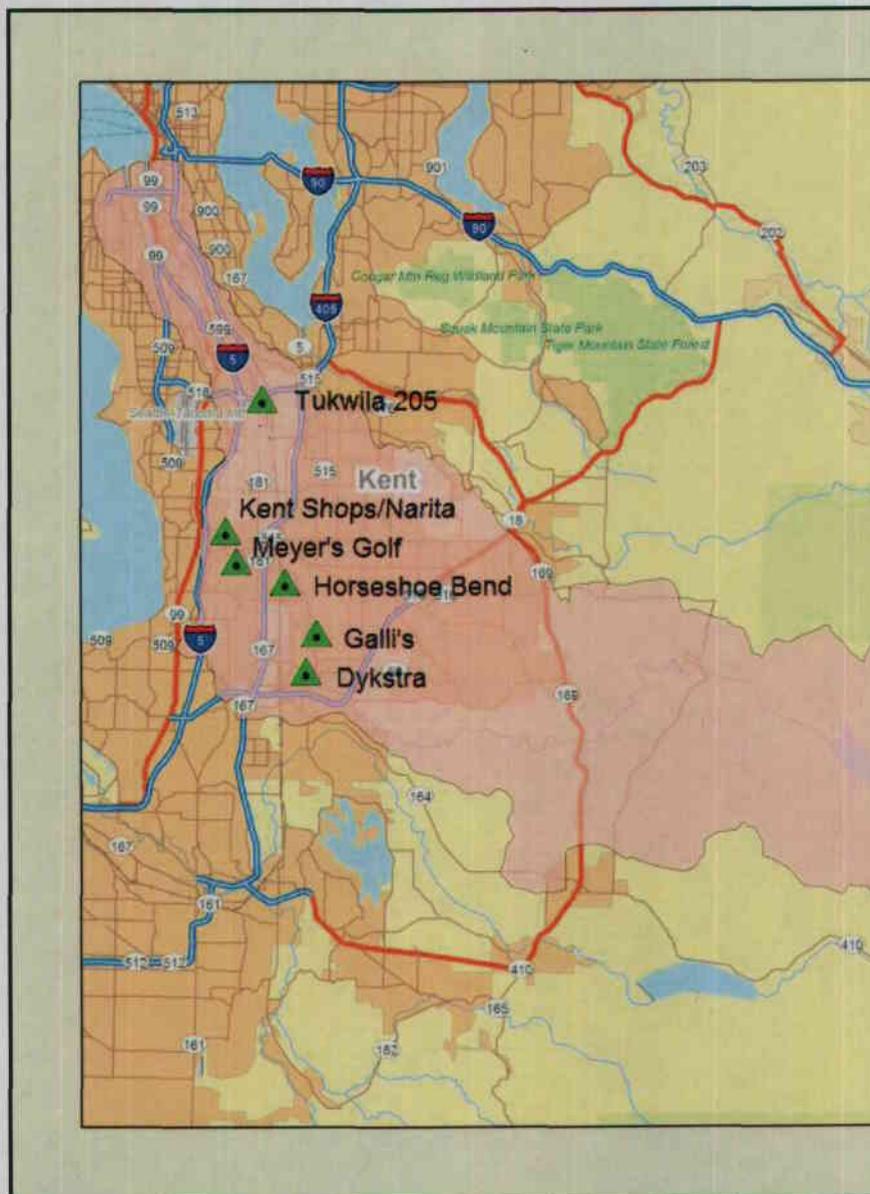


Table 1. Proposed Green River Projects

Sites Name	River Mile	River Bank	Location (Section, Township, Range)	Length of repair
Tukwila #3	RM 14.6 to RM 14.8	Left bank	T23N, R4E, Sec 35	1100 ft
Tukwila #5	RM 15.0 to RM 15.3	Left bank	T23N, R4E, Sec 35	800 ft
Horseshoe Bend #1	RM 25.8 to RM 26.1	Right bank	T22N, R5E, Sec 30	1,200 ft
Horseshoe Bend #2	RM 25.3	Right bank	T22N, R5E, Sec 30	160 ft
Horseshoe Bend #3	RM 25.2	Right bank	T22N, R4E, Sec 25	100 ft
Horseshoe Bend #4	RM 24.9 to RM 25.1	Right bank	T22N, R4E, Sec 25	1200 ft
Kent Shops/Narita	RM 21.0 to RM 22.0	Right bank	T22N, R4E, Sec 23	3600 ft
Meyer's Golf	RM 22.0 to RM 22.5	Right bank	T22N, R4E, Sec 23	1400 ft
Galli's	RM 30.5 to RM 30.8	Left bank	T21N, R5E, Sec 6 ,7	1100 ft
Dykstra	RM 30.8 to RM 31.5	Left bank	T21N, R5E, Sec 8	600 ft

1.3 Purpose and Need

The purpose of these projects is to provide protection to the communities and infrastructure from potential flood damage. These 10 levee sites along the lower Green River sustained significant damage during a flood event in November 2006. In December 2006, the Corps received a request for assistance to repair the levees from King County and the City of Tukwila.

The King County Flood Hazard Management Plan (Plan) was adopted in 2006. The Plan addresses and provides guidance for long-term flood reduction and management for all of King County. The goals of the Plan are to reduce the risk of future flood hazard, reduce long-term associated costs of maintaining the flood reduction infrastructure, and avoid or minimize the environmental impacts of flood management. (KC Flood Plan, Sec. 1.2). The Corps utilized this Plan as a guideline for designing the levee repairs that are the subject of this EA. As noted above, each site is considered as having independent utility. Each site may be constructed independent of the other sites. Funding is also a limitation on when construction may occur.

1.4 Project Authority

The proposed levee repairs are authorized by Public Law 84-99 (33 U.S.C. § 701n). Corps rehabilitation and restoration work under this authority is limited to flood control works damaged or destroyed by flood. The statute authorized rehabilitation to the condition and level of protection exhibited by the flood control work prior to the damaging event.

2.0 ALTERNATIVES CONSIDERED

For each levee section/site, multiple alternatives were considered, including the No-Action Alternative, the Non-Structural Alternative, the Repair the Damage Alternative, and a Layback the Levee Alternative. Different alternatives are preferred for different sites. In order for any alternative to be acceptable for consideration, it must meet certain objectives. The alternative must afford flood protection similar to the rest of the levee segment, it must be economically justified, it should be environmentally acceptable, and it should minimize costs for both the public sponsor and the Federal government. More detailed information regarding the

economics of the levees is set forth in the PIRs. Construction estimates regarding the particular projects are set forth in table 2. Construction timing is constrained by the Endangered Species Act (ESA) in-water construction fish windows which are from July 1 to September 15, as well as by the need to complete construction by the following flood season, which is generally considered to begin in November.

Table 2. Estimated Construction Costs for the Proposed Green River Projects

Site Name	Total Construction Cost
Tukwila (sites 3 and 5)	\$4.9M
Horseshoe Bend (all sites)	\$3.4M
Kent Shops/Narita	\$8.7M
Meyers Golf	\$4.7M
Dykstra	\$1.8M
Galli's	\$2.8M

2.1 The No-Action Alternative

The No-Action Alternative must be fully considered under NEPA. It would leave the levees in their current damaged condition. This alternative has high potential for flood damages to the structures and lands behind these levees in the Green River valley that are no longer protected to the 100-year flood protection level.

2.2 The Non-Structural Alternative

The Non-Structural Alternative would relocate all existing residences, commercial and retail structures, utilities, and public facilities. Relocation of infrastructure prior to the coming flood season is impractical, even if willing sellers were identified. Because the costs associated with flood proofing or relocating the structures in the potential inundation area would significantly exceed the cost of repairing the levee, the non-structural alternative was not selected.

2.3 The Repair to Pre-Flood Condition Alternative

The Repair to Pre-Flood Condition Alternative would be to restore the levees to pre-flood conditions. Damaged or lost riprap would be replaced, willow lifts would be planted at ordinary high water (OHW) and the levee slopes hydroseeded. This alternative is the preferred alternative for Horseshoe Bend #2 and #3. For the Dykstra and Galli's sites, the preferred alternative includes a 2H:1V riprap slope with willow lifts planted at OHW, and large woody debris (LWD) placed at the levee toe in limited areas.

2.4 The Layback the Levee Alternative

The Layback the Levee Alternative includes moving the landward footprint of the levee back from the river; the toe location would remain the same. The general design includes creating a mid-slope bench planted with native trees and shrubs, reducing the overall slope of the riverward face of the levee to 2V:1H, and adding willows and LWD. This is the preferred alternative for the following projects/sites: Tukwila 205 #3 and #5, Horseshoe Bend #1 and #4, Kent Shops/Narita, and Meyer's Golf.

3.0 DESCRIPTIONS OF THE PREFERRED ALTERNATIVES

3.1 Tukwila 205 #3 and # 5

The preferred alternative for the repairs at both sites is to layback the levee, which is also the locally preferred alternative. The proposed repair is approximately 800 LF at Site #3 and 1,100 LF at Site #5.

Repair at both Site #3 and Site #5 will consist of laying the existing levee back to establish a 2H:1V riverward slope with a 15 foot mid-slope bench. A launchable toe structure will be constructed using Class IV riprap to prevent future scour. A 3-foot blanket of Class IV riprap will be placed for armor rock. This slope will then be filled in with earthen material to achieve a 2H:1V slope, creating a planting bench. During the 2008 construction, the lower slope will be planted with 2 willow/dogwood lifts above the OHW elevation. The soil lifts containing the plantings will extend to the spall layer. Above the bench the levee prism will continue at a 2H:1V slope, underlain with 1 foot blanket of quarry spalls and hydro-seeded. At Site #5, a retaining wall will be constructed in place of the landward side levee prism due to site constraints. LWD will be placed, at approximately 20 foot intervals, at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone at Site #3 and in sections of Site #5. No LWD will be placed at the downstream end of the Site #5 repair due to concerns about bank erosion in this bend of the river. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009.

No wetland impacts are anticipated at either site and vegetation removal would consist primarily of blackberry and other invasive species. The repair of both of these sites would require in-water work.

3.2 Kent Shops/Narita

The preferred alternative for the repair at this site is to layback the levee, which is also the locally preferred alternative. The proposed repair is approximately 3,600 (LF).

Repair at this site will consist of laying the existing levee back to establish a 2H:1V riverward slope with a 12-18 foot mid-slope bench. A launchable toe structure will be constructed using Class III riprap to prevent future scour. A 3-foot blanket of Class III riprap will be placed for armor rock. This slope will then be filled in with earthen material to achieve a 2H:1V slope, creating a planting bench. The lower slope will be planted with 2 willow/dogwood lifts above the OHW elevation. The soil lifts containing the plantings will extend to the spall layer. Above the bench the levee prism will continue at a 2H:1V slope, underlain with 1 foot blanket of quarry spalls and hydro-seeded. LWD will be placed along a total of approximately 3000 ft of the levee at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone. No LWD will be placed at the farthest downstream 600 linear feet of the repair due to concerns about bank erosion in this bend of the river. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009. The portion of the golf course located behind the levee and in the new levee footprint will be off limits to the public during construction. Golf holes will be re-configured to allow golfers to play a full 18 holes during construction.

No wetland impacts are anticipated at this site and vegetation removal would consist primarily of blackberry and other invasive species on the existing levee. Approximately 35 mature, non-native trees would be removed from the golf course in order to layback the levee slope. These trees are far back from the river bank and therefore provide no shade to

the channel. The trees would be replaced by the golf course after construction. The repair of this site would require in-water work.

3.3 Meyer's Golf

The preferred alternative for the repair at this site is to layback the levee, which is also the locally preferred alternative. The proposed repair is approximately 1,600 LF.

Repair at this site will consist of laying the existing levee back to establish a 2H:1V riverward slope with an 18 foot mid-slope bench. A launchable toe structure will be constructed using Class III riprap to prevent future scour. A 3-foot blanket of Class III riprap will be placed for armor rock. This slope will then be filled in with earthen material to achieve a 2H:1V slope, creating a planting bench. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009. The lower slope will be planted with 2 willow/dogwood lifts above the OHW elevation. The soil lifts containing the plantings will extend to the spall layer. Above the bench the levee prism will continue at a 2H:1V slope, underlain with 1 foot blanket of quarry spalls and hydro-seeded. LWD will be placed, at approximately 20 foot intervals, at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone. The portion of the golf course located behind the levee and in the new levee footprint will be off limits to the public during construction. Golf holes will be re-configured to allow golfers to play a full 18 holes during construction.

No wetland impacts are anticipated at this site and vegetation removal would consist primarily of blackberry and other invasive species on the existing levee. Approximately 15 mature, non-native trees would be removed from the golf course in order to layback the levee slope. These trees are far back from the river bank and therefore provide no shade to the channel. The trees would be replaced by the golf course after construction. The repair of this site would require in-water work.

3.4 Horseshoe Bend 205

The preferred alternatives for the repairs at the four sites are as follows:

- **Site #1** - The plan for the repair is to layback the existing levee and create a mid-slope bench. This is the least cost alternative and is preferred by the sponsor. The proposed repair is approximately 800 LF. The proposed repair consists of removing damaged material and laying back the existing levee to a 2H: 1V slope. A launchable toe will be constructed using Class IV riprap to prevent future scour and a 3 foot blanket of Class IV riprap will be placed for armor rock. This slope will be filled with earthen material to achieve a 2H:1V slope, creating a 23 foot planting bench. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009. The lower slope will be planted with 2 willow lifts above the OHW elevation. The soil lifts containing the willows will extend to the spall layer allowing the willow roots to contact the native soil. Above the bench the levee prism will continue at a 2H:1V slope, underlain with 1 foot blanket of quarry spalls and hydro-seeded. LWD will be placed along the downstream 230 ft, at approximately 20 foot intervals, at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone
- **Site #2** - The plan is to repair to pre-flood condition and repair the approximately 10 sink holes that have developed on the landward side at this location. This is the least cost alternative. The proposed repair is approximately 150 LF. The proposed repair includes excavating the damaged material and re-grading the slope to 2H:1V. A 3 foot blanket of Class IV riprap placed on a 1 foot lift of quarry spalls over a six inch lift of gravel on the levee slope from the toe to the 100-year elevation. Two willow lifts will be installed at the OHW elevation and the levee will be hydroseeded. Additionally the approximately 10

sink holes that have developed on the landward side of the levee will be excavated. The cause of the sinkholes will be determined and repairs made. After construction the area will be hydroseeded.

- **Site #3** - The plan is to repair to pre-flood condition. This is the least cost alternative. The proposed repair is approximately 100 LF. The proposed repair includes excavating the damaged material and re-grading the slope to 2H:1V. The slope will be covered with a 1 foot blanket of quarry spalls and a launchable toe will be constructed of Class IV riprap. One willow lift will be constructed at the OHW and the slope will be covered with a layer of topsoil and hydroseeded.
- **Site #4** - The plan for the repair is to layback the existing levee and create a mid-slope bench. This is the locally preferred alternative. The proposed repair is approximately 1,000 LF. The proposed repair is to re-grade the damaged slope to 2H:1V creating a 15 foot mid-slope bench. A launchable toe will be constructed using Class III riprap to prevent future scour and a 3 foot blanket of Class III riprap will be placed for armor rock. This slope will be filled with earthen material to achieve a 2H:1V slope, creating a planting bench. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009. The lower slope will be planted with 2 willow lifts above the OHW elevation. The soil lifts containing the willows will extend to the spall layer allowing the willow roots to contact the native soil.

No wetland impacts are anticipated at any of these four sites and vegetation removal would consist primarily of blackberry and other invasive species. The repair of all four of these sites would require in-water work.

3.5 Galli's

The residences behind this levee preclude any setback/layback of the levee. The proposed repair is approximately 1,100 LF.

The repair would require grading the existing bank to a 2H:1V slope. To achieve this slope, the levee footprint will move riverward between 3 to 15 feet along the reach of the repair. The estimated total impact to the aquatic habitat is 3,000 ft². A launchable toe will be constructed using Class IV riprap to prevent future scour. The slope will be armored with Class IV riprap underlain by filter spalls. The armored slope will extend to approximately 8 feet above ordinary high water (OHW) line and will be planted with 2 willow/dogwood lifts. Above 8 ft OHW, the levee prism will continue at a 2H:1V slope and be hydro-seeded. LWD will be placed along a total of approximately 450 LF of the levee at the riverward edge of the riprap toe and anchored using 5-foot diameter quarry stone.

Several options were considered for Galli's to limit the riverward encroachment including set back, flood wall, vegetated geogrids and slope. However, riverward encroachment could not be eliminated. Elimination of riverward encroachment was not possible due to the need to provide a stable levee slope and the fact that on the landward side residences are located so close to the existing levee.

Based on slope stability analysis, the riverward slope cannot be steeper than 2 horizontal to 1 vertical. This is the minimum slope necessary for stability in this reach.

Use of vegetated geogrids would not reduce this required slope. The vegetated geogrids help protect the slope from surface erosion, but do not prevent rotational slope failures or draw down failures which are the primary slope failure mechanisms on the Green River.

Another alternative that was considered to reduce encroachment was a flood wall. However, a flood wall for this project would need to be extended well below the scour depth in order to be stable during high water events and is prohibitively expensive to design and construct. The flood wall option was also rejected because woody vegetation is not allowed (by regulation) within 15 feet of either side of a flood wall, which in this case eliminates the possibility of plantings on slopes as well as willow plantings.

A set back levee also was not feasible because of the location of existing residences so close to the levee. The current design limits of the project excavation comes within several feet of the existing apartment buildings and residences and can not be set back further landward. In addition, when the project is complete, there will be the minimum distance necessary between the structures and the top of the slope to access, maintain, and inspect this project.

No wetland impacts are anticipated at this site, however roughly 3,000 ft² of aquatic area will be filled. Vegetation removal would consist of less than 10 mature trees, as well as blackberry and other invasive species. The repair of this site would require in-water work. To mitigate for the construction impacts at this project site, the top of the levee will be planted with shrubs, and 8800 linear feet of bench between the levee and the river downstream of the Galli's levee will be planted to trees and shrubs.

3.6 Dykstra

The residences behind this levee preclude setback/layback of the levee. The proposed repair is approximately 600 LF.

The repair would require reestablishing a weighted toe for approximately 600 linear feet. The existing bank will be graded to a 2H:1V slope. A toe will be constructed using Class III riprap to prevent future scour. The slope will be armored with Class III riprap underlain by filter spalls. The armored slope will extend to approximately 8 feet above ordinary high water (OHW) line and will be planted with 2 willow/dogwood lifts. Above the armoring the levee prism will continue at a 2H:1V slope and be hydro-seeded. LWD will be placed along 200 ft of the levee at the riverward edge of the riprap toe and anchored using 5-foot-diameter quarry stone. Additional LWD will be placed on a mid-channel island across from the construction site.

No wetland impacts are anticipated at this site and vegetation removal would consist of less than 10 mature trees, as well as blackberry and other invasive species. The repair of this site would require in-water work.

4.0 EXISTING CONDITIONS

4.1 Basin Characteristics

Historically the Green River basin was nearly four times as large as its present size as it included the White River and all of the Lake Washington drainages. Through human alteration over the past 150 years, including rerouting of rivers and construction of an extensive levee and dam system, today the Green River Basin could be considered a highly urbanized landscape with little remaining of the original ecosystems.

Flood protection provided to infrastructure and buildings by the dam and levees has reduced the historical floodplain area by about 90%, resulting in substantial development on the floodplain from Auburn to Tukwila, the area in which all the levee sites are located. Urban growth has caused degradation of tributary streams in the basin, reduction of shade,

habitat and diversity in the mainstem of the river, and substantial decline in air and water quality, particularly in the lower reaches of the Green River.

The Green River Basin can be divided into four sub-basins: the upper Green River, above River Mile (RM) 45, the middle Green River, which runs from the outlet of the Green River Gorge at about RM 45 near Flaming Geyser down to Auburn at about RM 31; the lower Green River, which runs from Auburn down to the Duwamish River at RM 11; and the Duwamish River, which runs from RM 11 to the mouth in Elliot Bay. All proposed sites included in this EA are located in the lower Green River sub-basin, RM 31 to RM 11.

4.2 Geology and Soils

The entire Green River corridor is within the area affected by the continental glacial advances that have shaped much of the topography of the Puget Sound Lowland. A series of ice advances from Canada scoured much of Washington and the northern half of the US. The most recent glaciations left deposits of gravels and compacted till material seen today in most of the soils and surface formations (Kruckeberg 1991). The Green River originates in the Cascade Range south of Stampede Pass at an elevation of about 4,500 feet and flows northwest 90.5 miles to Elliot Bay through the North Cascades and Puget Lowlands ecoregions. The broad and flat lower Green River and Duwamish River basin is a glacial trough, eroded by sub glacial meltwater and scour of the glacier itself. The entire floor of the Green River Valley is composed of alluvium, which ranges in thickness from tens of feet in the upper end of the valley to probably over 120 feet in the lower end. (Mullineaux 1970). The alluvium is composed of coarse channel deposits and finer overbank deposits. Channel deposits are predominantly gravel and sand that are transported as bedload and deposited on bars and on the channel bottom.

These alluvial floodplain soils are subject to frequent flooding, seasonal ponding and a high water table. Soils included in this area of the basin are Oridia-Seattle-Woodinville association developed from fine-textured alluvial material deposited by the Green, White, and Cedar rivers, with organic soils in depressional areas. Soils in this reach of the lower Green River basin, and the site areas, have high agricultural potential, although urban development has now eliminated much of the previous agricultural land use in the area.

4.3 Hydrology

The Green/Duwamish River is fed by runoff from rainfall and groundwater inflows, along with snowmelt from the upper elevations. The tributaries throughout the basin collect surface waters and direct them into the mainstem of the Green River. The flow regime of the Green/Duwamish River generally follows that of other west slope Cascade Range rivers, with a characteristic seasonal double peak indicative of heavy winter rainfall and a spring peak from combined rainfall and snowmelt (Corps 1997). Large flood events are generally a result of rain-on-snow weather patterns which are most likely to occur from November – March. Highest flows generally occur in December or January, declining through March with a subsequent snowmelt peak in April or May (Corps 1997).

HHD, which was constructed in 1963, provides sufficient storage to control the flows in the Green/Duwamish River at a maximum rate of approximately 12,500cfs. As a consequence, there have been almost no discharges above this rate and flood events that inundated the adjacent floodplain no longer occur. Large, channel-altering flows have an extremely low probability of occurrence (Corps 1997). However, localized flooding does still occur as many of the tributary streams can no longer drain into the leveed banks of the Green River during flood events.

Low summer flows are most often associated with reduced upper basin runoff after a low snow year and/or by removal of water by the Tacoma Diversion Dam for the City of Tacoma water supply. Minimum stream flows in the river occur between July and November and are most frequent in August and September. Prior to construction of HHD, flows above the Tacoma Diversion Dam fell below 150 cfs every other year on average and below 100 cfs every 9 years on average. Operations of HHD and the reservoir are regulated to provide both flood control and to augment low summer flows in the mainstem for fisheries conservation. This regulated flow regime has reduced the frequency of low flows less than 150 cfs to approximately one in every six years, on average, and flows less than 100 cfs to less than once in 50 years (Corps 1997).

Levee produced constriction of the river becomes almost complete downstream in the lower Green and Duwamish Rivers. The river in this area has been channeled and straightened, increasing the velocity of flows through the lower basin due to reduced overbank storage. Overbank storage was historically provided by the wetlands and floodplains associated with the river and helped alternate flows, minimizing peak flows and maximizing low flows. Confining the river to a single channel has essentially cut the river off from its historic overbank storage, resulting in a loss of flow attenuation. Increased urbanization in the middle basin has also affected flow velocity and attenuation (Corps 1997).

