



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

REPLY TO ATTENTION OF

CENWS-OD-EM

MEMORANDUM FOR Commander, Northwestern Division U.S. Army Corps of Engineers
ATTN: CENWD-CM-OE

SUBJECT: Dykstra Levee Rehabilitation – City of Auburn, King County, Washington, GRN-02-14 –
Request for project approval

1. Request project review / approval of the project enclosed herein.

DISTRICT REMARKS

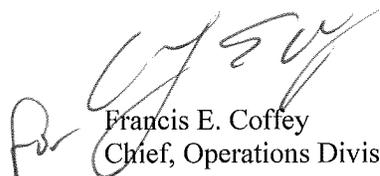
PROJECT APPROVAL / FUNDING SUMMARY SHEET

Project Number GRN-02-14
Category Code 910-320
Type Report Rehabilitation
Event Name March 2014 Storm
Event Date Start March 2014
State Washington
County King
CWIS Number 146620
B/C Ratio 1,257 : 1

Construction Subtotal	\$ 1,550,000
S&A (6%)	\$ 93,000
Contingency (10%)	\$ 155,000
Total Construction Cost	\$ 1,798,000
Engineering & Design (6% Federal)	\$ 108,000
Total Project Costs	\$ 1,906,000
Federal Project Costs (80% Construction Cost + E&D)	\$ 1,546,000
Sponsor Project Costs (20% Construction Cost)	\$ 360,000
B/C Ratio	1,257 : 1

2. This memorandum summarizes information found in the enclosed Project Information Report. For additional information, please contact CPT Rex Broderick at (206) 316-3133.

FOR THE COMMANDER


Francis E. Coffey
Chief, Operations Division

PROJECT INFORMATION REPORT
REHABILITATION OF FLOOD CONTROL WORKS
DYKSTRA LEVEE, CITY OF AUBURN, KING COUNTY, WASHINGTON
GRN-02-14

PART 1. PROJECT EXECUTIVE SUMMARY

PROJECT NAME: Dykstra Non-Federal Levee

PROJECT FUNDING CLASS: 320

PROJECT CWIS NUMBER : 146620

NON-FEDERAL SPONSOR: King County

LOCATION AND DESCRIPTION: The Dykstra levee is a non-federal levee, located along the left bank of the Green River. It extends from about river mile (RM) 30.8 to RM 31.9, in the City of Auburn, King County, Washington. It was constructed by King County in the early 1960s and is maintained by King County. The levee is composed of earthen material armored with riprap on the riverward side. The levee protects residential and commercial property and infrastructure.

DESCRIPTION OF DAMAGE: Three sections of the levee are flood damaged and currently provide a 1 yr level of protection. The length of damage is 850 feet. The major damage, on the downstream end of the levee, includes scour of the toe which has caused sloughing and a 2 foot vertical crack of the riverward levee slope to begin sloughing off. The other two damaged sites have approximately 300 feet and 400 feet sections of scour at the toe and embankments which left a 2-3 foot vertical face above the waterline. Damages were reported following recent high flows on 3/10/2014 of 9,090 cfs at USGS 12113000, Green River near Auburn, WA. This event is estimated to be a 2-yr return period, or about a 0.5 chance of exceedance for a given year.

PROPOSED REPAIR: The proposed repair includes replacement of approximately 850' of the riverward levee toe and slope embankment for three sections of this levee. The three levee sections will be graded to allow a 2H:1V slope and a 3 foot blanket and buried toe of class IV riprap armor rock. Soil lifts with willow plantings will likely be included. The proposed repair will return the damaged portions of the levee to the pre-flood 0.002 ACE (200 yr) for overtopping Level of Protection (LOP). The remainder of the levee and toe is assumed to be intact and provide a 200 yr level of protection which is consistent with overtopping. The site 1 repair, see Figure B-3, has a 42 inch corrugated metal pipe (CMP) culvert near the downstream end (see photos C-3 & C-4). The downstream tie-in will likely encroach on the culvert headwall. Consequently, the headwall, Tideflex gate, and about a 20 foot section of culvert will need to be replaced.

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4. Project Location

- a. Town: City of Auburn
County: King
State: Washington
Basin: Green
Flood Source: Green River

Narrative: This levee is part of a system of levees along the Green River. Due to current damages, the project's level of protection has been reduced from 200 years to 1 year protection. The damaged project sections are located on the left bank of the Green River between river miles 30.8 and 31.9. See Appendix C for photographs of damage and Appendix B for location and vicinity maps, and typical cross sections for the proposed repair. Residential structures butt the levee and, in some locations, may inhibit or limit the use of large construction equipment.

5. Project Design: The riverside levee slope is 1.5H:1V to 2H:1V (Horizontal to Vertical) and the levee is approximately 12 feet in height, measured from the waterside toe. The levee top width varies from 15 to 20 feet. The landside of the levee is either level with or drops only slightly (about 3 feet) from the crown elevation. Original as-builts for this levee are unavailable. Armor was added to past repair sites (see Figure B-1) and toe rock was observed at various locations along the levee. Riprap was observed from approximate Station 9+00 to 21+00. The designed repair would replace damaged toe and embankment areas with levee material and a blanket of rock armor, and restore a gravel path to the crown. A cross-section is included in Appendix B.

6. Disaster Incident: Damages were reported following recent high flows of 9,090 cfs at USGS 12113000, Green River near Auburn, WA on 3/10/2014. This event is estimated to be a 2-yr return period, or about a 0.5 (50%) chance of exceedance for a given year.

7. Project Damages:

- a. The high river flows caused scour and loss of embankment material and toe rock, which produced an unstable, oversteepened slope. This levee requires an emergency repair to restore flood protection.

- b. The loss of scour protection has compromised the levee's pre-flood level of protection. The current LOP for this levee is a 1-year return period and corresponds to the point where damage would occur with some certainty if the levee provided no flood mitigation.

8. Project Performance:

The last pre-flood levee inspection was conducted in June 2013. There were no deficiencies or damage noted at the proposed repair sites in this PIR. The overall levee was found to be in unacceptable condition but the levee segment remains eligible in the

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PL84-99 program due to King County's participation in the Corps' system wide improvement framework (SWIF) program. Although the current guidance would give the County two years to accomplish repairs, this levee will remain eligible for Federal assistance as long as the County continues progress in this program. Vegetation was the deficiency noted in the inspection report, and is the reason it is in the SWIF. The local sponsor performs periodic vegetation maintenance.

9. Project Repair Alternatives Considered:

Multiple alternatives were considered. The Repair to Pre-flood Level of Protection Alternative is the preferred alternative. A preliminary analysis has been performed on the following alternatives: All proposed structural repairs will restore the pre-flood 200 yr level of protection.

a. No Action Alternative:

The No-Action alternative was rejected due to the reduced level of protection and the increased likelihood of levee failure. The results of a failure would include extensive residential and commercial damages within Auburn, Washington.

b. Repair to Pre-Flood Level of Protection Alternative:

The repair includes rebuilding a total of approximately 850' levee embankment and toe on the riverward slope. The repair will reestablish the levee to the pre