The middle and lower Green River Basin has become increasingly urbanized as the area's economy and population have grown. In general, urbanization creates areas of impermeable land in the basin. The creation of impermeable surfaces reduces the rate and quantity of infiltration and increases the rate and quantity of surface runoff during storms. This can cause the river to reach a peak flow more quickly, and the peak to be higher in a basin which has undergone urbanization and industrialization (Corps 1997).

4.4 Water Quality

4.4.1 Designated Uses

The Washington State Department of Ecology (Ecology) is responsible for setting water quality standards based on water use and water quality criteria. State water quality standards were revised in 2003. Within the reach of the six projects (and 10 sites), the Green River is classified as core summer habitat for aquatic life uses (salmonid spawning, rearing and migration), primary contact for recreation uses, and suitable for all water supply uses and other miscellaneous uses (WAC 173-201A-602). In general, water quality in the upper Green River is better than at the downstream stations. While the Green River maintains its high water quality rating, it also appears on Ecology's list of impaired waters. The mainstem of the river and many of its tributaries regularly exceed water quality standards for certain parameters (Corps 1997).

4.4.2 Temperature

Historically, water temperatures in the Green River basin were considerably lower than today; this is particularly true in the middle and lower reaches. The combination of channel width, depth, lack of shade-producing riparian vegetation and the dam/reservoir contributes to warming of the river during low flow periods in summer (Corps 1997).

The historical cover of dense riparian vegetation and associated wetlands is almost completely gone due to levees and development. This has resulted in the disconnection of the river from groundwater. Groundwater is generally naturally cooler than surface water and leads to streams and rivers with better water quality. Additionally the loss of

riparian vegetation has resulted in almost complete loss of shading of the channel. The proposed repairs will require removing all vegetation within the repair footprint. In the short term, this will contribute to continuing higher water temperatures.

Additionally, HHD/Reservoir has a dramatic effect on river temperatures downstream from the dam from June through October. Stored water temperatures can be considerably warmer than river flows, thus altering the temperature of the river downstream of the reservoir upon release during the summer months.

All proposed sites are located in the lower reaches, in sections of the river on Ecology's current Water Quality Assessment, 303(d) list for temperature. Section 303(d) of the federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. Multiple exceedences over the criterion, 17.5C for salmonid spawning, rearing and migration waters (WAC 173-201A-200), occurred at RM 35, RM 27, RM 20 in 1992 and in all years between 1998 and 2002 at RM 41.5 (WDOE, 2004). High temperatures upstream may indicate even higher temperatures downstream as no additional shade or cold water source is present in the lower Green River to mediate the temperatures.

4.4.3 Nutrients and Dissolved Oxygen

In general, nitrate and ammonia levels in the lower Green River are highest during the winter, reflecting the source of pollutants from stormwater runoff, stormwater outfalls, and failing septic systems (METRO 1978).

Agricultural lands also contribute pollutants in the form of fertilizers and pesticides, primarily in the spring/summer months. However, the current trend in the lower basin is toward residential development of former agricultural lands. This has dramatically increased the amount of impervious surfaces and stormwater runoff in the lower basin, as well as increasing pollutants, such as petroleum products, pesticides and fertilizers (Corps 1997).

In addition, during periods of summer low flows, significant levels of ammonia from livestock and other non-point sources are quickly converted to nitrate, with a resulting depletion in dissolved oxygen (DO). DO levels that fail to comply with the state standard have been recorded frequently enough in the lower watershed during sustained low-flow periods to warrant placement on the state's 303[d] list.

4.4.4 Fecal Coliform

Fecal coliform bacteria are contributed to the tributaries and the mainstem Green River from domestic and farm animals pastured along the river. Additionally, failing septic systems can contribute to heightened fecal coliform levels.

Sections of the Green River and one of its tributaries a few miles upstream of the sites are on the Ecology 303(d) list for violation of standards for fecal coliform bacteria.

4.4.5 Turbidity and Suspended Sediments

Stormwater runoff is much faster across urbanized and agricultural lands than forested lands. Agricultural lands that are fallow and unvegetated during the rainy season can release significant amounts of fine sediment into the river. As agricultural land is converted to residential and commercial development, creating more impermeable

surfaces, stormwater runoff greatly increases in speed and quantity, which may result in higher sedimentation and turbidity levels. With the exception of increased turbidity levels during high flow events, high turbidity is not currently a problem in the middle and lower Green River Basin.

4.5 Vegetation

Prior to European settlement, the Green River basin was dominated by forest wetlands extending over the floodplain throughout the valley. This extremely dense, absorptive forest covered most of the floodplains, valley walls, rolling plateaus, and mountainsides of the basin.

Today, the lower Green River basin is characterized by rapid development and urbanization. Much of the forest land has been cleared through logging or for agriculture and development. With the construction of HHD and levee system, much of the remaining riparian vegetation has been removed. The vegetation that now exists in the riparian zone is patchy and narrow, and is often dominated by non-native, invasive species. This reduction in riparian vegetation has reduced the corridor function of the riparian zone for wildlife and plants, and has reduced connectivity to upland seed sources. The reduction in the riparian zone has also limited the amount of LWD available in the riparian system [such as for LWD recruitment] (Fuerstenberg et al. 1996).

4.6 Fishery Resources

4.6.1 Fish Habitat

Spawning habitat for salmon and trout species requires high quality gravel beds that do not have excessive fine materials filling the interstices of the gravel. Under natural flow conditions, floodwaters carry gravel sediments from the upper basin to the middle and lower basins, replenishing spawning gravels and depositing new gravels. Pool habitats, formed primarily by the deposition and recruitment of LWD, often act as a sink for fine sediments and help maintain the quality of the gravel beds. LWD also serves to slow water flow, accumulate gravel which is suitable for spawning, and producing cover and resting habitat for fish.

Juvenile salmon and trout rear in lower velocity areas, such as pools or side channels, in both the mainstem river and smaller tributaries (Groot and Margolis 1991). Typically, the larger the fish, the larger the river or stream in which they spawn and rear.

Fish habitat in the lower Green River has been greatly reduced from historic conditions by the construction of Tacoma Diversion Dam, HHD, levees along the river banks, logging, and development within the riparian zone. These activities have contributed to the loss of fish habitat by severely reducing recruitment of LWD, preventing sediment transport, reducing slow water habitats (e.g., pools and side channels), and inhibiting nutrient transformation and retention. However, suitable gravel beds for spawning are located upstream and adjacent to the Dykstra and Galli's project sites.

4.6.2 Fish Use

Over 30 fish species have been documented in the Green/Duwamish River. The salmonid species include both resident and anadromous stocks. Resident fish are present in the lower river and the upper river including the reservoir area. Anadromous stocks are limited to the river system below Tacoma Diversion Dam, except where they are stocked or released in the upper basin (Corps 1997a). Naturally spawning

anadromous fish have been recognized as a critical link in the aquatic food webs of the region. They are considered a “keystone” species upon which producers and consumers from the bottom to the top of the food chain depend (Tacoma Water 2001).

The Lower Green is categorized as “Salmonid Spawning, Rearing, and Migration” habitat (King County 2008). Four major anadromous salmonid runs use the lower and middle basin to complete their life cycles: Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), chum (*Oncorhynchus keta*), and pink (*Oncorhynchus gorbuscha*) salmon, and steelhead (*Oncorhynchus mykiss*). Small numbers of sea-run cutthroat trout (*Oncorhynchus clarki*) may also use the middle Green River. Additionally there are three hatcheries operating in the middle Green River, two run by WDFW and one by the Muckleshoot Tribe, which supplement Chinook, coho, chum and steelhead runs. Resident fish populations may include rainbow trout, cutthroat trout and mountain whitefish. Other native fish species are also present including lamprey, minnows, sculpins, and suckers.

The majority of salmonid spawning occurs upstream of RM 29.6. Limited spawning does occur downstream of this point, however, spawning gravel are limited. The downstream extent of WDFW spawner surveys are RM 25.4 (Cropp 2006). The primary species include Chinook, coho, and chum salmon and Steelhead. Recent odd years have also seen high numbers of returning pink salmon. As noted previously, the work will occur from river mile 12.6 to 30.8; however only two projects, Galli’s and Dykstra, occur in areas with potential spawning: Galli’s is located at RM 30.5 to RM 30.8 and Dykstra is located at RM 30.8 to RM 31.5. Based on site visits, the Galli’s site appears to contain limited gravel. Spawning sized gravels are present at the Dykstra site. Spawning is possible at each of these locations.

4.7 Wildlife Resources

Prior to European settlement, the middle and lower reaches of the Green River basin were predominantly covered with highly productive wetland and riparian habitat types. Presumably, abundant wildlife existed in the area, based on the high incidence of wetland habitats and forested areas.

Today, the remaining small patches of forest are predominantly located around the scattered ponds, lakes and wetlands in the area. Few areas of forested riparian habitat exist along the river corridor. This remaining riparian habitat is a valuable wildlife resource to this area, but has been fragmented by agricultural use, road building, and urbanization. In addition, invasive non-native species shade and crowd native vegetation and provide habitat for generalist wildlife species and non-native animal species that outcompete native wildlife.

Bird diversity remains high in the middle basin, but diminishes somewhat downstream in the lower basin where urban density is higher. Many small mammals (e.g., foxes, skunks, weasels, and squirrels) use the dense understories of some of the forested stands. Small streams and sloughs meander through the pasture and upland habitats, providing habitat for many species of insects and for amphibians including red-legged frogs (*Rana aurora*), Pacific tree frogs (*Pseudacris regilla*), salamanders, and toads. Reptilian fauna is not diverse, but several species of snakes and lizards occur here as well (Corps 1997). Waterfowl - mallard (*Anas platyrhynchos*), and American wigeon (*Anas americana*) are the most common species - also use ponds throughout the lower basin, either in the form of wet pastures that have year-round ponds, inactive sewage ponds in the Kent area, or ponds that

have formed in the pits associated with previous gravel operations. In all 10 sites, there remains little to no riparian vegetation, limiting potential for wildlife habitat.

4.8 Threatened and Endangered Species

Seven endangered or threatened species of animals and fish may occur in the Green River Basin: Northern spotted owl (*Strix occidentalis caurina*), grizzly bear (*Ursus arctos horribilis*), marbled murrelet (*Brachyramphus marmoratus*), Canada lynx (*Lynx canadensis*), Coastal/Puget Sound bull trout (*Salvelinus confluentus*), Puget Sound steelhead (*Oncorhynchus mykiss*) and Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*). Larger mammals, including lynx and grizzly bear, are almost certainly confined to the high elevation portions of the basin in the Cascade Mountains; they are unlikely to transit the lower Green River due to low elevation and extensive urbanization. Suitable nesting habitat for marbled murrelet and Northern spotted owl does not exist in the areas of the proposed sites, although marbled murrelet could transit the sites while traveling between nesting areas in the upper watersheds and feeding areas in Puget Sound.

Therefore, of the species listed above, Chinook salmon, bull trout, and steelhead have the most potential to be impacted by the levee rehabilitation sites described in this EA. The Green River, including the project sites, has been designated as critical habitat for Chinook salmon and bull trout to protect migration pathways, spawning and rearing habitat. Critical habitat for Puget Sound steelhead has not yet been proposed (NMFS 2007). A biological assessment (BA) was prepared and transmitted to the Services in June 2008.

4.8.1 Puget Sound Chinook Salmon

Chinook salmon present in the Green River are classified as summer/fall run stocks (WDFW and Western Washington Treaty Indian Tribes 1994). As of 2002 the stock status of Green/Duwamish Chinook is healthy (WDFW, 2002). Adult Chinook salmon migrate upstream into the Green River from the Puget Sound from late June through November (Grette and Salo 1986). Most juvenile Chinook salmon in the Green River have an ocean-type life history, meaning that they migrate to the ocean during the year they emerge from spawning gravels (Lister and Genoe 1970; Healey 1991). Consequently, the fry outmigration period for Chinook salmon in the Green River extends from February through June. Preferred spawning areas for Chinook salmon in the Green River include the main river channel and large side channels upstream of RM 30.0 to the Tacoma Headworks diversion (RM 61.0). Of the proposed sites, all sites fall within this area except Tukwila #3 and #5. However, suitable spawning and rearing habitat is limited in the site areas due to lack of riparian vegetation which causes higher water temperatures and limits LWD recruitment. Lack of LWD and hardened stream banks from riprap placement reduces sedimentation and formation of pool/riffle systems, further reducing habitat. Subsequently, the mainstem Green River in the site areas is primarily a migration corridor.

4.8.2 Puget Sound Steelhead

Puget Sound steelhead have a similarly mapped range as Chinook salmon. However, within individual watersheds, steelhead have a broader distribution because they can spawn in smaller stream systems, can occur higher in a system, and in streams with steeper gradients (WSDOT 2007). Additionally, and more significantly, steelhead stocks are generally present in the streams year-round creating difficulty in defining in-water work windows. Steelhead are known to be present in the Green/Duwamish River year-round, however their presence is not well documented, most recent studies have focused on Chinook. Steelhead are anadromous and can spend several years in freshwater prior

to smoltification and migration to salt water. The majority of steelhead found in the Green River remain in the river for two years and in the ocean for two years (Pautzke and Meigs, 1940). The Green River system supports both winter and summer stocks. As of 2002 the winter stock status was healthy, and the summer stock status was depressed (WDFW, 2002). The winter return adult wild steelhead in the Green/Duwamish begins in February but occurs predominately in March and April. The hatchery adult steelhead return is in November and December (Foley, personal communication). The smolts that out-migrate do so in April and May of each year and are usually larger than salmon as they will spend a minimum of two years in the river before going to salt water (Foley, personal communication).

4.8.3 Coastal/Puget Sound Bull Trout

Bull trout have historically been recorded in the Green River (Suckley 1859) and a bull trout was captured near the mouth of Newaukum Creek in 2000. There is ample evidence from captures that anadromous bull trout regularly use the lower Duwamish River downstream of RM 5.8, especially in the spring. These fish are believed to be migratory visitors from other watersheds that entered the Duwamish perhaps to forage on emigrating smolts (King County 2001). No bull trout have been found in recent surveys of the upper basin upstream of HHD and no bull trout stock is presently recognized as existing in the Green River by WDFW (1998). Regardless, USFWS believes bull trout are present and has designated critical habitat in the Green River.

4.9 Essential Fish Habitat (EFH)

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 and the 1996 Sustainable Fisheries Act (SFA), an evaluation of possible impacts to EFH is necessary for federal actions. For the Green River, Pacific salmon, including Chinook, coho, and pink salmon, are evaluated for EFH.

An EFH evaluation was prepared and included in the Corps' BA.

4.10 Cultural Resources

The proposed levee rehabilitation sites lie within traditional Duwamish and Muckleshoot territories. The Bureau of Indian Affairs map of 1978, depicting "Indian Land Areas Judicially Established," shows the Green River in the vicinity of the individual project Areas of Potential Effect (APEs) as lying between the area of Duwamish Tribe and Muckleshoot Tribe ceded lands (Docket and map index number 166 for Duwamish and 169 for the Muckleshoot). Suttles and Lane (1990:485) placed the Green River drainage basin as within the territory of cultural groups who spoke languages classified as the Southern Lushootseed dialect of the Southern Coast Salish speakers. The specific group of Southern Lushootseed speakers that occupied the site areas is unclear. Suttles and Lane (1990: Figure 1) appear to show the general site areas as within the territory of the "Stkamish" (St-Kah-mish treaty name; Sekamish of Hodge 1907-1910), which were situated on the Green River between the Duwamish to the north and the Yilalkoamish to the south. However, Ruby and Brown (1992:140) refers to the Skekomishes or Stakamishes as the White River Indians and state they moved to the Port Madison Reservation (present day Suquamish Reservation). The Lushootseed name for the inhabitants of this area, *Skwupabsh* (or *Skopamish*) is a compound word derived from the name of the river *Skwup* (*rising and falling or attraction/draw*) with the suffix *absh* (*people of*) (Thrush 2005).

4.11 Land Use

Land use in the middle and lower Green River basin is highly urbanized. Historically agricultural and forested lands, the middle reaches of the Green River Basin are currently rapidly developing into suburban residential centers. In the lower portions of the Green River, industrial, residential, commercial land uses dominate near the river.

4.12 Recreation

The sites located in the lower Green River (Horseshoe Bend #1, #2a, #2b, #3, #4 and Tukwila 205 #3, #5) are all part of the King County Green River Trail. The trail is heavily used by joggers, walkers, cyclists, and other recreation enthusiasts.

The upper stream sites (Dykstra, Galli's, Meyers Golf, and Kent Shops/Narita) are not formally established trails. However, all sites except Dykstra include wide walking paths and are presumed to be frequented by joggers, walkers, and cyclists. Additionally, there is at least limited access by local recreational anglers, rafters, and swimmers along these levees.

The Dykstra site is adjacent to several residences, and access is limited by a locked county gate. Several local residents appear to have built and maintain private sitting areas on the top of the levee.

4.13 Air Quality, Noise and Transportation

The Puget Sound airshed is currently in attainment for carbon monoxide, ozone, PM10, and has maintenance plans in place for these pollutants. Air quality in the lower Green River basin is quite variable and dependant on several factors: season, topography, and nature of pollution sources. In the lower basin, a high concentration of industrial sources and vehicles has caused air quality problems. Motor vehicles are the largest source of air pollutants in King County.

General periods of drought in the mid-summer can result in localized problems with dust and particulates from vehicles on unpaved roads or slash burning contributing to high particulate levels. In the winter months, temperature inversions can occur as a result of low solar heating. During these occasions, high concentrations of pollutants associated with wood burning (stoves and fireplaces) and transportation sources can occur. This condition is intensified by the topography of the valley walls.

Sound levels throughout the lower basin are very variable depending on location, ranging from relatively loud noises associated with urban and industrial activities on the Duwamish River in the lower basin to very quiet rural environments in the upper basin. In portions of the lower basin, especially near industrial areas, sound levels could occasionally exceed noise standards under certain conditions.

Roads in the lower Green River basin include residential streets to interstate freeways. Traffic volumes vary accordingly from few, infrequent cars to several thousand per day on the interstates.

4.14 Aesthetics

The visual quality of the lower Green River basin varies with its diverse land use and development. Visual quality decreases downstream as development increases.

5.0 EFFECTS OF THE NO ACTION AND PREFERRED ALTERNATIVE ACTIONS

Alternatives considered in this analysis are the No-Action Alternative and preferred alternatives (Repair the Levees to Pre-flood Condition and Layback, depending on the site). The levee repairs described below reflect the Corps preferred alternative for repair. Effects in this analysis are assumed to be the same for all six projects with their ten sites unless specifically stated.

5.1 Basin Characteristics

5.1.1 No Action Alternative

Under the No Action Alternative, the levees would not be repaired and the possibility of failure would increase over time. It is unlikely that the overall basin characteristics and topography would be altered from their present condition.

5.1.2 Preferred Alternative

The levees would be repaired as noted and the specified level of protection would be reestablished. The overall basin characteristics are not likely to be affected as the levee rehabilitations will take place in the same alignments as the existing levees.

5.2 Geology and Soils

5.2.1 No Action Alternative

Without repair, erosion of the slopes and the toe of the levees would continue. It is unlikely this would affect the geology or soils of the area since prior development along the lower Green River has already altered the native soils and geology.

5.2.2 Preferred Alternative

Restoration of the slopes and toes with riprap would minimize the erosion, reducing the potential for soil sloughing into the river. Compaction of the soil in the immediate area of the repair from heavy machinery operation will occur due to the construction. Minimal impact to geology or soils is expected.

5.3 Hydrology

5.3.1 No Action Alternative

Under the No Action Alternative, the levees would not be repaired and the possibility of failure would increase over time. In the event of a levee breach during a flood event, the river channel could migrate into developed areas, changing the hydrology in the immediate area of the breach and throughout the affected reach of the river.

5.3.2 Preferred Alternative

Construction of levees will include the addition of substantial amounts of riprap to existing soft banks. This hardening of the banks with riprap can lead to increased water velocity through the channel and restrict the natural movement of the river. The addition of large woody debris and vegetation to the levee banks will help to reduce flow velocity. It is unlikely that the overall hydrology of the lower Green River will be impacted by the rehabilitations.

5.4 Water Quality

5.4.1 Designated Uses

5.4.1.1 No Action Alternative

Under the No Action Alternative, no changes in the designated uses will occur.

5.4.1.2 Preferred Alternative

The construction is not expected to impact the designated uses for water quality.

5.4.2 Temperature

5.4.2.1 No Action Alternative

If the levees are not repaired, temperature in the lower Green River will continue to exceed standards. The current levee banks are almost completely covered with invasive vegetation which provides minimal shading to the river and precludes the colonization of the levee by native trees and shrubs which would provide more shading to the river channel. The Corps expects that the few trees currently present (primarily at the Dykstra and Galli's sites) would continue to grow and provide minimal shade to the river.

5.4.2.2 Preferred Alternative

The construction will include the addition of riprap to the slopes of the levees. This may further increase already elevated water temperatures due to thermal heating and light reflection of the rocks. To minimize the potential for an increase to water temperature caused by unvegetated riprap, the banks of the levees will be planted with willow/dogwood lifts above ordinary high water. After establishment, in 3-10 years, this vegetation may help to provide shade to the edges of the river and minimize the direct sunlight on the riprap face. In addition, mid-slope benches will be constructed at the sites where possible. These benches will be planted with riparian trees and shrubs, which with time and establishment will provide more shade to the river than currently exists and will help to moderate water temperatures throughout the lower reaches.

5.4.3 Nutrients and Dissolved Oxygen

5.4.3.1 No Action Alternative

There are no anticipated impacts to nutrient or dissolved oxygen levels in the Green River under the No Action Alternative.

5.4.3.2 Preferred Alternative

Under the preferred levee rehabilitation actions, which include vegetation establishment on the mid-slope benches and levees faces, it is anticipated that water temperatures will decrease over time due to shading of the channel. This lowering of water temperatures may result in increased dissolved oxygen. Nutrient levels are not likely to be affected by the proposed action.

5.4.4 Fecal Coliform

5.4.4.1 No Action Alternative

If the levees are not repaired and breaching resulted, it is possible that fecal coliform levels may increase due to intrusion of septic tank waste during flood events.

5.4.4.2 Preferred Alternative

There are no anticipated impacts to fecal coliform levels under the Preferred Alternative.

5.4.5 Turbidity and Suspended Sediments

5.4.5.1 No Action Alternative

Under the No Action Alternative no impacts to turbidity are anticipated.

5.4.5.2 Preferred Alternative

Proposed construction at all the sites includes excavation and rock placement below the ordinary high water line. Construction is scheduled to take place during the months of lowest expected water flow to minimize in-water disturbance and impacts to water quality. The projects will use BMPS to ensure state water quality standards are maintained during construction. All project sites will be monitored daily to ensure compliance with these standards. Should monitoring indicate that state water quality maximum standards for turbidity are exceeded; site work would be halted and modified such that standards are met.

5.5 Vegetation

5.5.1 No Action Alternative

Under the No Action Alternative no vegetation will be removed/planted on the existing levees by the Corps. It is assumed that the current, predominantly invasive, vegetation will remain. This persistent cover by blackberry and reed canary grass will continue to limit the ability of native riparian vegetation to colonize the sites perpetuating the on-going conditions of limited shade cover and poor wildlife habitat. The exception would be at the Galli's and Dykstra sites where several (less than 10) larger trees are currently present and would continue to provide minimal shade and habitat along the channel without the levee repairs.

5.5.2 Preferred Alternative

If the levee sites are constructed as proposed, all vegetation within the repair footprint will be removed. This includes approximately 10 trees at the Dykstra and Galli's sites. Additionally, approximately 50 trees will be removed from the golf course at Kent Shops and Meyer's Golf sites to allow for levee layback. These are non-native trees which provide no shade to the river channel, but possibly contribute organic input to the river that fuels the food chain. They may however, provide some bird habitat. Trees will be replanted by the golf course upon construction completion. Willow/dogwood lifts will be constructed on the levee face above ordinary high water at all repair sites. Mid-slope planting benches will be built at Tukwila #3, Tukwila #5, Horseshoe #1, Horseshoe #4, Kent Shops and Meyers Golf. These benches will be planted in spring 2009 with riparian trees and shrubs in an effort to provide shade to the river corridor. It should be noted however, that these benches are to be constructed on top of the launchable toe of the levee. If the toe were to "launch" during a flood event, part or the entire bench may also slide into the river resulting in a rock faced levee with no way to replant the vegetation. Over time and assuming bench stability, this addition of riparian vegetation to the lower Green River corridor would greatly improve habitat, lower water temperatures due to increased shading of the river, and create additional organic input to the river. There will be a temporal lag of 3-10 years while the vegetation is established. All necessary measures (i.e. irrigation and monitoring) will be taken to ensure planting success.

See the Cumulative Effects section for impacts of the PL 84-99 required vegetation removal by non-federal sponsors.

5.6 Fisheries Resources

5.6.1 Fish Habitat

5.6.1.1 No Action Alternative

Current habitat conditions are limited by the existing levees and the extensive deterioration of the riparian corridor caused by development in the floodplain.

Levees and the resulting development constrain the river to a single, fixed channel

and lead to a reduction in shade, organic/nutrient input and LWD recruitment, elements which are essential in the formation of high-quality fish habitat. No changes in fish habitat are expected under the No Action Alternative.

5.6.1.2 Preferred Alternative

If the levees are repaired as proposed, LWD and riparian vegetation will be reintroduced into the lower Green River corridor at the repair sites where possible. While the repair of the levees will perpetuate the constraint of the river, the placement of LWD into the channel may create areas of slower water flow allowing for the deposition of sediment/gravels and pool development. Additionally, LWD can provide refuge and cover for juvenile fish during periods of high flow. The planting and eventual establishment of riparian vegetation should provide increased nutrient input into the river from leaf/insect drop and shade to the edges of the channel.

At the Galli's site, the new levee prism will extend 3-15 feet into the river channel to ensure a slope of 2H:1V that is required under Corps engineering guidance. This encroachment of levee into the river will permanently alter aquatic habitat in this reach. The placement of large riprap into the channel will change the flow and deposition patterns of the river. While riprap is too large to provide for salmonid spawning substrate, the large rocks may create areas of slow water or pools. LWD will be placed at the toe of the levee to provide further habitat enhancement. The river encroachment will be further mitigated by habitat improvements as mentioned above at other repairs sites downstream of Galli's.

During construction, the excavation and placement of rock below ordinary high water will temporarily alter the river channel. These construction impacts are expected to be short-term and minimal.

5.6.2 Fish Use

5.6.2.1 No Action Alternative

The lower reaches are currently used primarily as a migration corridor, as little suitable habitat for spawning occurs downstream of RM 30. The Dykstra and Galli's sites are located at and slightly above RM 30 and suitable spawning gravels have been identified in the areas adjacent to the levees. It is assumed that fish use will not change in the lower Green River under the No Action Alternative.

5.6.2.2 Preferred Alternative

If the levees are repaired as proposed, including layback designs, native vegetation plantings and LWD placement where feasible, fish use in the lower Green River may increase. These environmental features are intended to improve fish habitat at the repair sites by creating areas of slower water and pools, refuge from high flows, nutrient/organic input, and shade. With the addition of these features and successful vegetation establishment, the Corps anticipates that fish will remain in the lower reaches of the Green River for longer periods of time.

At the Galli's site, the proposed levee rehabilitation will reduce existing aquatic habitat by roughly 3,000 ft². In the short-term, fish use in the area will likely decrease; over time however, fish may return as different pool/depositional patterns develop in the riprap filled areas.

A short-term, but immediate impact to fish is expected during construction. Fish are expected to be displaced and avoid the areas of the river under construction. Excavation, transportation, and placement of embankment materials would require the use of heavy construction equipment whose presence and noise may temporarily displace some species at the sites. Currently, construction is scheduled to take place during the designated construction windows which is believed to be when the least number of fish are present, July 1 to September 15.

5.7 Wildlife Resources

5.7.1 No Action Alternative

Under the No Action Alternative no changes to wildlife habitat and use are anticipated. Wildlife activity in the lower Green is limited by development, agriculture and roads. Human land use patterns have virtually eliminated the riparian corridor along the lower Green River and what is left is highly fragmented. There is minimal native vegetation present at any of the repair sites creating wildlife habitat that is poor at best.

5.7.2 Preferred Alternative

If the levee rehabilitations are constructed as proposed, native vegetation will replace invasive species on the levee prisms. Willow/dogwood lifts planted on the levee face and riparian trees and shrubs planted on the mid-slope benches may, after establishment, greatly improve wildlife habitat at the repair sites. The current condition of invasive vegetation leads to primary use of the sites by generalist and non-native wildlife species. The reintroduction of native riparian vegetation to the levees should provide appropriate habitat to support small, native mammal and bird species increasing biodiversity in the lower Green River corridor.

A short-term, but immediate impact to wildlife is expected during construction. Excavation, transportation, and placement of embankment materials would require the use of heavy construction equipment whose presence and noise may temporarily displace some species at the sites and borrow pits. It is possible that tree removal could result in the loss of nestling birds such as woodpeckers, robins, chickadees, nuthatches, flycatchers, and warblers. At the sites, which are largely already disturbed areas, many wildlife species are relatively tolerant of humans and their activities.

5.8 Threatened and Endangered Species

Puget Sound Chinook salmon, Puget Sound Steelhead and Coastal/Puget Sound bull trout are the focus of the BA that will be prepared by the Corps and transmitted to the Services. The proposed project is expected to have no effect on marbled murrelet, northern spotted owl, grizzly bear, and Canada lynx.

5.8.1 No Action Alternative

Under the No Action Alternative, no impacts to listed species would occur beyond those already having taken place by the construction of existing levees and the vegetation maintenance requirements for the non-federal sponsor to remain eligible for the PL 84-99 levee repair program (see "Cumulative Impacts" section 7.0 for details). These impacts include degradation of riparian habitat with consequent impacts to temperature, cover, organic input and food production for fish, and loss of some benthic habitat. No additional changes to endangered species in the lower Green River are anticipated if levee repairs are not conducted.

5.8.2 Preferred Alternative

Construction will likely cause temporary disturbances to Chinook salmon, Steelhead and bull trout due to increased noise and/or elevated turbidity levels, if fish are present during construction. Adult fish are expected to avoid the construction area and still be able to access upstream spawning areas. The work will be performed between July 1 and September 15, before spawners are likely to arrive, and after fry have departed.

Existing vegetation at all the proposed site locations consists primarily of invasive species (blackberry and reed canary grass) which provides minimal shade and organic/nutrient input to the river, both of which are important in the development of high-quality salmonid habitat. The Galli's and Dykstra sites do have existing mature trees (less than 10) which will be removed during construction. These trees provide a small amount of shade and nutrient input to the river in the immediate area. The vegetation removal that will occur as part of the Corps repair action is expected to have minimal impact on listed species.

The proposed levee repair at the Galli's site includes grading the existing bank to a 2H:1V slope. To achieve this slope, the levee toe will move riverward between 3-15 feet along the upstream 400 ft of the repair. This will result in permanent aquatic area loss of roughly 3,000 ft².

The proposed levee rehabilitation designs include planting native vegetation on the levee faces and mid-slope benches, laying back the levees, and adding LWD to the channel at all sites where feasible. Planted trees and shrubs will, with time, provide much improved salmonid habitat in the lower Green River by helping to offset any adverse impacts from construction, elevated water temperatures as a result of unvegetated riprap. Placement of LWD will also provide in-water habitat for salmonids and, together with planted trees and shrubs, help to offset impacts from construction and the river encroachment at the Galli's site.

As the proposed levee repairs are scheduled to occur within the approved work window (July 1 – September 15), constructed according to design, and the vegetation is expected to become established over time, the Corps believes that the proposed levee repairs at the Tukwila, Horseshoe Bend, Kent Shops/Narita, Meyer's Golf and Dykstra sites are ***not likely to adversely affect*** listed salmonids.

Under the preferred alternatives, the effects to listed species are detailed below for the Tukwila #3 and #5, Horseshoe Bend #1, #2, #3, and #4, Kent Shops, Meyer's Golf and Dykstra sites:

Species	Effect Determination	Critical Habitat Determination
Puget Sound Chinook salmon	Not likely to adversely affect	Not likely to adversely affect
Puget Sound steelhead	Not likely to adversely affect	Critical habitat is not yet determined
Bull Trout	Not likely to adversely affect	Not likely to adversely affect

The proposed construction at the Galli's site includes roughly 3000 ft² of river encroachment. This would result in a permanent loss of aquatic habitat area and may impact spawning gravels for Chinook and Coho that have been identified in the area. While this may not directly affect bull trout (unless individuals are present during the time

of construction), if spawning of salmon is disrupted, this could lead to a loss of prey for bull trout. Assuming the proposed site is built according to current design which includes levee encroachment into the river channel, the construction at the Galli's site is expected to **likely to adversely affect** listed species and is **likely to adversely affect** designated critical habitat.

Under the recommended alternatives the effects to listed species are detailed below for the Galli's site:

Species	Effect Determination	Critical Habitat Determination
Puget Sound Chinook salmon	Likely to adversely affect	Likely to adversely affect
Puget Sound steelhead	Likely to adversely affect	Critical habitat is not yet proposed
Bull Trout	Likely to adversely affect	Likely to adversely affect

5.9 Essential Fish Habitat (EFH)

5.9.1 No Action Alternative

Under the No Action Alternative, no impact to EFH is expected. The current substandard habitat conditions are anticipated to continue into the future as development in the lower Green River floodplain is complete. The river is unlikely to recover its floodplain due to urbanization. These existing constraints will prohibit the development of improved essential fish habitat components.

5.9.2 Preferred Alternative

If the levees are repaired as proposed, EFH in the nine of the locations may be improved. The addition of LWD, establishment of riparian vegetation on the levee benches, and wider river channel provided by the layback design may all contribute to an improved EFH condition or time.

The proposed construction at the Galli's site includes roughly 3,000 square feet of river encroachment. This will result in the permanent loss of aquatic habitat. The addition of LWD at this site and at the other repair sites may offset this loss by providing refuge from high flows and contributing to gravel bed an/or pool development, both of which are considered important components of EFH.

EFH effects are similar to those described for the ESA listed species. Similarly, the EFH effects determinations emulate the ESA determinations as described below:

Project Site	EFH Determination
Tukwila 205	Would not adversely affect
Kent Shops/Narita	Would not adversely affect
Meyers Golf	Would not adversely affect
Horseshoe Bend 205	Would not adversely affect
Galli's	May adversely affect
Dykstra	Would not adversely affect

5.10 Cultural Resources

5.10.1 No Action Alternative

Under the No-Action Alternative there would be no effect to cultural resources.

5.10.2 Preferred Alternative

The Corps has determined that the proposed rehabilitation sites (Preferred Alternatives) are an undertaking of the type that could affect historic properties and must comply with the requirements of Section 106, as amended through 2004, of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA) (16 USC 470). Section 106 requires that Federal agencies identify and assess the effects of Federal undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are those that are listed or are eligible for listing in the National Register of Historic Places (NRHP). Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by the National Environmental Policy Act (NEPA) and with other statutes. The Washington State Archaeological Sites and Resources Act (RCW 27.53) may also apply.

In compliance with Section 106, the Corps conducted an assessment of the proposed levee repair sites. This included archival and background research, a search of the Washington DAHP electronic historic site databases and other available records; and a search of King County Historic Preservation electronic historic site databases. No sites listed in the Washington State (WHR) or National Register of Historic Places (NRHP) are located within any of the individual levee construction zone APEs. No recorded prehistoric or early historic Native American archaeological deposits are located within any of the individual APEs. The Corps conducted two cultural resources surveys of the proposed sites. These surveys included transects along existing and proposed access roads and adjacent areas; through proposed staging areas; along the landward side of the levees in the rehabilitation area; and examinations of the eroded toe of the levees where water levels permitted.

A cultural resource report was prepared as part of the Section 106 of the National Historic Preservation Act compliance process. The present designs do not include any ground disturbing activities outside the levee footprints. If any levee repair designs change in such a way as to include disturbance to previously undisturbed native soils, monitoring by a Corps archaeologist will occur during certain phases of construction, and the construction contract would contain a stop work clause to notify the appropriate officials if evidence of cultural or human artifacts were unearthed.

A letter was received from the State Historic Preservation Officer (SHPO) dated 11 June 2008 concurring with the Corps finding of No Historic Properties Affected.

5.11 Land Use

5.11.1 No Action Alternative

Under the No-Action Alternative, further damage to levees is possible in the event of high flows. This could lead to levee breaches and/or flooding in some of the most highly

urbanized areas of King County. This would affect property values, and hence future land use.

5.11.2 Preferred Alternative

If the levees are repaired as proposed there will be changes to land use at the back side of the levees at Tukwila #3 and #5, Horseshoe #1 and #4, Kent Shops and Meyer's Golf due to the layback design. The levee crown will be built between 20-60 ft back from the existing crown to accommodate for the planting bench, increase conveyance through the river, and create a more stable slope. This action will require redesigning several holes on adjacent the golf course at the Kent Shops and Meyer's Golf sites; at Tukwila and Horseshoe Bend real estate acquisition from private owners is required. The overall impact on land use due to these repairs is expected to be insignificant.

5.12 Recreation

5.12.1 No Action Alternative

Under the No Action Alternative, impacts to recreation are expected to be minimal. However, a breach at Kent Shops or Meyer's Golf would cause the adjacent City of Kent Riverbend Golf Course to be inundated. Levee instability at Tukwila #3 and #5, and Horseshoe bend #1, #2, #3, and #4, could result in the closing of the popular King County Green River Trail.

5.12.2 Preferred Alternative

If the levee repairs are constructed as proposed, the existing Green River Trail will be rebuilt on top of the new levee prisms. The Riverbend Golf Course will be redesigned to accommodate the levee rehabilitations as necessary with only short-term disruptions in play expected. The Galli's and Dykstra levees both have informal trails, probably used primarily by residents and anglers, which will be removed during construction. No trails are proposed to be rebuilt at these two sites.

All sites will experience short-term, insignificant impacts to recreational activities (biking, jogging, walking, etc.) during construction.

5.13 Air Quality, Noise, and Transportation

5.13.1 No Action Alternative

Under the No Action Alternative, no effects to current air quality, noise or transportation routes is expected.

5.13.2 Preferred Alternative

If the levees are constructed as proposed, there will be short-term impacts to air quality from heavy equipment used in construction and trucks used to transport materials to and from the project site. These emissions will not exceed EPA's *de minimus* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) or affect the implementation of Washington's Clean Air Act implementation plan.

It is expected that the construction at the Kent Shops site will have the greatest air quality impact as it is the largest site with the longest planned construction period; therefore the following estimates are relevant for that site only. The other projects sites are expected to have less impact.

The construction at the Kent Shops site is expected to continue for 11 weeks (July 1 – September 15), 6 days/week, 12 hours/day. It is estimated that truck traffic between the

project site and the borrow/disposal areas will be 13 trucks/hour. Additionally the excavation and grading equipment will be operating onsite for 12 hours/day. Several borrow/disposal sites will be utilized throughout the County at the contractor's discretion. The Contractor is preparing a dust control plan, which preliminarily includes dust control by dampening the site at least four times a day, and "as needed".

Noise directly adjacent to the construction sites will have short-term increases during construction. It is expected that higher noise will occur only during construction times, for a maximum of 12 hours/day during daylight hours. With the exception of the Galli's, Dykstra and Horseshoe #1 sites, the project areas are all in locations of primarily commercial or industrial land use. Local noise ordinances are not expected to be violated during construction. The City of Kent has granted an exception to operate between the hours of 7:00 A.M-7:00 P.M. (normal construction hours per Kent's noise ordinance are 7:00 A.M-5:00 P.M.).

Traffic and transportation in the immediate construction areas will be moderately to heavily impacted. No roads will be closed but traffic will be controlled as needed at the ingress/egress for each project sites during construction hours.

5.14 Aesthetics

5.14.1 No Action Alternative

Under the No Action Alternative, no impact to aesthetics or visual quality of the projects sites is expected.

5.14.2 Preferred Alternative

If the levee repairs are constructed as proposed, aesthetic and visual quality at the sites may improve after the establishment of the native trees and shrubs. Currently the sites are predominantly covered with blackberry and other invasives, the removal of this vegetation and planting of natives trees/shrubs will, in the long term, create a more natural landscape at the repair sites.

6.0 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse effects associated with these levee repairs include:

- (1) minor temporary increases in river turbidity,
- (2) possible, temporary dislocation of migrating salmon to other parts of the river channel,
- (3) temporary and localized increase in noise, which may disrupt wildlife in the area, as well as causing some disturbance to local residents,
- (4) temporary and localized adverse impacts to air quality due to construction,
- (5) temporary and localized disruption of, and increase in, local traffic by construction vehicles,
- (6) loss of wildlife habitat due to removal of vegetation within the footprint of the repairs, although this will be minimal as wildlife habitat at the project locations is considered poor,
- (7) adverse impacts to fish habitat (reduced shade, decreased organic input, lack of refuge) by way of riparian removal, although this will be minimal as current riparian conditions are poor, and
- (8) Increased water temperatures for 3 to 10 years until vegetation becomes established.

7.0 CUMULATIVE IMPACTS

Historically the Green River Basin was nearly four times as large as its present size as it included the White River and all of the Lake Washington drainages. From the mid-1850s until the present, the Green River Basin has faced continual development and alteration. Dredging of the Duwamish River, to enable navigation farther upstream, and construction of Harbor Island began in the early 1900s. In 1906, a major flood and subsequent logjam altered the course of the White River to its present alignment, no longer connecting it with the Green River. Through further channelization efforts this alignment was made permanent, routing the White River to the Puyallup River. In 1916, the Lake Washington Ship Canal and Hiram Chittenden Locks were constructed, with the Cedar River permanently diverted to flow into the south end of Lake Washington (instead of into the Duwamish River via the Black River). Construction of the canal and locks, along with the 1906 White River diversion reduced flows in the Green/Duwamish basin by 70 percent.

After a major flood in 1958, extensive levee systems were constructed to protect the rapidly developing Green River valley from additional losses. HHD was built in 1962, for flood control and low-flow augmentation in the middle to lower portions of the basin during the summer months. Construction of the dam further limited natural river processes, including large woody debris recruitment and spawning gravel deposition, both critical habitat features for fish rearing in the middle and lower Green River. With reduction of channel-forming flows and elimination of a source of coarse sediment, the river now cuts down within its existing banks.

Past human alteration has created the lower Green River corridor as it exists today: highly urbanized with few to no natural riverine processes remaining, creating very poor habitat for fish and wildlife. The rehabilitation and repair of existing levees is expected to allow for the continued development in the floodplain. This reach of river has had previous levee repair projects, levee upgrades, and dike maintenance over the last twenty-five years. Additional levee repairs/upgrades are likely in the future. The King County Flood Hazard Management Plan was adopted in 2006 and provides guidance for long-term flood reduction and management for all of King County. The goals of this plan are to reduce the risk of future flood hazard, reduce long-term associated costs of maintaining the flood reduction infrastructure, and avoid or minimize the environmental impacts of flood management. Specific project and program recommendations are presented in a 10-year Action Plan, many of which are in the Green River corridor. It is expected that a number of projects, both levee rehabilitations and restorations, will be initiated along the Green River in the next 10 years.

The basin was once heavily vegetated by evergreen coniferous forest communities, which dominated most of western Washington from sea-level to timberline. In the valley between Auburn and Kent, the floodplain was likely dominated by Sitka spruce (*Picea sitchensis*)/Western red cedar (*Thuja plicata*) wetlands. Frequent flood events often kept the riparian corridors from developing climax communities, resulting in deciduous trees as the primary overbank cover with coniferous trees occurring farther from the river. Dominant trees along the banks of the lower Green River included red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), big-leaf maple (*Acer macrophyllum*) and willow (*Salix* spp.). During large flood events, flood waters would knock some of these trees into the river where they would become LWD. The LWD would change flows in the river, contributing to the formation of eddies, pools, side channels, and wetlands.

Starting in about the 1850s, forests were cleared and wetlands drained to provide suitable land for agriculture production. By the 1970s industrial and commercial development accelerated in the middle and lower Green River Basin. Pastures were drained and agricultural fields began to

be filled and developed. Remaining wetland systems were reduced in size and confined by new roads and developments (Shapiro 1990).

As part of the required levee maintenance for eligibility in the PL 84-99 program, the local sponsor (King County) must minimize the amount of vegetation on levees which are active in the program. This maintenance requirement is nationally addressed in ER 500-1-1. The Seattle District, has established a variance for this standard. Currently the variance allows for woody vegetation less than 4" in diameter at breast height (dbh) to remain on levees of standard design. This vegetation maintenance by the local government occurs as a separate action from the repairs addressed in this EA and is expected to be ongoing. This maintenance is required on all levees in the program and includes levees outside of the actions proposed in this document. This vegetation removal will result in continued negative impacts on the riparian habitat, shade and temperature in the river. To be consistent with the program, removal of all trees/shrubs that are larger than 4" dbh along all levees proposed for repair this summer, including the areas outside of the project footprint, is required. The proposed repair site along the Green River corridor most affected by the County vegetation removal action will be Dykstra, where 24 mature trees will be removed prior to the end of the construction. The other rehabilitation sites are primarily vegetated with invasive shrubs (blackberry) and include few large trees; therefore the loss of vegetation due to maintenance will be less detrimental. However, the regular (it is assumed bi-yearly) removal of 4" or greater dbh woody vegetation by the County required to continue in the PL 84-99 program, will limit the formation of wildlife and fish habitat along the Green River corridor.

In an effort to mitigate for the adverse impacts of these proposed repairs to the river corridor and future adverse impacts by required levee vegetation maintenance, the levee footprints will be laid back where feasible. This will allow for the construction of a mid-slope bench. This bench falls outside of the vegetation maintenance requirements of PL 84-99 as it is not considered part of the levee prism. Therefore, the trees and shrubs planted on the benches in spring 2009 (and any future bench plantings) will be allowed to mature. In addition, LWD will be installed in the river below the levee repair footprints to create shade and refuge for fish. Willow/dogwood lifts will be incorporated into the riverward levee prism to increase shade and organic input to the river. To remain in the PL 84-99 program, the local government is required to maintain these willows/dogwoods according to PL 84-99 standards. These environmental features may improve fish and wildlife habitat in the lower sections of the Green River in the long-term.

Additional, Corps activities in the immediate project location include two large civil works projects, the HHD Additional Water Storage Project (AWSP) and the Green-Duwamish Ecosystem Restoration Program (ERP). The AWSP includes storing water from the Green River behind HHD for the City of Tacoma. It also includes a suite of restoration actions including the annual addition of gravel and wood to the middle Green River. The ERP includes a number of environmental restoration projects throughout the lower and middle Green River.

Other work that may affect the Green River environment that is currently underway include the Department of Transportation's widening of Interstate 405 where it crosses the Green River, and the City of Kent's development of Riverview Park, which is adjacent to the Green River. The latter development will include public access to the river, including a boat ramp and fishing access, including handicap accessible fishing.

The lower Green River is almost completely lined with levees. Less than 10% of the river's historic floodplain remains in the valley. The continued presence of the levees is a limiting

factor in the habitat restoration activities that are necessary for ESA listed salmon recovery. The rehabilitations proposed in this EA, and any future projects, will slightly improve salmonid habitats in the degraded river corridor, though at the same time continuing to confine the river channel, decreasing opportunities for natural floodplain processes, and allowing further urbanizing in the lower Green River floodplain.

8.0 COORDINATION

The following agencies and entities have been involved with the environmental coordination of this project:

- National Marine Fisheries Service (NMFS)
- U.S. Fish and Wildlife Service (USFWS)
- Washington Department of Fish and Wildlife (WDFW)
- Washington Department of Ecology (Ecology)
- Washington State Office of Archaeology and Historic Preservation
- Muckleshoot Indian Tribe
- King County

9.0 ENVIRONMENTAL COMPLIANCE

9.1 National Environmental Policy Act (NEPA) (42 USC 4321 et seq.)

In accordance with the National Environmental Policy Act, federal projects are required to evaluate potential environmental impacts. Section 1500.1(c) and 1508.9(1) of the National Environmental Policy Act (NEPA) of 1969 (as amended) requires federal agencies to “provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact” on actions authorized, funded, or carried out by the federal government to insure such actions adequately address “environmental consequences, and take actions that protect, restore, and enhance the environment”. Per NEPA requirements, this assessment evaluates environmental consequences from the proposed federal actions involving levee repairs at these six projects (10 sites) along the Green River in King County, Washington. Comments were solicited from interested agencies and members of the public, and responses to those comments are attached to this EA as Appendix E. The Finding of No Significant Impact (FONSI) is included in Appendix D.

9.2 Endangered Species Act of 1973, as Amended (16 USC 1531-1544)

Due to the urgent nature of completing this rehabilitation project prior to the oncoming flood season, the Corps may proceed with construction prior to completion of the consultation with the Services pursuant to the “emergency circumstances” provisions of the ESA consultation regulation and complete ESA consultation after the fact, rather than delaying the urgent work in order to complete ESA consultation before construction begins. The applicable regulation is set out at 50 CFR Part 402.05 (a) and (b) and provides as follows:

(a) Where emergency circumstances mandate the need to consult in an expedited manner, consultation may be conducted informally through alternative procedures that the Director determines to be consistent with the requirements of section 7(a)-(d) of the Act. This provision applies to situations involving acts of God, disasters, casualties, national defense or security emergencies, etc.

(b) Formal consultation shall be initiated as soon as practicable after the emergency is under control. The Federal agency shall submit information on the nature of the emergency actions(s), the justification for expedited consultation, and the impacts to endangered or threatened species and their habitats. The Service will evaluate such

information and issue a biological opinion including the information and recommendations given during emergency consultation.

Though consultation is not complete, the Corps has reached an agency determination, based on the best factual and technical information available at the time of decision, and following preliminary coordination with the Services, that the impacts are not likely to adversely affect ESA-listed species at Tukwila #3 and # 5, Horseshoe Bend #s1-4, Dykstra, Meyers Golf, and Kent Shops/ Narita; and likely to adversely affect ESA-listed species at Galli's. The Corps believes that this work is not likely to jeopardize the continued existence of the listed species, by reducing appreciably the likelihood of either the survival or recovery of the listed species; nor does the work constitute an adverse modification of critical habitat.

The Corps will also commit to fully funding and performing all Reasonable and Prudent Alternatives necessary to avoid the likelihood of jeopardy to listed species or destruction or adverse modification of designated critical habitat, as well as Reasonable and Prudent Measures (RPMs) necessary and appropriate to minimize the impact of Incidental Take, that are described in a Biological Opinion is received from the Services. The Environmental Assessment will be reevaluated at the time that consultation is complete. If necessary, this EA will be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project.

9.3 Clean Water Act, as Amended (33 USC 1251 et seq.)

The Clean Water Act (CWA) is the primary legislative vehicle for federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the United States. The CWA was established to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA sets goals to eliminate discharges of pollutants into navigable waters, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment.

This EA evaluates possible impacts to water quality, primarily with respect to suspended solids, turbidity and temperature. There are no other water quality effects anticipated.

CWA Section 402, **National Pollutant Discharge Elimination System** and the associated implementing regulations for **General Permit for Discharges from Large and Small Construction Activities** and require the filing of a notice of intent for Construction disturbance over one acre. All of the construction sites will exceed this one acre limitation. Because the work is being done by the Corps, a federal agency, and the Washington State EPA approved program exempts federal projects, the Corps filed its notice of intent with the Environmental Protection Agency (EPA). The Corps has received confirmation from EPA (June 11, 2008) that the permit status is "active".

CWA Section 404 requires permits for discharges of dredge or fill material into waters of the United States. The Corps does not issue itself Section 404 permits but conducts a review of such discharges.

The Tukwila, Horseshoe Bend #2, #3, and #4, Kent Shops and Meyer's Golf sites are exempt from Section 404 of the CWA per Section 404(f)(1)(B), which allows for emergency reconstruction of recently damaged parts of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches,

and transportation structures if the proposed work would not result in changes to the character, scope, or size of the original fill design and occurs within a reasonable period of time after damage occurred. The Horseshoe Bend #1, Galli's and Dykstra sites are not exempt per Section 404 (f)(1)(B) of the CWA as the proposed repairs extend waterward of the pre-damage footprint of the existing levees below OHW. The work at these sites includes fill into the water of the U.S and are subject to Section 404 regulation, and is not covered by NWP 3. At Dykstra and Horseshoe Bend site #1, this fill is limited to rock anchors for LWD. At Galli's, the fill includes movement of the toe of the levee waterward by 3-15 ft at the upstream 300-400 ft of the site and rock anchors for LWD. A Section 404(b)(1) analysis is located in Appendix C.

All project sites have been coordinated with Department of Ecology for compliance with Section 401 of the Clean Water Act. All project sites are considered exempt with regards to obtaining a state Water Quality certification (WQC) because they are being constructed within the existing levee footprint except for the Galli's, Dykstra, and Horseshoe Bend Site #1. For these latter projects, a Water Quality certification (WQC) has been requested from the Department of Ecology.

During the 7 March 2008 site visit, the Corps concluded that no jurisdictional wetlands are present along the riverward toe, face, or top of the respective levees, and no wetlands would thus be impacted as a result of this project.

9.4 Rivers and Harbors Act (33 U.S.C. 403)

Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) prohibits the creation of an obstruction to navigable waters without authorization of the Corps of Engineers. The Corps has previously determined that the Duwamish River is navigable 10 miles upstream of the mouth of the Duwamish River where the Green meets the Duwamish River. [NPDR 1145-2-303, Appendix I, 3 July 1970]. All of the levee repair locations are located more than 10 miles upstream of the mouth of the Duwamish River and therefore not within designated navigable waters.

9.5 Coastal Zone Management Act (16 U.S.C. 1451-1465)

The Coastal Zone Management Act of 1972 as amended requires Federal agencies to carry out their activities in a manner, which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program. The proposed action will restore existing flood control project to a state comparable to their original condition before damage by the elements occurred. Work at Tukwila, Horseshoe Bend #2, #3, #4, Kent Shops and Meyer's Golf will not extend beyond the footprint of the original project, and will not cause substantial adverse effects to shore resources or the environment. The work at Horseshoe Bend #1, Galli's and Dykstra will extend beyond the original footprint of the levee but also will not cause substantial adverse effects to the shore resources or the environment. After review of the local Shoreline Master Programs for the respective jurisdictions, City of Tukwila for the Tukwila sites, City of Kent for Kent Shops, Meyer's Golf and Horseshoe Bend sites, and City of Auburn for the Galli's and Dykstra projects, the Corps believes this proposal is consistent to the maximum extent practicable with the City of Tukwila, City of Kent, and City of Auburn Shoreline Master Programs. See Appendix A for detailed analysis of consistency with the Coastal Zone Management Act.

9.6 National Historic Preservation Act (16 USC 470 et seq., 110)

Section 106 of the National Historic Preservation Act (36 CFR Part 800) requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for

the National Register of Historic Places must be identified and evaluated. As required under Section 106 of the NHPA, the Corps has coordinated with the Washington State Department of Archeology and Historic Preservation (DAHP) and the Muckleshoot Indian Tribe.

No recorded prehistoric or historic-period Native American or settlement period archaeological deposits are located within any of the individual sites. A cultural resources survey was conducted in the individual repair areas and a cultural resource report was prepared as part of the Section 106 of the National Historic Preservation Act compliance process. A letter was received from the State Historic Preservation Officer (SHPO) dated 11 June 2008 concurring with the Corps finding of No Historic Properties Affected. The present designs do not include any ground disturbing activities outside the levee footprints. If any levee repair designs change in such a way as to include disturbance to previously undisturbed native soils, monitoring by a Corps archaeologist will occur during certain phases of construction.

9.7 Clean Air Act, as Amended (42 USC 7401, et seq.)

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The act also required Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that will not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The U.S. Army Corps of Engineers has determined that emissions associated with these sites will not exceed EPA's *de minimus* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

9.8 Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)

No portions of the Green River have been designated as a Wild and Scenic River and this act is therefore not applicable to the proposed work. .

9.9 Migratory Bird Treaty Act and Migratory Bird Conservation Act (16 USC 701-715)

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.) establishes a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, ... or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." This prohibition applies to birds included in the respective international conventions between the United States and Great Britain, the United States and Mexico, the United States and Japan, and the United States and the former Union of Soviet Socialist Republics.

The alternatives considered in this EA are evaluated with regard to effects on birds and their habitat in wetlands and riparian areas. There may be displacement of birds from riparian habitat, with habitat impacts until vegetation re-establishes.

9.10 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), (16 U.S.C. 1801 et. seq.) requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The objective of an EFH assessment is to

determine whether or not the proposed action(s) “may adversely affect” designated EFH for relevant commercial, federally-managed fisheries species within the proposed action area. The assessment also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

Effects on EFH are considered in this EA. The Corps has consulted with NMFS on the effects to EFH.

9.11 Federal Water Project Recreation Act, as Amended (16 USCA 4612 et seq.)

In the planning of any Federal navigation, flood control, reclamation, or water resources project, the Federal Water Project Recreation Act, as amended (16 U.S.C. 460(l) (12) et seq.) requires that full consideration be given to the opportunities that the project affords for outdoor recreation and fish and wildlife enhancement. The Act requires planning with respect to development of recreation potential. Projects must be constructed, maintained, and operated in such a manner if recreational opportunities are consistent with the purpose of the project.

This EA assesses impacts of alternative actions on recreation, but the proposed actions are not intended to provide recreational benefits.

9.12 Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

The Farmland Protection Policy Act (Public Law 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The proposed actions would not affect farmland classified as prime and unique.

9.13 Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)

RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste, regulate underground storage tanks (USTs) that store petroleum or hazardous substances, establish a system for managing solid (primarily non-hazardous) waste, including household waste, and set forth the framework for EPA's comprehensive waste management program. No abandoned waste has been observed during project site visits. If abandoned or buried hazardous waste or pesticides were discovered during construction, it would be managed in accordance with RCRA or the Comprehensive Environmental Response, Compensation, and Liability Act requirements, as applicable. Contractor hazardous materials and waste would be managed in accordance with RCRA requirements. The proposed actions are in compliance with this act.

9.14 Executive Order 11988, Floodplain Management (24 May 1977)

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, “each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains.” Section 8 of the order notes that it does not apply to assistance provided for emergency work essential to save lives or protect public property, health, and safety. The proposed actions will not create a change that would affect occupancy of the floodplain. By repairing the levee breach, the proposed actions would be consistent with the executive order in reducing the risk of flood and minimize the impact of floods on human safety, health, and welfare, while not changing floodplain occupancy conditions.

9.15 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. The proposed actions do not involve construction of a facility that will discharge pollutants or contaminants, so no human health effects would occur. Therefore the proposed actions are in compliance with this act.

9.16 Executive Order 11990, Protection of Wetlands, May 24, 1977

The purpose of these proposed actions is to restore the damaged levee and enhance riparian habitat where possible under the constraints of the PL84-99 program. No wetlands would be impacted by this project.

9.17 Treaty Rights

In the mid-1850's, the United States entered into treaties with a number of Native American tribes in Washington. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F. Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F. Supp. 312 at 343 - 344, the court also found that the Treaty tribes had the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis.

In *United States v. State of Washington*, 384 F. Supp 312 at 367, the court stated that the Muckleshoot Indians had usual and accustomed fishing places:

76. "... primarily at locations on the upper Puyallup, the Carbon, Stuck, White, Green, Cedar and Black Rivers, the tributaries to these rivers (including Soos Creek, Burns Creek and Newaukum Creek) and Lake Washington, and secondarily in the saltwater of Puget Sound.

By letter dated June 10, 2008, the Muckleshoot Indian Tribe Fisheries Division stated the construction would impact their usual and accustomed fishing. The letter mentioned the Galli's project site in particular as a concern, which includes 3000 sq. ft. of encroachment out into the river. Telephone conversations with have indicated that the specific period during which the Tribal members will be fishing in the river has yet to be determined but they usually fish in the river sometime in the August-September timeframe. They have also stated that they fish both from the bank and by boat and that they fish in the entire river without indicating specific sites.

Access to the Galli's site via the land, as well as the other sites, will be restricted during construction because of safety concerns. There will also be a construction curtain (to prevent turbidity and interference with construction) in the river a limited distance offshore that would prevent access to a small portion of the shoreline (about 150 linear feet) via boat close to shore. As previously noted not all sites will necessarily be constructed during the same construction season and some sites will take longer to complete than others. As previously noted the construction season is primarily constrained by the ESA/WDFW

construction fish window which runs from July 1 to September 15 and the need to get the work completed prior to the flood season. In particular, the Galli's site is expected to be repaired this construction season and the construction is expected to continue for the entire construction season. Once completed the access restriction to the river will be removed at each site. Until construction commences, there is no restriction on access.

Avoidance of all potential impact to Tribal fishing on the Green River is not possible due to the ESA concerns, water quality concerns, and concerns for human health and safety in getting the repairs completed prior to the flood season. However, the projects will in all likelihood not occur in one construction season which will minimize the overall impact to fishing on the Green River. Coordination with the Tribe will be ongoing during construction to further minimize the impact to the Tribal fishing.

The work is considered to be consistent with the Tribe's treaty rights due to the limited number of sites under construction, the fact that no specific site has been identified as a specific fishing place, the temporal nature of the restriction, and the fact that the limited impact is necessary to protect human health and safety and is authorized by PL 84-99. Habitat impacts have been addressed in the design of the project including plantings, placement of LWD, and benches.

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APPENDIX A - Coastal Zone Management Act Consistency Determinations

COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION

Coastal Zone Management Act Consistency Determination Green River Levee Rehabilitation Projects within the City of Kent, 2008

The rehabilitation actions are activities undertaken by a Federal agency; the following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

1. INTRODUCTION

The proposed Federal action applicable to this consistency determination is the rehabilitation activities on six levee segments along the Green River, as described in the Environmental Assessment. This determination of consistency with the Washington Coastal Zone Management Act is for the six levee segments located within the City of Kent - Kent Shops/Narita segment which is located on the right bank of the Green River extending from RM 21.0 to RM 22.0 in the city of Kent (T 22N, R 04E, Sec. 22 and 23); the four Horseshoe Bend segments located as follows Site #1 is located between RM 25.8 and RM 26.1, Site #2 is located at RM 25.3, Site #3 is located at RM 25.2 and Site #4 is located between RM 24.9 and RM 25.1; and Meyers Golf segment which is located on the right bank of the Green River between RM 22 and RM 22.5, in the city of Kent (T 22N, R 04E, Sec. 23). This determination is based on review of applicable sections of the State of Washington Shoreline Management Program and policies and standards of the City of Kent, Washington Shoreline Master Plan.

The determination of consistency for all the sites but Horseshoe Bend #1 is further confirmed through analogy to the provisions of the regional conditions under Nationwide Permit 3 pursuant to the Corps of Engineers' Clean Water Act Sec. 404 permitting program. The regional conditions under NWP 3 provide that the State of Washington has predetermined its concurrence that a levee rehabilitation project meeting NWP 3 parameters is consistent with the State's coastal management program as long as individual review under CWA Section 401 is not triggered. This is further confirmed by the letter from Ecology dated 4 June 2008. Because all but site 1 on Horseshoe Bend are exempt from the application of CWA Section 404 under 33 U.S. Code Section 1344(f)(1)(B), the projects are not subject to State certification under Section 401. The consequent State predetermination of concurrence with a conclusion of consistency provides extrinsic validation for the Corps' analysis that follows.

2. STATE OF WASHINGTON SHORELINE MANAGEMENT PROGRAM

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved state Coastal Zone Management (CZM) Programs. The Shoreline Management Act of 1972 (RCW 90.58) is the core of authority of Washington's CZM Program. Primary responsibility for the implementation of the SMA is assigned to local government. City of Kent, in which the proposed levee rehabilitation projects are located, fulfilled this requirement with the Shoreline Master Program for the City of Kent

The proposed repair footprints are located along the Green River which is designated Urban – River Resource environment and classified as a "Shoreline of Statewide Significance."

3. CITY OF KENT SHORELINE MANAGEMENT PROGRAM

Applicable portions of the City of Kent SMP are presented below with the Corps consistency indicated in *bold italics*.

City of Kent SMP 4.8 Flood Control states:

GOAL 1: Ensure future flood control works are in the public benefit.

Policies:

1. Ensure that all flood control project proposals in Kent are based on a thorough analysis of the potential impacts on the shoreline and an examination of alternative measures, for example, the control or reduction of surface water runoff.
2. Require that flood control works are designed for multiple uses.
3. The City shall acquire public access to the flood control works prior to construction.
4. Design flood control projects to maximize open space elements which are not subject to extensive flood damage, such as parks and agriculture.
5. Design flood control projects to provide diverse public recreational opportunities, such as fishing, swimming, boating, birdwatching, viewing, etc.
6. Design and manage flood control works to avoid or minimize negative impacts, and enhance and restore the natural environment and wildlife habitat.
7. Design, landscape and plant flood control projects to maximize a natural shoreline appearance, fish and wildlife habitat values, public access, and public recreation.
8. Provide dike setbacks at favorable locations that promote bank stabilization, restoration of natural habitat and large river-level access parks.

Consistent. The Corps conducted an alternative analysis, as described in the Environmental Assessment, to ensure the rehabilitated levee design would provide the required flood protection while minimizing potential impacts to the shoreline. The new levee designs include setbacks where feasible and include planting benches and large woody debris (LWD) placed in-stream to promote natural habitat restoration to the extent possible within the levee footprint. The additional vegetation on the benches will provide small animal and bird habitat and increase aesthetic value. Existing biking/walking paths will be rebuilt to continue to offer public access to the shoreline.

GOAL 2: Ensure that shoreline stabilization activities conducted for flood control and/or habitat restoration purposes are in the public benefit and protective of the overall river corridor environment.

1. Shoreline stabilization shall not be used to create new lands.
2. Permit shoreline stabilization only when it has been demonstrated that shoreline stabilization is necessary for the protection of legally established structures and public improvements.
3. Require that all shoreline modification activities be in support of a permitted shoreline use that is in conformance with the provisions of this master program unless it can be demonstrated that such activities are necessary and in the public interest.

4. Place shoreline stabilization solutions that replace existing shoreline stabilization along the same alignment as the shoreline stabilization being replaced; however, these may be placed waterward, directly abutting the old structure, in cases where removal of the old structure would result in construction problems or severe environmental impacts as determined by the City of Kent.
5. Shoreline stabilization shall not significantly interfere with normal surface and/or subsurface drainage into the water body.
6. Design shoreline stabilization so that it does not constitute a hazard to navigation, nor substantially interfere with visual access to the water.
7. Design shoreline stabilization to not create a need for shoreline stabilization elsewhere.
8. Require professional design of shoreline stabilization works, as approved by the City.

Consistent. The levees will be constructed within the existing footprint of the original structure and along the same alignment where possible. Any variation from this footprint is to provide additional habitat elements (i.e. LWD) to offset project impacts. They will protect existing infrastructure, commercial, residential and recreational buildings, and all life and property contained therein. There will be no interference with navigation, surface or subsurface drainage, or visual access to the water.

City of Kent SMP 5.7 Salmon and Steelhead Habitat states:

WATERCOURSE HABITAT:

The Green River is a travel corridor for Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and chum (*Oncorhynchus keta*) salmon as well as sea-run cutthroat (*Oncorhynchus clarkii*) and steelhead (*Oncorhynchus mykiss*) trout. Both Chinook and chum salmon spawn in the Green River within the city limits of the Kent. All species of salmonids use the river and its tributaries for rearing and refuge, with steelhead and cutthroat trout being the longest freshwater residents.

Because of the importance of these sensitive habitat areas, this Shoreline Master Program gives special attention to them. The following policies **and** regulations apply to the waterbodies addressed in Kent shoreline master program, and the portion of the streams within the two hundred (200) foot shoreline jurisdiction that provide habitat for salmonids.

Performance Standards

1. Structures and uses shall be allowed in salmonid habitat only if the proponent provides for in-place or in-kind mitigation of impacts to the affected habitat areas.

Consistent. The levee rehabilitation designs include environmental features to offset habitat impacts caused by the construction, including: LWD, mid-slope vegetated benches, willow/dogwood lifts at the OHW and layback levee designs.

4. Landfills may intrude into areas used by salmonids for migration corridors, rearing, feeding, and refuge only where the proponent obtains a conditional use permit and demonstrates that all of the following conditions are met:

- a. The landfill is for a water-dependent use;
- b. An alternative alignment, location or technology is not feasible;

- c. The project is designed to minimize its impacts to the environment;
- d. The project does not adversely affect salmonid spawning habitat;
- e. The facility is in the public interest; and
- f. If the project will create significant unavoidable adverse impacts on habitat, the impacts are mitigated by creating in-kind replacement habitat near the project. Where in-kind replacement mitigation is not feasible, rehabilitation of degraded habitat may be required as a substitute.

Consistent. The landfill included in the levee repair projects consists of LWD anchor rock placed in the river channel along sections of the levee toe to provide additional salmonid habitat including high flow refuge and shade. It is designed specifically to offset impacts which may occur due to construction. These anchor rocks should cause no long term adverse affect to salmonid habitat.

11. The removal of aquatic and riparian vegetation within or adjacent to salmonid habitat shall be minimized. Areas of disturbed earth shall be revegetated as soon as possible.

Consistent. The repairs will require the removal of existing vegetation within the construction footprint; this removal will be limited to only the vegetation within the footprint. The areas of disturbance will be revegetated with willow/dogwood lifts installed in the levee at OHW and mid-slope bench plantings where possible.

4. STATEMENT OF CONSISTENCY

Based on the above evaluation, the Corps has determined that the proposed rehabilitation activities comply with the policies, general conditions, and activities as specified in the City of Kent Shoreline Master Program adopted in 1999. The proposed action is thus considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the City of Kent Shoreline Master Program.

COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION

Coastal Zone Management Act Consistency Determination Green River Levee Rehabilitation Projects within the City of Auburn, 2008

The rehabilitation actions are activities undertaken by a Federal agency; the following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

1. INTRODUCTION

The proposed Federal action applicable to this consistency determination is the rehabilitation activities on two levee segments (Dykstra and Galli's) along the Green River, as described in the Environmental Assessment. This determination of consistency with the Washington Coastal Zone Management Act is based on review of applicable sections of the State of Washington Shoreline Management Program and policies and standards of the City of Auburn, Washington Shoreline Master Plan.

2. STATE OF WASHINGTON SHORELINE MANAGEMENT PROGRAM

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved state Coastal Zone Management (CZM) Programs. The Shoreline Management Act of 1972 (RCW 90.58) is the core of authority of Washington's CZM Program. Primary responsibility for the implementation of the SMA is assigned to local government. City of Auburn, in which the proposed levee rehabilitation projects are located, fulfilled this requirement with the Shoreline Management Master Program for the City of Auburn.

The proposed repair footprints are located along the Green River which is designated in the City of Auburn's Shoreline Management Program as Urban Environment.

3. CITY OF AUBURN SHORELINE MANAGEMENT PROGRAM

The City of Auburn has designated per the General Regulations for All Use Activities, Shoreline Protection A, of the 1973 Auburn Shoreline Management Master Program that "Any stabilization measures on the Green River in Auburn must conform to the policies set forth by the King County Flood Control Department of Hydraulics" (currently known as the King County Flood Control Zone District). Therefore the King County Shoreline Management Program was used to determine project consistency.

Applicable portions of the King County SMP are presented below with the Corps consistency indicated in *bold italics*.

25.16.180 Shoreline protection. Shoreline protection may be permitted in the urban environment, provided:

A. Shoreline protection to replace existing shoreline protection shall be placed along the same alignment as the shoreline protection it is replacing, but may be placed waterward directly abutting the old structure in cases where removal of the old structure would result in construction problems;

Consistent. The proposed levee repairs will be built along the same alignment as the protection it is replacing.

B. On lots where the abutting lots on both sides have legally established bulkheads, a bulkhead may be installed no further waterward than the bulkheads on the abutting lots, provided that the horizontal distance between existing bulkheads on adjoining lots does not exceed one-hundred feet. The manager may, upon review, permit a bulkhead to connect two directly adjoining bulkheads, for a distance up to one hundred fifty feet. In making such a determination the manager shall consider the amount of inter-tidal land/or water bottom to be covered, the existence of fish or shellfish resources thereon, and whether the proposed use or structure could be accommodated by other configurations of bulkhead which would result in less loss of shoreland, tideland, or water bottom;

C. In order for a proposed bulkhead to qualify for the RCW 90.58.030(3) (e) (iii) exemption from the shoreline permit requirements and to insure that such bulkheads will be consistent with this program as required by RCW 90.58.141(1), the Building and Land Development Division shall review the proposed design as it relates to local physical conditions and the King County shoreline master program and must find that:

1. Erosion from waves or currents is imminently threatening a legally established residence or one or more substantial accessory structures, and
2. The proposed bulkhead is more consistent with the King County shoreline master program in protecting the site and adjoining shorelines than feasible, non-structural alternatives such as slope drainage systems, vegetative growth stabilization, gravel berms and beach nourishment, are not feasible or will not adequately protect a legally established residence or substantial accessory structure, and
3. The proposed bulkhead is located landward of the ordinary high water mark or it connects to adjacent, legally established bulkheads as in subsection B. above, and
4. The maximum height of the proposed bulkhead is no more than one foot above the elevation of extreme high water on tidal waters as determined by the National Ocean Survey published by the National Oceanic and Atmospheric Administration or four feet in height on lakes;

Consistent. No bulkheads will be built during construction of the levee repair project.

D. Shoreline protection shall not be considered an outright permitted use and shall be permitted only when it has been demonstrated that shoreline protection is necessary for the protection of existing legally established structures and public improvements or the preservation of important agricultural lands as designated by the Office of Agriculture.

Consistent. The proposed levee repairs will protect existing infrastructure, commercial, residential and recreational buildings, and all life and property contained therein.

E. Shoreline protection shall not have adverse impact on the property of others.

Consistent. The proposed actions are repairs to existing levees and therefore no property values will be affected.

F. Shoreline protection shall not be used to create new lands, except that groins may be used to create a public Class I beach if they comply with all other conditions of this section.

Consistent. No new lands will be created by this action.

G. Shoreline protection shall not significantly interfere with normal surface and/or subsurface drainage into the water body.

Consistent. The proposed levee repairs will not change or interfere with surface or subsurface drainage into the river.

H. Automobile bodies or other junk or waste material which may release undesirable material shall not be used for shoreline protection.

Consistent. All riprap and fill materials used in the levee construction will come from a permitted and clean source.

I. Shoreline protection shall be designed so as not to constitute a hazard to navigation and to not substantially interfere with visual access to the water.

Consistent. The proposed levee repairs are replacing existing structures; there will be no interference with navigation or visual access to the water.

J. Shoreline protection shall be designed so as not to create a need for shoreline protection elsewhere.

Consistent. The action will replace existing levee structures and will not change the current path of the river.

K. Bulkheads on Class I beaches shall be located no farther waterward than the bluff or bank line;

L. Bulkheads must be approved by the Washington State Department of Fisheries;

M. Bulkheads shall be constructed using an approved filter cloth or other suitable means to allow passage of surface and groundwater without internal erosion of fine material;

N. Groins are permitted only as part of a professionally designed community or public beach management program.

Consistent. No bulkheads or groins will be constructed during this action.

25.16.190 Excavation, dredging and filling. Excavation, dredging and filling may be permitted in the urban environment, only as part of an approved overall development plan not as an independent activity provided:

A. Any fill or excavation regardless of size shall be subject to the provisions of K.C.C. 16.82.100;

Consistent. Excavation and grading activities conform to the provisions of K.C.C. 16.82.100 (Grading standards). No cuts will exceed 2H:1V in slope. All cleared areas will be hydroseeded or replanted with native vegetation after construction.

B. Landfill may be permitted below the ordinary high water mark only when necessary for the operation of a water dependent or water related use, or when necessary to mitigate conditions which endanger public safety;

Consistent. Levee repairs require installation of new riprap toe structures to ensure levee stability and minimize the threat to public safety.

C. Landfill or excavations shall be permitted only when technical information demonstrates water circulation, littoral drift, aquatic life and water quality will not be substantially impaired;

Consistent. An Environmental Assessment is currently being prepared to address any environmental impacts from this project. Approximately 4300 cubic yards of riprap will be placed below ordinary high water to reduce the potential for future levee failure and

to provide anchorage for the large woody debris which will be placed in the river channel as a habitat enhancement features. Water quality will be protected to the extent practicable through Clean Water Act Section 401 certification, the development of a Stormwater Pollution Prevention Plan, and utilization of Best Management Practices as described in the SWPPP.

D. Landfill or disposal of dredged material shall be prohibited within the floodway;

Consistent. No landfill or dredging material will be deposited in the floodway.

E. Wetlands such as marshes, swamps, and bogs shall not be disturbed or altered through excavation, filling, dredging, or disposal of dredged material unless the manager determines that either:

1. The wetland does not serve any of the valuable functions of wetlands identified in K.C.C. 20.12.080 and U.S. Army Corps of Engineers 33 CFR 320.4(b), including but not limited to wildlife habitat and natural drainage functions, or

2. The proposed development would preserve or enhance the wildlife habitat, natural drainage, and/or other valuable functions of wetlands as discussed in K.C.C. 20.12.080 or U.S. Army Corps of Engineers 33 CFR 320.4(b) and would be consistent with the purposes of this Title;

Consistent. No wetlands will be filled or impacted by this construction project.

F. Class I beaches shall not be covered by landfill except for approved beach feeding programs;

Consistent. No beaches will be covered with landfill by this action.

G. Excavations on beaches shall include precautions to prevent the migration of fine grain sediments, disturbed by the excavation, onto adjacent beach areas and excavations on beaches shall be backfilled promptly using material of similar composition and similar or more coarse grain size;

Consistent. No excavations on beaches will occur during this action.

H. No refuse disposal sites, solid waste disposal sites, or sanitary fills of putrescible or non-putrescible material shall be permitted within the shorelines of the state;

Consistent. The Corps will use only designated and permitted disposal sites for any waste material associated with this project.

I. Excavation or dredging below the ordinary high water mark shall be permitted only:

1. When necessary for the operation of a water dependent or water related use, or
2. When necessary to mitigate conditions which endanger public safety or fisheries resources, or

Consistent. Excavation associated with this project below ordinary high water is necessary for installation of the levee toe structure and is required for operation of the levee to ensure public safety.

J. Disposal of dredged material shall be done only in approved deep water disposal sites or approved contain upland disposal sites;

K. Stockpiling of dredged material in or under water is prohibited;

Consistent. All excavated material will be removed to a permitted disposal site. No material s will be stockpiled in or near the river.

L. Maintenance dredging not requiring a shoreline permit(s) shall conform to the requirements of this section;

M. Dredging shall be timed so that it does not interfere with aquatic life;

N. The county may impose reasonable conditions on dredging or disposal operations including but not limited to working seasons and provisions of buffer strips, including retention or

replacement of existing vegetation, dikes, and settling basins to protect the public safety and shore users' lawful interests from unnecessary adverse impact;

Consistent. No dredging will occur during the levee repair work.

O. In order to insure that operations involving dredged material disposal and maintenance dredging are consistent with this program as required by RCW 90.58.140(1), no dredging may commence on shorelines without the responsible person having first obtained either a substantial development permit or a statement of exemption; PROVIDED, that no statement of exemption or shoreline permit is required for emergency dredging needed to protect property from imminent damage by the elements;

Consistent. The levee repair projects are to be built in the same in-water footprint as the existing levee and are considered emergency actions by the Corps; therefore the Corps believes this action to be exempt from the requirement of a substantial development permit.

4. STATEMENT OF CONSISTENCY

Based on the above evaluation, the Corps has determined that the proposed rehabilitation activities comply with the policies, general conditions, and activities as specified in the City of Auburn Shoreline Master Program adopted in 1973, which defers to King County policies. The proposed action is thus considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the King County Shoreline Master Program.

COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION

Coastal Zone Management Act Consistency Determination Green River Levee Rehabilitation Projects within the City of Tukwila, 2008

The rehabilitation actions are activities undertaken by a Federal agency; the following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

1. INTRODUCTION

The proposed Federal action applicable to this consistency determination is the rehabilitation activities on two levee segments (Tukwila #3 and #5) along the Green River, as described in the Environmental Assessment. This determination of consistency with the Washington Coastal Zone Management Act is based on review of applicable sections of the State of Washington Shoreline Management Program and policies and standards of the City of Tukwila, Washington Shoreline Master Plan.

The determination of consistency is further confirmed through analogy to the provisions of the regional conditions under Nationwide Permit 3 pursuant to the Corps of Engineers' Clean Water Act Sec. 404 permitting program. The regional conditions under NWP 3 provide that the State of Washington has predetermined its concurrence that a levee rehabilitation project meeting NWP 3 parameters is consistent with the State's coastal management program as long as individual review under CWA Section 401 is not triggered. Because the Tukwila levee work is exempt from the application of CWA Section 404 under 33 U.S. Code Section 1344(f)(1)(B), the projects are not subject to State certification under Section 401. The consequent State predetermination of concurrence with a conclusion of consistency provides extrinsic validation for the Corps' analysis that follows.

2. STATE OF WASHINGTON SHORELINE MANAGEMENT PROGRAM

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved state Coastal Zone Management (CZM) Programs. The Shoreline Management Act of 1972 (RCW 90.58) is the core of authority of Washington's CZM Program. Primary responsibility for the implementation of the SMA is assigned to local government. City of Tukwila, in which the proposed levee rehabilitation projects are located, fulfilled this requirement with the Shoreline Master Program (SMP) and the Shoreline Overlay District within the Comprehensive Plan for the City of Tukwila.

The proposed repair footprints are located along the Green River which is designated Urban Environment and classified as a "Shoreline of Statewide Significance." Within the Shoreline Overlay District the repair sites are located within River Environment and Low-Impact Environment.

3. CITY OF TUKWILA SHORELINE MANAGEMENT PROGRAM

Applicable portions of the City of Tukwila SMP are presented below with the Corps consistency indicated in *bold italics*.

18.44.110 General Shoreline Regulations

All uses within the Shoreline Overlay District must conform to the following general regulations:

1. The use is in conformance with the regulations of the underlying zone district;

Consistent. The levee rehabilitations are in the same alignment and will provide the same use as the existing levees and therefore conform to the zoning requirements - Tukwila Urban Center.

2. The use does not conflict with the goals and policies of the shoreline master program or the provisions of the Shoreline Act and shoreline regulations;

Consistent. The levee rehabilitations are replacing existing levees which do not conflict with the shoreline regulations.

3. No structures or accessory facilities shall be located over the river unless such structure protects or promotes the public interest;

Consistent. No structures will be built over the river.

4. There shall be no disruption of existing trees or vegetation within the river environment unless necessary for public safety or flood control, or if allowed as a part of an approved shoreline substantial development permit;

Consistent. Only vegetation in the construction footprint will be removed. Native trees and shrubs will be replanted on the levee face and mid-slope benches.

5. No effluent shall be discharged into the Green River which exceeds the water quality classification as established by the State for the adjacent portion of the river;

Consistent. There will be no discharges into the Green River. All work will be accomplished without exceeding water quality standards.

6. All State and federal water quality regulations shall be strictly complied with;

Consistent. The Corps will comply with all state and federal water quality regulations. Water quality will be protected to the extent practicable though the development of a Stormwater Pollution Prevention Plan and utilization of Best Management Practices as described in the SWPPP.

7. Wildlife habitat in and along the river should be protected;

Consistent. Wildlife habitat in this stretch of the river is poor and may be improved after the project as native vegetation will be planted to replace the invasive species currently present onsite.

8. All perimeters of landfills or other land forms susceptible to erosion shall be provided with vegetation, retaining walls or other satisfactory mechanisms for erosion prevention;

Consistent. All areas subject to erosion will be protected with riprap or vegetation. The levee rehabilitations are being constructed to minimize future erosion through this reach of the Green River.

9. All necessary permits shall be obtained from federal, State, County or municipal agencies;

Consistent. The Corps will obtain all necessary permits required for a federal construction project.

10. Dredging for purposes other than for navigational improvements or flood control is prohibited;

Consistent. No dredging will take place during this action.

11. Mining is prohibited along the river shoreline;

Consistent. No mining will take place during this action.

12. Solid waste disposal is prohibited along the river shoreline;

Consistent. The Corps will use only designated and permitted disposal sites for any waste material associated with this project.

13. No property will be acquired for public use without dedication by or just compensation to the owner;

Consistent. All property required for the project was obtained with just compensation to owners as necessary.

14. Landfilling is prohibited within the river channel unless such landfill is determined by the Planning Commission to protect or promote the public interest.

Consistent. No landfilling within the river channel will take place during this project. The levee is being built in the existing footprint on the riverward side.

15. Notwithstanding any provisions of this Code to the contrary, removal of any cottonwood tree within the river environment or the low-impact environment, which tree is 12 inches or greater in diameter as measured 4.5 feet above grade, shall be subject to the requirements of TMC Chapter 18.54, Tree Regulations.

Consistent. No large trees will be removed during the course of the levee rehabilitation projects.

18.44.130 Specific Shoreline Regulations – River Environment

A. The river environment shall consist of a 40-foot wide management zone as measured on a horizontal plane from the mean high water mark, and shall contain no uses or structures other than the following:

1. Public and/or private footpaths or trails;
2. Recreation facilities such as benches, tables, viewpoints, and picnic shelters, provided no such facility shall exceed 15 feet in height;
3. Support facilities for pollution control such as runoff ponds and filter systems, provided they are at or below grade;
4. Information and direction signs conforming to the underlying zoning district;
5. Diking for bank stabilization, erosion control, and flood control purposes;
6. Bridges;
7. Fire lanes and dike maintenance roads;
8. Plaza connectors between buildings and dikes, not exceeding the height of the dike, are permitted for the purpose of providing and enhancing pedestrian access along the river and for landscaping purposes.

Consistent. No structures will be built within 40 feet of the ordinary high water mark except the levee prism and mid-slope planting bench. No structures will exceed 15 feet in height.

B. River environment uses shall conform to the following standards:

1. Access roads, parking or storage areas, the closest edge of which shall be a minimum of 40 feet from the mean high water mark;
2. The centerline of railroad lead tracks shall be located no closer than 40 feet from the mean high water mark, except where the railroad lead track is bridging the river;
3. Where the riverbank has been reconstructed, it shall be landscaped with suitable plant material consistent with flood control measures to include large hardy shade or fruit trees, at maximum of 30 feet on center, such as maple, alder, poplar, cottonwood, sycamore, willow,

oak, beech, walnut, ash and birch, or other species approved by the Director. In addition, at least one of the following landscape materials shall be used:

- a. Live groundcover at a maximum of 18 inches on center,
 - b. Natural grass,
 - c. Addition to the existing natural vegetation where appropriate;
4. Facilities such as pumps, pipes, etc., shall be suitably screened with hardy plant material;
 5. Utility easements where necessary shall be landscaped with live groundcover or natural grass cover.

Consistent. The reconstructed levee will include mid-slope benches which will be planted with native riparian trees and shrubs at an appropriate spacing to ensure sufficient shading and habitat value after establishment while allowing for initial mortality. All soil areas will be hydroseeded with native grass seed. These mid-slope benches will also serve as temporary maintenance roads as needed for repair or inspection of the levee structure.

18.44.140 Specific Use Regulations - Low-Impact Environment

A. The low-impact environment shall contain no uses other than those allowed in the river environment and the following:

1. Structures not to exceed 35 feet in height, excluding utility towers;
2. Parking/loading and storage facilities adequately screened or landscaped;
3. Railroad lead and spur trackage or public or private roads;
4. Utilities, including towers;
5. Signs not to exceed regulations of the underlying zoning district's sign code.

Consistent. The levee rehabilitation projects construction within the Low-Impact Environment will contain only access roads on the levee crest, backslope levee prism or retaining walls. No other structures will be built.

B. Low-impact environment uses shall conform to the following standards:

1. Structures shall be sited and appropriately landscaped in accordance with underlying zoning regulations;
2. Access roads shall be located no closer than ten feet to buildings, spur tracks or parking/loading and storage facilities, and the effective setback area shall be suitably landscaped. This shall not prohibit ingress and egress points between an access road and the described facilities;
3. Parking, loading, and storage facilities shall be appropriately screened from the river with:
 - a. A solid evergreen screen of a minimum six-foot height, or
 - b. Decorative fence six feet high. (Note: Chain link fence shall be slatted and planted with ivy or other trailing vine except where a safety hazard may exist.), or
 - c. Large hardy shade or fruit trees such as maple, alder, poplar, cottonwood, sycamore, willow, oak, beech, walnut, ash, birch or other species approved by the Director at a maximum of 30 feet on center, or
 - d. Earth berms at a minimum of four feet high, suitably planted with live groundcover or natural grass;
4. Railroad lead trackage shall be no closer than 15 feet to parking/loading and storage facilities, and shall be suitably landscaped.

Consistent. The levee backslopes and access roads will be hydroseeded with native grass where bare soil exists. Sufficient space will be maintained for ingress/egress. No parking, loading, storage facilities or railroad trackage will be constructed during this action. .

4. STATEMENT OF CONSISTENCY

Based on the above evaluation, the Corps has determined that the proposed rehabilitation activities comply with the policies, general conditions, and activities as specified in the City of Tukwila Shoreline Master Program adopted in 1982. The proposed action is thus considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the City of Tukwila Shoreline Master Program.

APPENDIX B - Section 404(b)(1) Analysis

**Armor Rock and LWD Anchor Placement
2008 Green River Levee Rehabilitation Projects.
Galli's, Horseshoe Bend Site #1 and Dykstra Levees.
King County, Washington**

Section 404 of the Clean Water Act

The purpose of this document is to record the Corps' evaluation and findings regarding this project pursuant to Section 404 of the Clean Water Act (CWA).

This document covers the placement of armor rock within the Green River near the Cities of Auburn, and Kent in order to establish levee toe protection (Galli's Levee) and to anchor large woody debris (LWD) structures (Galli's, Dykstra and Horseshoe Bend Site #1). Armor rock placement for these two purposes are considered essential design elements of the 2008 levee rehabilitation program which is intended to repair levees damaged from past flooding. These sites represent 3 of 10 proposed projects and are the only ones that require fill within waters of the United States. All 10 proposed projects (see Table 1) are located in King County, Washington.

This document addresses the substantive compliance issues of the Clean Water Act 404(b)(1) Guidelines [40 CFR §230.12(a)].

1. BACKGROUND

1.1. Project Location

The proposed repairs are located along the lower Green River between river miles 12.6 and 30.8. The repairs will take place on six projects at 10 sites totaling about 11,000 linear feet. The six projects are located in or near the cities of Auburn, Kent and Tukwila, King County, Washington. All of the levees proposed for repair are eligible for repair under the PL84-99 program.

Table 1. Locations of Green River Projects

Site	Length of Repair	Location of Repair	River Bank	Environmental Compliance
Tukwila #3	800 ft	RM 14.6 to RM 14.8	Left bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Tukwila #5	1100 ft	RM 15.0 to RM 15.3	Left bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Horseshoe Bend #1	800 ft	RM 25.8 to RM 26.1	Right bank	Not exempt from 404 of CWA, 401 Certification required from Ecology
Horseshoe Bend #2	150 ft	RM 25.3	Right bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Horseshoe Bend #3	100 ft	RM 25.2	Right bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Horseshoe Bend #4	1000 ft	RM 24.9 to RM 25.1	Right bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Kent Shops/Narita	3600 ft	RM 21.0 to RM 22.0	Right bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Meyer's Golf	1600 ft	RM 22.0 to RM 22.5	Right bank	Exempt per Section 404(f)(1)(B) of CWA, 401 Certification not required
Galli's	1100 ft	RM 30.5 to RM 30.8	Left bank	Not exempt from 404 of CWA, 401 Certification required from Ecology
Dykstra	600 ft	RM 30.8 to RM 31.5	Left bank	Not exempt from 404 of CWA, 401 Certification required from Ecology

1.2. Project Authority

The proposed levee repairs are authorized by Public Law 84-99 (33 U.S.C. § 701n). Corps rehabilitation and restoration work under this authority is limited to flood control works damaged or destroyed by flood. The statute authorized rehabilitation to the condition and level of protection exhibited by the flood control work prior to the damaging event.

1.3. Purpose and Need

The purpose of the levee rehabilitation projects is to provide protection to the communities and infrastructure from potential flood damage. The levee sites along the lower Green River sustained significant damage during a flood event in November 2006. In December 2006, the Corps received a request for assistance to repair the levees from King County Flood Control Zone District and the City of Tukwila.

The King County Flood Hazard Management Plan (Plan) was adopted in 2006. The Plan addresses and provides guidance for long-term flood reduction and management for all of King County. The goals of the Plan are to reduce the risk of future flood hazard, reduce long-term associated costs of maintaining the flood reduction infrastructure, and avoid or minimize the environmental impacts of flood management. (KC Flood Plan, Sec. 1.2) The levee repairs that are the subject of this document used this Plan as a guideline for designing the levees reconstructions, and in determining what was feasible and structurally appropriate.

2. Availability of Less Environmentally Damaging Practicable Alternatives to Meet the Project Purpose.

2.1. Alternative 1- No Action

The No-Action Alternative includes no-action to restore proper levels of flood protection and reliability. This alternative would not result in the establishment of willow plantings and LWD features currently absent from the sites. This alternative would also avoid the need to install levee toe protection on the Galli's levee and the LWD related anchor rock at the Galli's, Dykstra and Horseshoe Bend Site.

2.2. The Non-Structural Alternative

The Non-Structural Alternative would relocate all existing residences, commercial and retail structures, utilities, and public facilities. Relocation of infrastructure prior to the coming flood season is impractical, even if willing sellers were identified. Because the costs associated with flood proofing or relocating the structures in the potential inundation area would significantly exceed the cost of repairing the levee, the non-structural alternative was not selected.

2.3. The Repair to Pre-Flood Condition Alternative

The Repair to Pre-Flood Condition Alternative would be to restore the levees to pre-flood conditions. Damaged riprap would be replaced, willow lifts would be planted at ordinary high water (OHW) and the levee slopes hydroseeded. This alternative is the preferred alternative for Horseshoe Bend #2 and #3. For the Dykstra and Galli's sites, the preferred alternative includes a 2H:1V riprap slope with willow lifts planted at OHW, and LWD placed at the levee toe in limited areas. Bioengineered design elements such as vegetated geogrids were rejected because though they help protect the slope from surface erosion, they do not prevent rotational slope failures or draw down failures which are the primary slope failure mechanisms on the Green River.

Galli's Levee

The repair would require grading the existing bank to a 2H:1V slope. To achieve this slope, the levee footprint will move riverward between 3 to 15 feet along the reach of the repair. The estimated total impact to the aquatic habitat is 3000 ft². A launchable toe will be constructed using Class IV riprap to prevent future scour. The slope will be armored with Class IV riprap underlain by filter spalls. The armored slope will extend to approximately 8 feet above OHW line and will be planted with 2 willow lifts. Above 8 ft OHW, the levee prism will continue at a 2H:1V slope and be hydro-seeded. LWD will be placed along a total of approximately 450 ft of the levee at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone.

Dykstra Levee

The repair would require re-establishing a weighted toe for approximately 600 linear feet. The existing bank will be graded to a 2H:1V slope. A toe will be constructed using Class III riprap to prevent future scour. The slope will be armored with Class III riprap underlain by filter spalls. The armored slope will extend to approximately 8 feet above OHW line and will be planted with 2 willow lifts. Above the armoring the levee prism will continue at a 2H:1V slope and be hydro-seeded. LWD will be placed along the downstream 200 ft at the riverward edge of the riprap toe

and anchored using 5 foot diameter quarry stone. Additional LWD will be placed on a mid-channel island across from the construction site.

2.4. The Layback the Levee Alternative

The Layback the Levee Alternative includes moving the landward footprint of the levee back from the river; the toe location would remain the same. The general design includes creating a mid-slope bench planted with native trees and shrubs, reducing the overall slope of the riverward face of the levee to 2V:1H, and adding willows and LWD. This is the preferred alternative for Horseshoe Bend #1.

Horseshoe Bend Site #1

The recommended alternative for the above site consists of removing damaged material and laying back the existing levee to a 2H: 1V slope. A launchable toe will be constructed using Class IV riprap to prevent future scour and a 3 foot blanket of Class IV riprap will be placed for armor rock. This slope will be filled with earthen material to achieve a 2H:1V slope, creating a 23 foot planting bench. The mid-slope bench will be hydroseeded to prevent erosion after construction and planted with native trees and shrubs in spring 2009. The lower slope will be planted with 2 willow lifts above the OHW elevation. The soil lifts containing the willows will extend to the spall layer allowing the willow roots to contact the native soil. Above the bench the levee prism will continue at a 2H:1V slope, underlain with 1 foot blanket of quarry spalls and hydro-seeded. LWD will be placed along the downstream 230 ft, at approximately 20 foot intervals, at the riverward edge of the riprap toe and anchored using 5 foot diameter quarry stone

Findings. The Corps rejected the No Action and Non-Structural Alternatives for all sites because they would either not meet the project objectives, were not cost effective, and/or considered outside the scope of the PL-84-99 authority. At Dykstra and Galli's, the Layback the Levee Alternative is not feasible since there is insufficient room between the landward levee toe and existing structures to accommodate a layback design. At Horseshoe Bend #1, the Repair to Pre-Flood Condition Alternative is not the least environmentally damaging practicable alternative since the Layback the Levee Alternative is logistically feasible and would provide greater environmental benefits. The Repair to Pre-Flood Condition Alternative (Dykstra and Galli's) and Layback the Levee Alternative (Horseshoe Bend #1) provided the best assurance of making positive improvements in both flood protection and environmental conditions given the constraints at each site while representing minimal environmental impact.

3. Significant Degradation, Either Individually or Cumulatively, To the Aquatic Environment

3.1. Impacts on Ecosystem Function.

The Corps has assessed potential impacts from the construction and determined that they will be highly localized in nature, short in duration, and minor. These short-term impacts will be reduced to the extent practicable or avoided through implementation of timing restrictions and best management practices (BMPs). The armor rock placed as part of the proposed projects is clean and not anticipated to alter downstream substrate compositions or suitability for aquatic resources. The work does not represent an increase in sediment supply to the Green River as this material is specifically designed to resist movement at flood flows.

At the Galli's site, the new levee prism will extend 3-15 feet into the river channel to ensure a slope of 2H:1V that is required under Corps engineering guidance. This encroachment of levee into the river will permanently alter aquatic habitat in this reach. The placement of large riprap into the channel will change the flow and deposition patterns of the river. While riprap is too large to provide for salmonid spawning substrate, the large rocks may create areas of slow water or pools. LWD will be placed at the toe of the levee to provide further habitat enhancement. The river encroachment will be further mitigated by habitat improvements as mentioned above at other repairs sites downstream of Galli's.

As a whole, impacts of the proposed work on ecosystem function will not be significant either individually or cumulatively. The placement of LWD at the Dykstra and Horseshoe Bend Site #1 will ensure improved juvenile rearing and adult holding habitat.

Findings. The Corps has determined that there would be no significant adverse impacts to aquatic ecosystem functions.

4. Appropriate and Practicable Measures To Minimize Potential Harm to the Aquatic Ecosystem

4.1. Impact Avoidance Measures.

Construction areas, material stockpiles, vehicle turnarounds and other disturbances will be sited to avoid sensitive areas. Work will be kept to existing disturbed areas and the extent limited only to the amount needed to ensure flood protection. Work is being conducted within the in-water work window at a time when use by sensitive juvenile salmonids is lowest. The requirement of additional fill for all sites other than the Galli's levee has been avoided through extensive design efforts.

4.2. Impact Minimization Measures.

Turbidity resulting from the movement of gravels will be monitored on site by a qualified biologist to avoid excessive releases and adverse affects to downstream salmonids. A bulldozer will be used to maximize earth moving efficiency so that materials lost downstream are minor. The armor rock associated with LWD placement is required to ensure stability of these environmental features and have been minimized as much as practicable.

4.3. Compensatory Mitigation Measures.

Habitat impacts have been addressed in the design of the project including plantings (including plantings of woody vegetation along 8800 linear feet downstream of Galli's levee), placement of LWD, and benches. Over time and assuming bench stability, this addition of riparian vegetation to the lower Green River corridor would greatly improve habitat, lower water temperatures due to increased shading of the river, and create additional organic input to the river. There will be a temporal lag of 3-10 years while the vegetation is established. All necessary measures (i.e. irrigation and monitoring) will be taken to ensure planting success.

Findings. The Corps has determined that all appropriate and practicable measures have been taken to avoid and minimize potential harm.

5. Other Factors in the Public Interest.

5.1. Fish and Wildlife.

The Corps has coordinated with Tribal, State and Federal natural resource entities to assure careful consideration of fish and wildlife resources. The Corps has coordinated with agencies to ensure understanding and input on the preferred alternative. Consultations with the USFWS and NMFS have been initiated and will continue as each proposed project is implemented. Based on initial requirements and recommendations by the Services (NMFS “2006 King County Flood Hazard Management Plan-Green River Projects, Biological Assessment for Puget Sound Chinook Salmon, Coho Salmon Bull Trout and Steelhead Trout” dated December 2007), the proposed projects were designed to be consistent with NMFS recommendations to the extent practicable and will be subject of Section 7 consultation pursuant to for consistency with the Endangered Species Act.

5.2. Water Quality.

Possible sources of water quality degradation include releases of turbid water and operation of mechanical equipment in and around the waters edge. Monitoring of turbidity during in-water rock placement in and near the waters edge will be conducted to provide means for turbidity control. Primary control factors for turbidity will be the speed of placement and the volume of armor rock placed.

5.3. Historical and Cultural Resources

The Corps has determined that the Preferred Alternatives are an undertaking of the type that could affect historic properties and must comply with the requirements of Section 106, as amended through 2004, of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA) (16 USC 470). A cultural resource report was prepared as part of the Section 106 of the National Historic Preservation Act compliance process. The present designs do not include any ground disturbing activities outside the levee footprints. If any levee repair designs change in such a way as to include disturbance to previously undisturbed native soils, monitoring by a Corps archaeologist will occur during certain phases of construction, and the construction contract would contain a stop work clause to notify the appropriate officials if evidence of cultural or human artifacts were unearthed. A letter was received from the State Historic Preservation Officer (SHPO) dated 11 June 2008 concurring with the Corps finding of No Historic Properties Affected.

5.4. Environmental Benefits.

The proposed project would have several environmental benefits. The proposed project represents an opportunity to improve existing instream fish habitat features, channel capacity and riparian vegetation over the existing condition. The work represents the best management principals of levee rehabilitation available given the site specific constraints and requirements for reliable flood protection.

Findings. The Corps finds that this project is within the public’s interest and complies with the substantive elements of Section 404 of the Clean Water Act.

6. 404(b)(1) Evaluation [40CFR§230]- Potential Impacts on Physical and Chemical Characteristics (Subpart C)

6.1. Substrate [230.20].

The proposed project will utilize clean angular rock from an established quarry. The rock is intended to resist mobilization during high flows and is not likely to alter substrate quality outside the footprint of the project site. Alteration of substrate will occur at the Galli's levee under the location of the new toe rock. The size and character of the proposed rock has been engineered to ensure stability and minimize the amount of fill required.

6.2. Suspended Particulate/Turbidity [230.21].

Any increases in turbidity resulting from the proposed action would be a result of construction activities and contact of the armor rock with unconsolidated sands and gravels at the waters edge. Any sediment plumes attributable to the resultant material would be temporary, localized, and equivalent to those created by natural sediment transport processes. Water quality monitoring during construction will be implemented to ensure adequate water quality protections.

6.3. Water Quality [230.22].

No significant water quality effects are anticipated (see 5.2 above).

6.4. Current Patterns and Water Circulation [230.23].

No significant adverse impacts to current patterns and water circulation are anticipated. The placement of LWD in the toe of the proposed project is expected to create localized microcurrents that benefit accumulation of detritus and serve as resting habitat for juvenile salmonids. The levee design at the Galli's levee has been engineered to ensure channel capacity is not negatively affected by the placement of the armor rock fill.

6.5. Normal Water Fluctuations [230.24].

No adverse affects anticipated.

6.6. Salinity Gradients [230.25].

No adverse affects anticipated.

7. 404(b)(1) Evaluation [40 CFR §230]- Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)

7.1. Threatened and Endangered Species [230.30].

The Services have provided recommendations and criteria for conducting levee rehabilitation projects such as the ones proposed. While Section 7 consultations have not been completed for the proposed actions, both Services have been contacted and have offered to continue working with the Corps to ensure that impacts to ESA listed species are considered and minimized. Assuming the proposed projects are built within the approved work window, constructed according to design, and the vegetation becomes established over time, it is expected that the proposed projects at the Horseshoe Bend and Dykstra sites are *not likely to adversely affect* listed species and designated critical habitat.

Below is a table detailing the results of the preliminary effects analysis of the federal action on listed species at the above sites:

Species	Effect Determination	Critical Habitat Determination
Puget Sound Chinook salmon	Not likely to adversely affect	Not likely to adversely affect
Puget Sound steelhead trout	Not likely to adversely affect	Critical habitat is not yet determined
Bull Trout	Not likely to adversely affect	Not likely to adversely affect

The proposed construction at the Galli's site includes roughly 3000 ft² of river encroachment. This would result in a permanent loss of aquatic habitat area. Since the current design includes levee encroachment into the river channel, the construction at the Galli's site is expected to **likely to adversely affect** listed species and is **likely to adversely affect** critical habitat.

Below is a table detailing the results of the preliminary effects analysis of the federal action on listed species at the Galli's site:

Species	Effect Determination	Critical Habitat Determination
Puget Sound Chinook salmon	Likely to adversely affect	Likely to adversely affect
Puget Sound steelhead trout	Likely to adversely affect	Critical habitat is not yet determined
Bull Trout	Likely to adversely affect	Likely to adversely affect

The incorporation of plantings on the mid-slop benches, installation of willow/dogwood lifts, LWD placement at the toe of the levees, and the decrease in levee slope created by the proposed laybacks will provide habitat benefits and are expected to help substantially to offset any adverse effects caused by strengthening the levees with additional rock and loss of aquatic area at the Galli's site. Discussions with both Services will continue and recommendations made during construction will be incorporated.

7.2. Aquatic Food Web [230.31].

If the levees are repaired as proposed, LWD and riparian vegetation will be reintroduced into the lower Green River corridor at the repair sites where possible. While the repair of the levees will perpetuate the constraint of the river, the placement of LWD into the channel may create areas of slower water flow allowing for the deposition of sediment/gravels and pool development. Additionally, LWD can provide refuge and cover for juvenile fish during periods of high flow. The planting and eventual establishment of riparian vegetation should provide increased nutrient input into the river from leaf/insect drop and shade to the edges of the channel.

7.3. Wildlife [230.32].

If the levee rehabilitations are constructed as proposed, native vegetation will replace invasive species on the levee prisms. Willow/dogwood lifts planted on the levee face and riparian trees

and shrubs planted on the mid-slope benches may, after establishment, greatly improve wildlife habitat at the repair sites. The current condition of invasive vegetation leads to primary use of the sites by generalist and non-native wildlife species. The reintroduction of native riparian vegetation to the levees should provide appropriate habitat to support small, native mammal and bird species increasing biodiversity in the lower Green River corridor.

A short-term, but immediate impact to wildlife is expected during construction. Excavation, transportation, and placement of embankment materials would require the use of heavy construction equipment whose presence and noise may temporarily displace some species at the sites and borrow pits. It is possible that tree removal could result in the loss of nestling birds such as woodpeckers, robins, chickadees, nuthatches, flycatchers, and warblers. At the sites, which are largely already disturbed areas, many wildlife species are relatively tolerant of humans and their activities.

8. 404(b)(1) Evaluation [40 CFR §230]- Potential Impacts to Special Aquatic Sites (Subpart E)

8.1. Sanctuaries and Refuges [230.40].

The proposed project will not impact any designated sanctuary or refuge area.

8.2. Wetlands [230.41].

The banks of the Green River at the proposed project sites are vegetated and characterized by mixed unsorted soils and large rock. No wetlands will be altered as a result of this action.

8.3. Mudflats [230.42].

The proposed project will not alter or discharge material in or near mudflat areas. The project will not alter the inundation patterns of mudflats.

8.4. Vegetated Shallows [230.43].

No adverse affects are anticipated

8.5. Coral Reefs [230.44].

No adverse affects are anticipated.

8.6. Riffle and Pool Complexes [230.45].

The three projects subject to this 404(b)(1) evaluation are located in river reaches previously converted from their natural bank condition to earth and rock levees with homogeneous slope characteristics. Water surface characteristics at each of the three projects are correspondingly similar and characterized under mean average flow as moderate to slow moving reaches with water depths of between 3 and 8 feet. Bottom contours at the proposed sites are generally uniform consistent with glide type habitats rather than channel wide pool/riffle complexes. However, pool/riffle complexes are not necessarily precluded from occurring at a smaller scale in association with fallen logs, LWD, outside bends or rock sills. At the Horseshoe Bend Site #1 and Dykstra levees, the limited and sporadic armor rock placements associated with LWD are highly unlikely to negatively affect pool riffle complexes. The Galli's project design will result in the loss of approximately 3000 ft² of aquatic area along about 400 LF of the levee. The

aquatic area to be filled is currently river edge habitat that consists primarily of riprap and a large pool on the outside of a river bend. The riprap edge habitat will be replaced by construction of the new levee. In the short term, there will likely be some loss in area of the existing pool. With time a new riprap edge habitat may develop forming a similar or possibly deeper pool. Overall, no notable changes to existing riffle/pool complexes will occur.

9. 404(b)(1) Evaluation [40 CFR §230]- Potential Effects on Human Use Characteristics (Subpart F)

9.1. Municipal and Private Water Supplies [230.50].

None of the three proposed projects have the potential to affect municipal or private water supplies.

9.2. Recreational and Commercial Fisheries [230.51].

Work area designations within the construction zones of Galli's, Dykstra and Horseshoe Bend Site #1 may preclude access by recreational fishermen for safety reasons. Areas upstream and downstream of the Green River will remain accessible by bank fisherman should a salmon or trout fishery be established during construction. Long term fishing access to each of the three sites will be retained following construction.

9.3. Water Related Recreation [230.52].

No water related recreation takes place at the project location.

9.4. Aesthetics [230.53].

The projects will not result in damage to aesthetically pleasing features of the aquatic landscape.

9.5. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves [230.54].

There are no Federal preserves in or near the vicinity of the project area.

10. 404(b)(1) Evaluation [40 CFR §230]- Evaluation and Testing (Subpart G)

10.1. General Evaluation of Dredged or Fill Material [230.60].

The fill material will be composed of clean coarse armor rock obtained from an established and permitted source.

10.2. Chemical, Biological, and Physical Evaluation and Testing [230.61].

Armor rocks used at each of the three sites under analysis will be obtained from an established source. There is reasonable assurance that the proposed discharge material is not a carrier of contaminants. Therefore, the required determinations pertaining to the presence and effects of contaminants can be made without testing.

11. 404(b)(1) Evaluation [40 CFR §230]- Action to Minimize Adverse Effects (Subpart H)

11.1. Actions Concerning the Location of the Discharge [230.70].

The effects of the discharge will be minimized by limiting discharge volume to areas that require repairs to provide the pre-flood level of protection. The volume of armor rock for each of the three sites has been minimized to what is necessary to ballast the LWD and to establish an armored toe at the Galli's site. The following table summarizes all of the excavation and fill below the OHW mark for these three projects.

Site	Amount of Excavation below OHW (cubic yards)	Volume of Fill below OHW (cubic yards)
Galli's	2,622	3,119
Dykstra	1,230	1,374
Horseshoe Bend –Site 1	4,214	4,780

11.2. Actions Concerning the Material to be Discharged [230.71].

All materials being used for the proposed action are clean angular armor rock from established borrow sources. The volume of rock being placed for installation of the toe rock at the Galli's levee and required to anchor LWD has been designed to be the minimal necessary to ensure meeting project objectives. Fines associated with preparatory earthwork on the levee or attached to the armor rock may result in minor turbidity during construction. This turbidity will be consistent with other rock placements throughout Western Washington and unlikely to result in acute or long-term impacts to aquatic resources. By using an established borrow source, the potential for introducing excessive fines or contaminants is minimized.

11.3. Actions Controlling the Material after Discharge [230.72].

There are no feasible means of controlling fines at the time of discharge. River flows are too high to install erosion control curtains.

11.4. Actions Affecting the Method of Dispersion [230.73].

Dispersion of material will be minimized through appropriate sizing of the proposed projects and by using natural material. No portion of the proposed project is expected to disperse from its original location although some limited amount of rock may shift and be washed downstream through time, mostly at the Galli's site where the rock is not associated with LWD. Dispersion of fines will be minimized at the time of construction by monitoring the speed and volume of rock placement. Material will be dispersed using a large sized excavator to minimize the time required to conduct the work and allow for improved placement. Sediment releases will be correlated with the amount of armor rock in contact with the river flow.

11.5. Actions Related to Technology [270.74].

Appropriate machinery and methods of transport of the material for removal and discharge will be employed. All machinery will be properly maintained and operated.

11.6. Actions Affecting Plant and Animal Populations [270.75].

Construction features will be located to minimize impacts to plant and animal populations.

11.7. Actions Affecting Human Use [230.76].

The discharge will not result in damage to aesthetically pleasing features of the aquatic landscape. The discharge will not increase incompatible human activity in remote fish and wildlife areas. The area is not directly used for recreation. Human use is generally limited to trail use and passive recreation.

11.8. Other Actions [230.77].

Not applicable.

12. General Policies for Evaluating Permit Applications

12.1. Public Interest Review.

The Corps finds these actions to be in compliance with the 404(b)(1) guidelines and not contrary to the public interest.

12.2. Effects on Wetlands.

No wetlands will be altered by the proposed project.

12.3. Fish and Wildlife.

The project has been coordinated through Washington Department of Fish and Wildlife, affected tribes and other regulatory agencies to ensure consideration of fish and wildlife concerns.

12.4. Water Quality.

The Corps has requested Section 401 Water Quality Certification from the Department of Ecology. The Corps will monitor water quality at the time of construction to ensure impacts are minimized.

12.5. Historic, Cultural, Scenic, and Recreational Values.

No wild and scenic rivers, National Landmarks, National Rivers, National Wilderness Areas, National Seashores, National Recreation Areas, National Lakeshores, National Parks, National Monuments, or estuarine and marine sanctuaries are in or near the project and none will be adversely impacted by the proposed project.

12.6. Effects on Limits of the Territorial Sea.

Not applicable.

12.7. Consideration of Property Ownership.

Existing easements are in place for construction operations and work on adjacent gravel bars. Real estate at each of the three sites is under public ownership and generally controlled by local sponsors of the levee rehabilitation.

12.8. Activities Affecting Coastal Zones.

The Coastal Zone Management Act (CZMA) of 1972 as amended requires Federal agencies to carry out their activities in a manner, which is consistent to the maximum extent practicable with the enforceable policies of the approved state program. The Corps determined the proposed work is consistent to the maximum extent practicable with the enforceable State of Washington Shoreline Management Program. The work at Horseshoe Bend #1, Galli's and Dykstra will extend beyond the original footprint of the levee but also will not cause substantial adverse effects to the shore resources or the environment. After review of the local Shoreline Master Programs for the respective jurisdictions - City of Kent for Horseshoe Bend and City of Auburn for the Galli's and Dykstra projects - the Corps believes the proposed work is consistent to the maximum extent practicable with the City of Kent and City of Auburn Shoreline Master Programs. See Appendix A for detailed analysis of consistency with the Coastal Zone Management Act. The Corps has submitted the consistency statements for the three projects to the Department of Ecology for review and concurrence.

12.9. Activities in Marine Sanctuaries.

Not applicable.

12.10. Safety of Impoundment Structures.

Not applicable.

12.11. Floodplain Management.

No significant impacts anticipated. The level of flood protection following the proposed projects will not be the same as under pre-flood conditions.

12.12. Water Supply and Conservation.

No adverse effects to water supply or conservation will occur as a result of the proposed work.

12.13. Energy Conservation and Development.

No adverse effects to energy conservation or development will occur as a result of the proposed work.

12.14. Navigation.

No adverse effects to navigation will occur as a result of the proposed project. The Green River in the affected reaches does not support commercial navigation.

12.15. Environmental Benefits.

The proposed project would have several environmental benefits. The proposed project represents an opportunity to improve existing instream fish habitat features, channel capacity and riparian vegetation over the existing condition. The work represents the best management principals of levee rehabilitation available given the site specific constraints and requirements for reliable flood protection.

12.16. Economics.

None anticipated.

12.17. Mitigation.

This work contains several environmental features intended to minimize environmental impacts and improve aquatic and riparian conditions over the baseline condition. LWD, vegetative plantings, and layback benches are all intended to improve ecosystem function at the project sites.

13. Conclusions.

Based on the analyses presented in the above 404(b)(1) Evaluation and General Policies for the Evaluation of Permit Applications analysis, the Corps finds that this project complies with the substantive elements of Section 404 of the Clean Water Act.

APPENDIX C - Finding of No Significant Impact



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Environmental Resources Section

2008 Green River Levee Rehabilitation Projects
King County, Washington

FINDING OF NO SIGNIFICANT IMPACT

1. Background. The U.S. Army Corps of Engineers (Corps), in cooperation with the City of Tukwila and King County Flood Control Zone District, Washington has initiated plans to rehabilitate flood-damaged levees at six projects, Tukwila, Horseshoe Bend, Kent Shops/Narita, Meyers Golf, Dykstra and Galli's, with 10 sites (Tukwila #3 and #5; Horseshoe Bend #s1-4; Kent Shops/Narita; Meyers Golf; Dykstra and Galli's) along the lower Green River.

In November 2006 flow rates of 12,200 cfs were recorded in the Green River near Auburn, Washington. During this event, these 6 projects (10 sites) along the Green River levee system from river mile 14.6 to 30.8, totaling about 11,000 linear feet, were damaged. Saturated soils during high peak flow resulted in toe scour, sink holes and rotational failure in some instances. The damaged levees are constructed of earthen material and armored with riprap on the riverward side. All damaged levees are in highly urbanized areas of King County and protect significant infrastructure and/or life. Prior to the flood, the Green River levees offered greater than 100-year level of protection (LOP). In the current state, the 10 damaged sites offer between 5 and 15 year LOP. Most of the damaged levees have a 2H:1V (horizontal to vertical) (or steeper) slope on the riverward side.

2. Purpose and Need. The purpose of these actions is to repair levees along the Green River that were recently damaged during the November 2006 flooding, and restoring them to provide 100-year flood protection. There is a high potential that without the repairs the areas in question could fail in a much smaller flood causing considerable harm to human health and safety as well as property damage.

3. Proposed Action. The proposed action is to repair damaged levees at 10 sites totaling about 11,500 linear feet. The sites are located in or near the cities of Auburn, Kent and Tukwila, King County, Washington, along the lower Green River between river miles 14.6 and 30.8. Site location details are provided in Table 1.

Table 1:

Site Name	River Mile	River Bank	Location (Section, Township, Range)	Length of repair
Tukwila #3	RM 14.6 to RM 14.8	Left bank	T23N, R4E, Sec 35	1100 ft
Tukwila #5	RM 15.0 to RM 15.3	Left bank	T23N, R4E, Sec 35	800 ft
Horseshoe Bend #1	RM 25.8 to RM 26.1	Right bank	T22N, R5E, Sec 30	950 ft
Horseshoe Bend #2	RM 25.3	Right bank	T22N, R5E, Sec 30	160 ft
Horseshoe Bend #3	RM 25.2	Right bank	T22N, R4E, Sec 25	100 ft
Horseshoe Bend #4	RM 24.9 to RM 25.1	Right bank	T22N, R4E, Sec 25	1000 ft
Kent Shops/Narita	RM 21.0 to RM 22.0	Right bank	T22N, R4E, Sec 23	3800 ft
Meyer's Golf	RM 22.0 to RM 22.5	Right bank	T22N, R4E, Sec 23	1700 ft
Galli's	RM 30.5 to RM 30.8	Left bank	T21N, R5E, Sec 6 ,7	1100 ft
Dykstra	RM 30.8 to RM 31.5	Left bank	T21N, R5E, Sec 8	600 ft

The preferred alternative for the following six sites: Tukwila 205 #3 and #5, Horseshoe Bend #1 and #4, Kent Shops/Narita, and Meyer's Golf is called the layback alternative. The layback alternative consists of moving the footprint of the levee landward back from the river; the toe location would remain the same. The general design includes creating a mid-slope bench planted with native trees and shrubs, reducing the overall slope of the riverward face of the levee to 2V:1H, and adding willows and LWD. The preferred alternative for Horseshoe Bend #2 and #3, Dykstra, and Galli's levee locations is called the Repair to Pre-Flood Condition Alternative. The Repair to Pre-Flood Condition Alternative consists of restoring the levees to pre-flood conditions. Damaged or lost riprap would be replaced, willow lifts would be planted at ordinary high water (OHW) and the levee slopes hydroseeded and/or planted with shrubs. This alternative is preferred at these sites because the "layback alternative" is not possible to construct at these four sites due to site constraints.

4. Impacts Summary. Pursuant to the National Environmental Policy Act, the attached environmental assessment (EA) has been prepared. The EA provides an evaluation of the potential environmental impact of the proposed work (repairing 10 levee sites along the Green River) which is briefly summarized below. Each site is considered as having independent utility. Each site may be constructed independent of the other projects. Construction timing is constrained by the Washington Department of Fish & Wildlife and Endangered Species Act (ESA) in-water construction fish windows established for these specific projects which are from July 1 to September 15, as well as by the need to complete construction by the following flood

season, which is generally considered to begin in November. Funding is also a limitation on when construction may occur.

Impacts from the repair/rehabilitation actions are typically minor and temporary in nature. At those six site locations where the levee will use the layback alternative the top of the levee will be laid back to provide for a plantable bench while still allowing for a 2H:1V river side levee slope. Nine of the 10 sites would be constructed with a launchable toe (Dykstra is the lone exception). The bench at the 6 layback sites can be planted with trees and shrubs that will be allowed to grow to maturity. Large wood would be placed at all but the two shortest repair sites. The one levee location where impacts to the habitat are not minor is the Galli's levee, at which the levee toe would be moved riverward 3-15 feet in order to lessen the slope (the top cannot be moved landward due to the presence of residences immediately behind the levee), and limited spawning does occur downstream of this point, however, spawning gravel are limited at Galli's. Spawning sized gravels are present at the Dykstra site. The estimated total loss of aquatic habitat at this location is approximately 3000 ft². Construction will end just as Chinook salmon spawning begins. There will likely be some overlap. The Corps considers the impacts at Galli's levee to be mitigated by planting 8800 linear feet of downstream levee benches with a range of vegetation including shade trees. The Galli's site will also be planted with shrubs. Additional environmental features include placement of large woody debris along about 6700 linear feet of levee toe at all project sites, and the layback of the levee at 6 sites allowing the planting of permanent trees and shrubs.

Temporary impacts will result from noise disturbance and air quality impacts due to increased emissions from the frequent and nearly continuous operation of equipment, including dump trucks, front end loaders, bulldozers, and track hoes. The Puget Sound airshed is currently in attainment for carbon monoxide, ozone, PM10, and has maintenance plans in place for these pollutants. The levee repair work is considered to be routine maintenance/repair activities that will have only a *de minimus* impact on air quality (40 CFR 93.153(c)(iv)). Further, preliminary calculations of the U.S. Army Corps of Engineers indicate that emissions associated with these sites will not exceed EPA's *de minimus* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

The work complies with the Clean Water Act. The CWA 402 NPDES NOI has been provided. For Section 404, three of the sites are not exempt from the CWA. These are Horseshoe Bend #1, Galli's and Dykstra sites. As part of the Section 404 evaluation, the Corps has determined that the fill at Horseshoe Bend #1 and Dykstra that consists of anchoring rock for large woody debris (LWD) mitigation features is the least environmentally damaging alternative. Galli's fill consists of the launchable toe which the Corps has likewise determined is the least environmentally damaging alternative because of site constraints. These three sites are also therefore required to obtain Section 401 Water Quality certification. The Corps has not yet received the CWA Section 401 water quality certification for these sites from the Washington Department of Ecology (WDE). No in water work will occur until the WQC is received.

The work has been analyzed pursuant to the Coastal Zone Management Act (CZMA), and a consistency determination has been provided to the Washington State Department of Ecology (Ecology). To date concurrence has not been received from Ecology. No construction work

may commence until the concurrence is received or there is a waiver, concurrence from Ecology is expected.

The Corps has prepared a biological assessment to address potential effects to species listed under the Endangered Species Act to the U. S. Fish and Wildlife Service and the National Marine Fisheries Service.

Due to the urgent nature of completing this rehabilitation project prior to the oncoming flood season, the Corps may proceed with construction prior to completion of the consultation with the Services pursuant to the “emergency circumstances” provisions of the ESA consultation regulation and complete ESA consultation after the fact, rather than delaying the urgent work in order to complete ESA consultation before construction begins.

Though consultation is not complete, the Corps has reached an agency determination, based on the best factual and technical information available at the time of decision, and following preliminary coordination with the Services, that the impacts are *not likely to adversely affect* ESA-listed species at Tukwila #3 and # 5, Horseshoe Bend #s1-4, Dykstra, Meyers Golf, and Kent Shops/ Narita; and *likely to adversely affect* ESA-listed species at Galli’s. The Corps believes that this work *is not likely to jeopardize* the continued existence of the listed species, by reducing appreciably the likelihood of either the survival or recovery of the listed species; nor does the work constitute an adverse modification of critical habitat. The Corps believes the construction of benches with trees and shrubs, and placement of large woody debris at other sites, reduces this adverse effect to the level of insignificance, and also believes that no additional ameliorative actions are necessary to avoid jeopardy to listed species.

However, the Corps will also commit to fully funding and performing all Reasonable and Prudent Alternatives necessary to avoid the likelihood of jeopardy to listed species or destruction or adverse modification of designated critical habitat, as well as Reasonable and Prudent Measures (RPMs) necessary and appropriate to minimize the impact of Incidental Take, that are described in a Biological Opinion is received from the Services. The Environmental Assessment will be reevaluated at the time that consultation is complete. If necessary, this EA will be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project.

As required under Section 106 of the NHPA, the Corps has coordinated with the Washington State Office of Archeology and Historic Preservation (OAHP) and the Muckleshoot Indian Tribe (MIT). No recorded prehistoric or early historic Native American archaeological deposits are located within any of the individual projects. A cultural resources survey was conducted in the repair area and a cultural resource report was prepared as part of the Section 106 of the National Historic Preservation Act compliance process. A letter from the State Historic Preservation Officer dated June 11, 2008 concurring with the Corps finding of No Historic Properties Affected, has been received.

The Muckleshoot Indian Tribe (MIT) provided comments to the Notice of Preparation indicating that tribal fishing might be disrupted by levee rehabilitation work. They also suggested they may

require mitigation for impacts to tribal fishing from the Galli's fill and from interfering with the fishery. The Green River is designated as a usual and accustomed fishing area of the MIT. The work is considered to be consistent with the Tribe's treaty rights due to the limited number of sites under construction, the fact that no specific site has been identified as a specific fishing place, the temporal nature of the restriction, the fact that the repairs are necessary to protect human health and safety and is authorized by PL 84-99, as well as the fact that habitat impacts have been addressed in the design of the project including plantings, placement of LWD, and benches. Coordination with the Tribe will be ongoing during construction to try to further minimize the possible impact to the Tribal fishing.

5. Finding. For the reasons described above, I have determined:

A. The proposed actions are in the public interest. These proposed actions, either at the individual sites or combined, will not constitute major Federal actions significantly affecting the quality of the human environment, and therefore, do not require preparation of an environmental impact statement

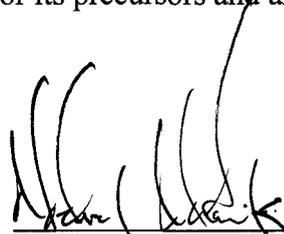
B. Evaluation of Compliance with Section 404(b)(1) Guidelines [40 CFR 230.10]: For the 3 sites not exempt from the CWA, the work was evaluated pursuant to Section 404(b)(1) of the Clean Water Act in accordance with the guidelines promulgated by the EPA (40 CFR 230) for evaluation of the discharge of dredged or fill material into waters of the United States. In addition, consideration has been given to the need for the work and to such water quality standards as are appropriate and applicable by law. Alternatives not requiring the discharge of dredged or fill material into water of the U.S. are not available. The proposed discharge represents the least environmentally damaging practicable alternative and includes all appropriate and practicable measures to minimize adverse effects on the aquatic environment. The work will not result in the unacceptable degradation of the aquatic environment.

C. Section 404(b)(1) Compliance/Non-compliance Review [40 CFR 230.12]: The discharges and methods specified in the proposed work are in accordance with the Section 404(b)(1) Guidelines.

*D. Section 176(c) of the Clean Air Act General Conformity Rule Review: The proposed project has been analyzed for conformity with the regulations implementing Section 176(c) of the Clean Air Act. I have determined the activities proposed under this permit will not exceed *de minimus* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153.*

20 JUNE 2008

Date



Michael McCormick,
Colonel, Corps of Engineers
Commanding

APPENDIX D - Comments on Draft EA and Corps' Responses

WRIA 9 Comments

1. The removal of native vegetation beyond the footprint of the actual construction. At Dykstra (30.02-30.16 LB) and Kent Shops/Narita (20.34-21.04 RB) repairs, the Corps proposes to remove mature native vegetation that is not in the way of construction. We understand that the Corps is requiring King County to remove this additional vegetation consistent with PL84-99. We request:

- Documentation that this vegetation jeopardizes the structural stability of the facilities;

Corps Response:

The Corps is not removing vegetation beyond the footprint of the construction. Vegetation adjacent to the proposed project sites may be removed by King County in order to meet requirements of the PL 84-99 program. That action is only indirectly related to the proposed action that is the subject of this NOP. King County may choose not to remove subject vegetation. However, this may affect the levee's status in the Program. Seattle District utilizes a levee vegetation variance for determining suitable vegetation maintenance. The Corps levee inspectors evaluate vegetation on a case by case basis. If it is determined that the vegetation jeopardizes the structural stability of the levee the inspector informs the local entity that the vegetation is required to be removed if they are to remain in the program.

2. An explanation of how the – we believe – unnecessary removal of riparian vegetation is consistent with the Puget Sound Recovery Plan for Chinook salmon. It is important to note that simply requiring off-site re-vegetation is not adequate mitigation if it is not similarly located next to the Lower Green River.

Corps Response:

The Green River levee project sites are primarily vegetated with grass and blackberries today. The Galli's and Dykstra sites contain approximately 5-10 mature trees. Along all project sites, willows will be planted on the face of the levee to provide shade to the river. For the most part these areas contain minimal shade to the river. In addition, along 8,800 ft of levee including the Myers Golf, Tukwila, Kent-Narita, and Horseshoe bend sites, a range of vegetation including shade trees will be planted on the levee benches. The launchable toe slope of the Galli's site will also be planted with the shrubs on the planting list. These plantings will likely take 3-10 years to mature, but after this period of time the riparian habitat and shade of the river should be improved over the currently degraded condition.

The projects have been coordinated with NMFS who approved the recovery plan. NMFS provided the Corps design guidance for the levee projects. The specific guidance was largely levee specific and based on the 2006 King County Flood Management Plan. For example, guidance for the Kent-Narita design was: *'Repair of this levee segment should be incorporated into a reach-length levee setback with acquisition of sufficient*

easement area for reconstruction of the riverward levee slopes at a minimum 2.5H:1V slope angle. This project would include reconstruction of the levee toe, installation of large woody debris structures, excavation of a mid-slope bench and toe buttress revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank. Guidance for the other project sites was similar. The Corps has met this criteria at most sites. Galli's and Dykstra are the exceptions where the criteria was met as much as practical. Private residences immediately behind the levee, and in some cases partially on the levee precluded moving the levees landward at these sites.

3. The heavy use of rock armoring in place of proven, bioengineered design elements in most of the repairs. While we understand that a certain amount of riprap is necessary for armoring the levee toe, the extensive use of three-foot thick blankets of Class III and IV riprap seems unnecessary based on our discussions with engineers who know the Green River very well. The extensive use of riprap blankets will make it more difficult to plant vegetation beyond grasses on levee surfaces. We request that the EA consider whether the design can be revised to a "softer" approach that would use less riprap and improve the likelihood that suitable riparian vegetation could be established.

Corps Response:

Riprap is a reliable and proven method for protecting levees. Given the potentially grave consequences of levee failure on the Green River, the Corps does not consider bioengineered methods suitable for these levees. Bioengineered design elements such as vegetated geogrids help protect the slope from surface erosion, but do not prevent rotational slope failures or draw down failures which are the primary slope failure mechanisms on the Green River.

4. Again, while we are entirely supportive of the repair of flood-damaged levees and revetments on the Lower Green River, we request that the Corps alter elements related to non-critical vegetation and riprap armoring to ensure that these projects contribute to – rather than undermine – Endangered Species Act-driven salmon habitat recovery.

Corps Response:

The Corps has spent considerable time and effort developing levee designs consistent with guidance from the National Marine Fisheries Service for these projects to ensure that they contributed to salmon habitat recovery. See response to comment 2.

Washington Department of Fish and Wildlife (WDFW) comments

5. WDFW supports the efforts of the US Army Corps of Engineers (Corps) to provide flood protection by maintaining the existing levees on the lower Green River. WDFW also appreciates the opportunity to work collaboratively with the Corps and other involved agencies and tribal governments to ensure that levee rehabilitation projects are constructed in a manner which fulfills the objectives of flood protection while meeting other objectives, particularly preservation and restoration of fish and wildlife habitat.

WDFW applauds the considerable efforts made by the Corps to incorporate design criteria which are improvements over some criteria used in the past with regard to habitat issues and values. WDFW also believes further improvements can and should be made to ensure that opportunities for successful project collaboration and implementation occur. In general, some of the current improvements include use of large woody material (LWM) to help mitigate for project impacts and installation of willow lifts and planting benches to provide enhanced levee stability and habitat value. These are significant design improvements and are greatly appreciated by WDFW (and, I am sure, other agencies and tribal governments).

Corps Response:

The Corps appreciates the recognition for the considerable effort and cost that has gone into designing these projects. Thank You

6. WDFW remains very concerned about the manner in which the PL-84-99 program is requiring local sponsors to remove vegetation in order to certify eligibility for the program. This seems contrary to sound levee management, since pertinent research has documented that levees lacking vegetation are more heavily damaged by flooding and require more maintenance than vegetated levees. Removal of vegetation on levees also impacts fish and wildlife habitat and is contrary to recovery of federally listed threatened and endangered species. If the reason for requiring removal of vegetation is to facilitate inspection of levees, it seems obvious that methods of inspection need to be modified so the PL-84-99 program can become integrated with the Endangered Species Act.

Corps Response:

Certain vegetation is beneficial to levees. The Corps inspectors evaluate levee vegetation on a case by case basis. If the vegetation is considered detrimental to the levee structure, the local entity is so informed. Levees need to be accessible and inspectable for both routine inspection and maintenance as well as emergency response activities. The Corps inspector evaluates whether the levee can be properly inspected. The Corps inspector informs the local entity if vegetation interferes with an adequate inspection.

7. Another significant issue is the need to revise engineering standards used by the Corps to utilize the knowledge of habitat friendly designs accumulated by WDFW and other agencies, particularly the King County Water and Land Resources Division. The use of launchable toes is not encouraged, except where a project is constructed during flood events or site

constraints preclude of the toes being keyed in below the scour elevations. Keyed in toes require lesser quantities of rock and result in fewer long term impacts to habitat.

Corps Response:

WDFW is correct in their observation that keyed in toes would require less rock volume. However, site conditions do not permit for keyed in toes. Construction of keyed in toes would require deeper excavation and/or more in-water work. King County has advised the Corps that their experience is that soil sloughing does not allow excavation more than 2 ft below the water surface along the Green River. Thus to avoid expensive and disruptive construction methods and additional in-water work, the Corps has chosen not to construct keyed in toes.

8. WDFW suggests clumping pieces of LWM, especially at the upstream and downstream ends of the projects to help reduce flow velocities along the river banks downstream of the LWM.

Corps Response:

The Corps has designed the LWD to provide hydraulically smooth transitions at the upstream and downstream ends of the LWD. This was done to minimize the risk of failure by erosion at these critical locations where the new projects blend into the existing projects. We do not anticipate any measurable changes in velocities along the banks downstream of the projects. The Corps chose not to clump LWD anywhere on these projects to minimize the potential for scour and avoid hydraulic disturbances that could raise flood elevations.

9. Integration of LWM anchor rocks into the levee toes such as was done at the Briscoe levee project is also recommended. There is a concern that placement of the large anchor rocks adjacent to the levee toes will accelerate scouring and failure of the toes.

Corps Response:

The safety of the levees was the paramount concern of the Corps in the design of the LWD and anchoring system. The LWD anchor rocks are placed outside the launchable toe so that if there is scour around them or they move, disturbance of the toe will be minimal. The anchor rocks will be sunk into the riverbed to minimize the scour potential and the launchable toe contains sufficient volume to accommodate scour around the anchor rocks. King County has indicated that their experience is that deposition is more likely than scour at constructed LWD sites.

10. WDFW policy would preclude approval of the proposed riverward encroachment at the Galli's levee. The position of the toe needs to be held in place. Vegetated geogrids can be installed to ensure adequate stability of the levee face at steeper than 2:1 sloping.

Corps Response:

The Galli's project will encroach on the river by 3-15 ft along 300-400 linear ft at the upstream end of the site. The Corps recognizes this particular project does result in negative habitat effects at the site. The Corps has attempted to offset these effects by improving habitat at downstream levees that are less constrained by site conditions

than Galli's. Principle among these is planting a range of vegetation including shade trees along approximately 8,800 linear feet of downstream levee. Currently these levees have limited vegetation which likely leads to elevated temperatures in the Green River. These plantings should improve this condition. Additional habitat features include decreasing the slope along 9,100 linear ft of existing levee, and placement of in-water LWD along the toe of 6,700 linear feet of levee. This includes LWD along the downstream 470 ft of the Galli's project.

For the Gallis Levee, the design team has limited the encroachment into the river as much as possible. The riverward slope cannot be steeper than 2 horizontal to 1 vertical. Based our slope stability analysis, this is the minimum slope necessary for stability in this reach.

Vegetated geogrids help protect the slope from surface erosion, but do not prevent rotational slope failures or draw down failures which are the primary slope failure mechanisms on the Green River.

Another alternative we considered to reduce encroachment was a flood wall. A flood wall for this project would need to be extended well below the scour depth in order to be stable during high water events and is prohibitively expensive to design and construct. The flood wall option was also rejected for environmental reasons.

The current limits of the project excavation come within several feet of the existing apartment buildings and residences. In addition, when the project is complete, there will be the minimum distance necessary between the structures and the top of the slope to access, maintain, and inspect this project. A set back option is not feasible unless the existing apartments and residences are removed.

WDFW follow-up comment:

WDFW encourages the USACOE to avoid extending the toe of the levee waterward of the existing toe. To do this, WDFW encourages the USACOE to consider other engineering options to stabilize the slope such as vegetated geogrids.

In an e-mail from you dated June 6, 2008 it was stated that USACOE engineers had considered the use of vegetated grids and concluded "Vegetated geogrids . . . do not prevent rotational slope failures or draw down failures which are the primary slope failure mechanisms on the Green River." Site specific circumstances that include existing apartment buildings and residences in close proximity to the levee preclude the use of other set-back options. The only practical option at this site is to extend the toe into the river if the federally required 2:1 slope for the levee is to be achieved. To mitigate for this impact to the fish resource, the USACOE proposed to:

- Plant a range of vegetation including shade trees along approximately 8,800 linear feet of downstream levee.
- Decrease the slope along 9,100 linear ft of existing levee,
- Place in-water LWD along the toe of 6,700 linear feet of levee which includes
- LWD along the downstream 470 ft of the Galli's project.

In addition, the USACOE continues to consider implementing other recommendations provided in the letter intended to minimize impacts to fish life in the other portions of the project.

WDFW appreciates that the USACOE has evaluated various options at this site that would avoid or minimize the impacts to fish life. Given site specific circumstances and limitations, the placement of rip rap rock waterward of the OHWL to achieve the required 2:1 slope appears to be the only viable option. WDFW requests that the USACOE provide appropriate monitoring and maintenance of the mitigation listed above to assure it continues to provide the desired functional value for fish life.

Corps Response:

Monitoring and maintenance of the projects will be performed by the local sponsor King County. A vegetation monitoring plan will be written for the project that will be coordinated with the resource agencies.

Muckleshoot Indian Tribe comments

1. We appreciate the Army Corps' efforts to work with local sponsors and interested parties to incorporate habitat features in the proposed levee repairs including planting benches, willow lifts, and large woody debris. However, we remain concerned about conflicts between the proposed project and from future PL 84-99 levee repairs and salmonid habitat needs. As the Corp's Notice acknowledges, fish habitat in the lower Green River is severely limited by levees, and the proposed project will perpetuate the already degraded condition of the river. The conversion of existing soil-based levees to rock-based levees in the proposed project will cause additional permanent confining of the river and further decrease opportunities for natural floodplain processes.

Corps Response:

This is acknowledged in the EA. The Green River is currently confined and without potential for channel migration within the project areas due to a history of flood control and human development in the adjacent floodplain. The proposed projects will not further preclude the river from migrating.

2. An improved regional approach is needed to better align the PL 84-99 and other relevant flood facility programs with salmon recovery and local habitat plans. This approach would incorporate local government experience and innovation in levee design and vegetation management, and allow for continuous adaptation to improve habitat conditions for salmonids. We are especially concerned with vegetation maintenance requirements for eligibility in the PL 84-99 program where sponsors must clear levees of trees larger than 4 inches in diameter to maintain eligibility for federal funding. This requirement conflicts with the Tribe's fisheries interests; with the Green River's designation as Critical Habitat for Puget Sound Chinook salmon under the Endangered Species Act; with the Clean Water Act; with regional and local salmon habitat plans; and salmonid habitat restoration projects, including the Corps' Ecosystem Restoration Plan for WRIA 9. We urge the Corps and its sponsors to work with the Tribe, the National Marine Fisheries Service and other interested parties develop a regional approach that allows mature trees on and near levees in the PL 84-99 and other relevant programs, and to implement lower impact levee designs. We understand that this has been pursued in Sacramento River basin where similar conflicts and issues have arisen.

Corps Response:

The Corps recognizes a regional approach would better integrate the various ongoing programs. Currently there is no flood plan management study for the Green River basin. The Corps has several authorities that can be used to study this issue. However, a local sponsor is required for such a study. The Corps itself is not responsible for floodplain management or floodplain development. This is the responsibility of local governments. The Corps is certainly available to assist such efforts. In the case of the Green River repairs that are the subject of this notice, the local sponsors including King County requested assistance from the Corps to repair existing levees that were damaged by the November 2006 flood

The requirement to maintain levee vegetation is an existing Corps requirement for local participation in the voluntary PL 84-99 program. The vegetation limitations are based upon structural integrity and inspectability concerns. The Seattle District continues to work towards a balance between vegetation and integrity of the levee system such that risk to human life and property is maintained. The non-Federal levee sponsors have, at times, chosen to repair their levees outside the PL 84-99 program in order to maintain looser vegetative standards. If the national PL 84-99 program changes the standards, the Seattle District will adjust accordingly.

The Corps has and continues to work with local tribes, State and Federal resource agencies on improved methods for determining appropriate vegetation on levees and designs for each site condition. The proposed project contains several environmental features for the minimization of environmental impacts as a direct result of prior coordination with WDFW, NMFS, USFWS and other agencies.

3. The proposed mitigation for the levee repair projects' adverse impacts relies heavily on the success of the mid-slope planting benches to grow native trees for shade and organic inputs, while incorporating some instream large wood and willow lifts. However, the likely effectiveness of the proposed mitigation is questionable since the design of the planting benches may not be conducive to successful riparian tree growth. It is doubtful that adequate moisture will infiltrate the bench soils in the proposed design, and heat from surrounding rip-rap may make it difficult to establish healthy native riparian trees. Furthermore, the planting bench is designed as part of a launchable toe with the potential or design purpose of being washed out during a flood event. Comments from other fisheries agencies NMFS and WDFW suggest that they share similar concerns.

Corps Response:

The planting benches will be watered for a period of 2 years. A monitoring plan will also be developed for the projects with input from Ecology and NMFS. The Tribe is also welcome to participate in the development of that plan. We have attempted to address the moisture issue by placing as much soil as possible in the levee. This includes two willow lifts each with 1 ft depth of topsoil extending back through the levee. In addition, soil placed on top of the rock will be worked into the open rock spaces in attempt to provide as much soil in the levee as possible. This approach seemed the best compromise between constructing a safe levee and providing shade to the river. The existing site conditions largely include invasive blackberry and grasses which provide minimal shade to the river. Even if the planting benches are completely unsuccessful (which we believe is unlikely), the willow lift which have been proven at other sites including on the Green River will provide shade the river where there previously was none.

4. Therefore, we recommend that the Corps revise its approach by completing the proposed project levee repairs in two phases. The first phase would be to complete the work necessary to lay back the upper banks could proceed to minimize risk of imminent flood damages and delay the construction of the planting benches and launchable toe and riverward project

elements until a consensus design can be worked out with the interested parties including the Tribe, NMFS, WDFW and the local sponsors.

Corps Response:

Seattle District has coordinated the proposed project with the local sponsor, resource agencies, project designers and engineers to develop an approach that includes environmentally beneficial features while maintaining structural integrity and reliable flood protection. We appreciate the input and suggestions the local resource agencies and tribes contributed to the design to this point. Your perspectives and requests have been considered by the designers and have been factored into their decision making process. The final project design is based on their best engineering and biological efforts and is believed to be as responsive as possible and still remain within the scope of the PL-84-99 authority.

5. As far as the EA is concerned, it should address the potential for this project to adversely affect treaty fishing rights and activities conducted by the Muckleshoot Indian Tribe. Tribal fisherman routinely fish in the identified project areas. Both construction activities and the constructed levee repairs may interfere with tribal fishing, including in-water construction, bank work, and staging activity. Expansion of levee footprints within the ordinary high water mark of river will cause a loss of fishing area for the Tribe. For example, the proposed Galli's Levee repair will move the levee footprint riverward by 3 to 15 feet along 400 feet eliminating approximately 3,000 square feet of aquatic habitat which means a direct loss of fishing area. Also, the July through mid-September construction work window coincides with potential coho and chinook fisheries and the adult migration period for these species. In addition, noise, turbidity, and habitat disturbance during construction may disrupt adult salmon behavior and result in decreased fishing success. These and other potential impacts to treaty fishing should be discussed in the EA along with measures to avoid or mitigate impacts.

Corps Response:

The work is not believed to violate the Tribe's treaty rights due to the limited number of sites under construction, the fact that no specific site has been identified as a specific fishing place, the temporal nature of the restriction, the fact that the repairs are necessary to protect human health and safety and is authorized by PL 84-99, and the fact that habitat impacts have been addressed in the design of the project including plantings, placement of LWD, and benches. The Corps is actively coordinating with the Tribe to address impacts to treaty fishing. This will continue through the construction process and the beginning of the fishery. The Corps will attempt to minimize or address any potential conflicts with Tribal fishing throughout the construction.

6. The EA notes that the project purpose is to repair levees damaged by the November 2006 floods. The EA should analyze the need for future levee repairs in the Green River. If likely, then these future projects should also be fully evaluated for potential cumulative impacts to the Green River and salmon populations. The EA should evaluate the magnitude and frequency of discharge that the lower Green River levees are capable of withstanding before damage occurs to evaluate the likelihood of future levee repairs at these sites. For example,

the Tukwila Section 205 levee appears to be ill-suited to convey the regulated peak flow it was designed to accommodate (12,000 cubic feet per second (cfs) at USGS Gage 211300, Green River near Auburn). According to the Corps March 2008 *Project Information Report Rehabilitation of Flood Control Works Tukwila 205*, this levee has required repair after every year that the peak flow has reached 12,000 cfs since the original project was constructed in 1992.

Corps Response:

The Corps is required to assess the benefits and costs of each rehabilitation project proposed to us by local sponsors. The cumulative impacts section indicates that future rehabilitation efforts either at these sites or nearby sites will maintain similar conditions as are present today. It is hoped that by working with Corps HQ and others, when future projects are required, they can result in an incremental improvement over today's conditions.

The Corps records show the Tukwila 205 was repaired once since it was originally constructed in 1992. The Seattle District repaired approximately 200' of the levee near Home Depot in 1996. The sponsor has performed routine maintenance annually which is normal for an earthen levee.

7. Several other projects under current environmental and permit review in the Green River should be considered in a cumulative effects discussion. These projects include, but are not limited to, the widening of I-405 and the City of Kent's Riverview Park development proposal as well as other projects.

Corps Response:

This information has been added to the EA cumulative impacts section.

8. Two additional alternatives should be considered in the EA. One new alternative should consist of a *comprehensive river corridor approach to levee improvement and flood risk reduction*. This alternative would involve acquiring additional lands and easements over time so that levees can be set back to allow development of increase in natural floodplain processes and improved riparian area within a significantly less-confined urban river channel. The goal would be to improve the river corridors for the purpose of Puget Sound salmon recovery and is further described in Montgomery et al. (2003). River and floodplain habitat processes in the project area are vital to the natural production of chinook and other salmon species but are severely impaired by flood control activities as discussed in the WRIA 9 Limiting Habitat Factors Report for Puget Sound Chinook (<http://dnr.metrokc.gov/Wrias/9/Recon.htm>). A comprehensive river corridor alternative would be more consistent with stated chinook recovery plan objectives, and would reduce flood risk over the long term by restoring channel flood conveyance capacity.

Corps Response:

In 2006, King County completed the '2006 King County Flood Hazard Management Plan'. This document provides the comprehensive approach the county is pursuing. The design guidance provided in that document was used to design the 2008 projects.

The Corps is not responsible for local flood plain management and therefore can't direct or initiate such planning. That is the responsibility of local governments. The Corps is implementing the 2008 levee projects at the request of the County and consistent with their flood plan as much as is practicable based on real estate acquisitions and easements obtained by the County.

A comprehensive corridor approach which includes areas outside the real estate boundaries associated with the levee repair is outside the current scope of the PL-84-99 authority.

9. The second alternative to be evaluated in the EA is a *phased construction and consensus design approach* where bench construction and instream work is deferred until the interested parties can develop consensus designs with less environmental impact than the current proposal.

Corps Response:

The current design represents the most environmentally sustainable solution that still meets the PL-84-99 authority. Delaying the project in favor of a consensus design presents unacceptable risks to human health and safety as well as considerable property damage.

10. In addition to including the two added alternatives described above, the EA should fully evaluate the four alternatives discussed in the Notice and the specific criteria evaluated for each alternative. For example, in the case of cost, it should not be the sole criteria for evaluating the non-structural alternative; there are other factors to consider including cost savings from reductions in flood hazards to structures and infrastructure.

Corps Response:

The economics of a proposed project is an important consideration of Corps planning projects intending to use Federal funds. Other considerations include human health and safety, environmental acceptability, real estate, flood risk and local support. The Green River valley in the reaches affected by the proposed project currently supports a large number of businesses and other economic benefits derived from the flood control structures. The Corps believes it has responded to our responsibilities to protect the Green River valley and its economic values with the need to incorporate environmental features necessary for the sustainability of aquatic and riparian resources.

11. Similarly, for those sites proposed to be repaired using the pre-flood condition alternative, the EA should discuss how this alternative impacts habitat processes and salmon production, and describe how the proposed measures successfully mitigate for these impacts. This discussion should include an analysis of the two other less environmentally damaging alternatives, i.e. non-structural alternative and the layback levee alternative, and discuss why these alternatives were not chosen at these sites. Finally, for all of the sites, each alternative

should identify and evaluate specific mitigation measures necessary to offset impacts to fisheries resources.

Corps Response:

The EA discusses these alternatives and any mitigation measures associated with them.

12. The EA should evaluate the potential impacts under each alternative at each site: The levees have caused loss and impairment of aquatic edge habitat structure and in-channel complexity such as pools, side channels, wetlands, and other complex floodplain habitat types, and restrict the floodplain from dissipating flood energy. All of these habitat losses are detrimental to salmonids. The EA should evaluate the potential for each alternative to impact these habitat conditions and processes at each site both site specific and cumulatively.

Corps Response:

The EA discusses these issues. In general, existing habitat conditions are degraded. The preferred alternative will improve conditions by decreasing levee slope by extending the levee landward, adding in-water LWD at each levee project, and planting willows/dogwoods at each location to provide shade to the river. At most sites additional plants including shade trees will also be planted. These environmental features should improve the currently degraded habitat conditions.

13. The EA should evaluate the potential impacts under each alternative at each site: The levees in lower Green River have also contributed to the near total loss of suitable flood refuge and rearing habitat for juvenile salmonids that are present in the project area from February through June. The concern is that without this habitat, natural origin chinook fry are being flushed into the Duwamish estuary immediately following late winter and spring freshets with a reduction in survival rates. The EA should evaluate how each alternative at each project site will affect rearing and flood refuge habitat availability.

Corps Response:

The EA addresses this issue. In general, the project sites will have limited effect on flood plain refuge. All project sites currently contain levees that prevent any floodplain refuge at the sites. This condition will be incrementally improved by laying back the slopes along approximately 9,100 linear feet of existing levee. This includes moving the toe of these levees 5 ft landward along this entire length creating additional capacity for the river. In addition benches will be constructed along approximately 8,800 linear feet of levee that will provide further room for the river. These two elements will incrementally improve this condition in the lower Green. The Galli's site is an exception to this where there will be some fill into the river in order to construct a stable levee.

14. The EA should evaluate the potential impacts under each alternative at each site: As proposed, it appears that the mid-slope benches proposed for the "layback the levee" alternatives may not be located so that rearing habitat is accessible when the juvenile salmonids are present based on the available flow records for the Green River. See our attached comments for the Tukwila 205 levee for additional information.

Corps Response:

The EA addresses this issue.

15. The EA should evaluate the effects of levees, the proposed repairs, and likely future repairs to maintain the levees on geomorphic and ecosystem processes in the Green River. The proposed hardening of the river banks with what is essentially a rock-lined riprap channel standard, will permanently preclude riverine processes that promote salmon habitat development. Bank hardening is not conducive to promoting favorable habitat conditions as lateral migration and other natural geomorphic processes are encumbered or prohibited. Without these processes, the river will permanently lose the ability to recruit spawning gravels from the banks, recruit trees for large woody debris that promote aquatic habitat structure, form off-channel habitats and side channels for rearing and high-flow refuge, and interact with its flood plain. Research conducted by the Army Corps of Engineers (Fischenich 2003) evaluates the potential impacts of bank-hardening structures. The author states “the prevailing philosophy in ecosystem management is that physical alterations of the structure and character of an ecosystem are most significant if they also impact process-based functions.”

This author also reports that erosion control measures such as levees are most likely to impact morphological evolution, sediment processes, and habitat. Additionally, he reports that energy reduction measures, which include various techniques to reduce the energy gradient of the stream, have the greatest potential impacts where the functions most likely to be impacted by stabilization measures include stream evolution processes, riparian succession, sedimentation processes, habitat, and biological community interactions. Furthermore, he notes that the impacts of bank hardening are most detrimental to salmonids. Clearly the Corps’ own research identifies the adverse effects of levees upon the geomorphic processes that support salmonid habitat. These impacts should be adequately evaluated in the EA using this research.

Corps Response:

Natural process along these sections of the lower Green River have already been prevented by the existing levees. The proposed projects will therefore have no effect on this condition. Most of the sites are downstream of spawning areas and have sand beds. Gravel recruitment to these sites currently does not occur. The exceptions are Galli’s and Dykstra which are at the downstream end of the spawning range for salmonids. Gravel recruitment to these sites is from upstream sources and not from the immediate river banks that contain levees. In general, these projects have a limited effect on channel processes relative to the existing condition. Hardening of the levees does make this condition more permanent however, and makes any habitat restoration more difficult.

The Corps continues to work at the national level to refine its’ PL-84-99 responsibilities to better co exist with regional recovery plans. However, the PL 84-99 authority provides only limited responsiveness to these plans unless the local sponsor pays for additional features. We recommend the Tribe work with the local sponsors, who

initiate most of these rehabilitations, to develop a long-term ecosystem based strategy that incorporates the research of the Corps and other agencies.

16. The levees have contributed to the near-total loss of riparian functions including shade, woody debris recruitment, and terrestrial insect inputs. The EA should evaluate the potential for each alternative to impact these conditions and processes at each site. The EA should evaluate how each alternative will affect existing impaired water quality conditions. Implementation of vegetation standards under PL-84-99 will result in the removal of existing vegetation larger than 4 inches in diameter and preclude the growth of mature riparian vegetation necessary to provide shade. In addition, the projects propose to add large amounts of rock that accumulates and conducts heat, which will likely worsen existing temperature problems, particularly during the summer and early fall chinook salmon adult migration period. The proposed planting of willow and dogwood lifts are not likely to provide adequate riparian shade or wood recruitment functions, compared to conifer or broad leaf tree species, let alone in comparison to natural site potential riparian shade development. Furthermore, the current proposal may permanently exclude natural riparian characteristics.

Corps Response:

The EA has addressed these issues. In general, 8,800 linear feet of levee benches will be planted with a range of vegetation including shade trees. This is in addition to the willow/dogwood lifts at all sites. These planting should improve the riparian conditions in the lower Green River.

17. The project sites are located with river reaches currently listed as impaired under Section 303(d) list of the Clean Water Act for water temperature. There are requirements to meet the state water quality standards. The EA should explain how this proposed project is consistent with State temperature and dissolved oxygen water quality standards in the Green River.

Corps Response:

The Horseshoe Bend site is the only project area currently listed on the 303(d) list for temperature. As stated in response to other comments and discussed in the EA, vegetation including shade trees will added to most of the length along over 75% of the levees being repaired. Willow and dogwoods will be added all sites. All of the sites currently provide very limited vegetation to shade the river. The projects should improve riparian habitat and temperatures in the river.

18. The proposed actions are in serious conflict with salmon habitat plans and projects in the Puget Sound Salmon Recovery Plan and in the WRIA 9 Habitat Plan. For example, the Shared Strategy Development Committee, represented by Corps, King County, and other local governmental representatives, developed a strategy for the purpose of salmon recovery. The Puget Sound Salmon Recovery Plan (Shared Strategy Development Committee (SSDC, 2007), adopted by the National Marine Fisheries Service in 2007, states that

“Riparian function depends on vegetated banks, and the removal of large trees precludes the recruitment of large woody debris, essential to a varied channel structure. Dikes and

levees generally have maintenance requirements that prohibit vegetation, largely eliminating the production of food for salmon and the recruitment of large woody debris for cover and diverse channel structure. Channelization and floodplain structures such as dikes reduce river sinuosity, increasing water velocity and reducing the volume of habitat. In many cases, floodplain structures eliminate the connection to side channels and wetland complexes where salmon once could rest and feed.”

The Plan includes Chinook recovery Goals. The SSDC write:

“The long term goal of the local governments working on habitat is to recover Chinook to naturally sustaining, harvestable levels. The plan developed by the Green/Duwamish and central Puget Sound Watershed Forum is intended to improve the watershed aquatic ecosystem with a focus on the needs of listed salmonid species...”

The Plan proposes to increase natural origin chinook in the Green River over the next 50 years, with an eventual equilibrium spawner abundance target of 27,000 adult chinook. Habitat restoration to substantially increase the availability of juvenile chinook rearing and refuge habitat in the lower Green River has been identified as a key strategy to help meet this target.

The Plan cites habitat factors limiting salmon recovery in the Green River. Several of these factors are directly associated with the construction and maintenance of levees. These limiting factors stated in the Plan are as follows:

- “• Reduced water quality - changes to dissolved oxygen, temperature, chemical contaminants and nutrients, suspended sediment/turbidity. Primary causes include stormwater runoff, lack of shade due to loss of riparian vegetation

- Hydromodification - changes to estuarine tributary and distributary channels, cutoff of sediment supply (spawning gravels), reductions in the amount of in-channel large woody debris, and alteration of nearshore independent tributary channels. Primary causes include bank hardening, levees, clearing of mature streamside vegetation, dams, channel straightening, dredging, filling, loss of side channel and other off-channel habitats, loss of channel and habitat complexity, loss of connection to floodplain, and loss of channel migration.

- Alteration of Habitat Forming Processes- interruption or other modification of processes that form nearshore habitat, such as sediment transport and freshwater input. Primary causes include shoreline armoring,

- Degraded Riparian Condition - altering the presence or absence of native riparian vegetation along the shorelines. Primary causes include shoreline armoring.”

There are conflicts with the WRIA 9 Salmon Habitat plans as well. The WRIA 9 Salmon Habitat Plan¹ specifically identifies preventing and reducing the armoring of stream banks and

1 : *Making our Watershed Fit for a King* (Green Duwamish and Central Puget Sound Watershed August 2005, King County Water and Land Resources Division, prepared for the WRIA 9 Forum.)

shorelines as a key salmon habitat need in all subwatersheds of the Green River (Page 1-10). The goals of the WRIA 9 Habitat Plan are to protect and restore physical, chemical and biological processes and the freshwater, marine and estuarine habitats on which salmon depend; protect and restore habitat connectivity where feasible, and protect and improve water quality and quantity conditions to support healthy salmon populations. To accomplish these goals, the Plan states the following as “Recommended Mechanisms”:

“-Protecting and improving riparian conditions would provide greater juvenile growth and survival

-Preventing new bank/shoreline armoring and fill would improve juvenile growth, increase available habitat and improve diversity.

- Protecting or restoring natural channel geomorphology, sediment recruitment, off-channel habitats, tributary habitats and inaccessible mainstem segments, refugia, riparian areas, water quality”

The levees as proposed would impair salmon recovery efforts and conflict with the efforts of representatives from both the Corps and King County agencies. We suggest that improved coordination occur with salmon recovery groups in order to find flood risk reduction solutions that avoid or minimize conflict with salmon habitat objectives.

Corps Response:

The Corps disagrees with the comment. The Corps has spent considerable effort and cost working to design levees on the Green River consistent with guidance from NMFS so that the projects would be consistent with salmon recovery. The Corps believes it has largely met the goals and design criteria provided by NMFS. In general, the Corps believes the post project condition in the river will be improved for salmon relative to existing habitat conditions.

The projects are not considered habitat restoration projects. These are levee repair projects designed to protect life and property. As stated above, the Corps has attempted to improve the habitat at the existing levees by adding numerous habitat features to the sites consistent with NMFS guidance.

Also see response to comment #2.

19. The EA should fully disclose and evaluate the proposed mitigation measures for each alternative and each site. As part of this discussion, the EA should identify the proposed mitigation for the temporal impact of removing existing shade producing vegetation at the Dykstra and Galli sites where an unspecified amount of replacement shade vegetation will be planted and it will take 3-10 years for the willow/dogwood lifts to produce comparable shade. The EA should also discuss the potential for mitigation to fail and the contingency actions that will follow should this mitigation fail. The EA also should also discuss the mitigation that will occur as a result of the permanent loss of habitat at the Galli’s site where

the levee will be reconstructed waterward of its existing footprint and why the addition of an unspecified amount of wood is sufficient to mitigate for this impact.

Corps Response:

The EA has addressed these issues.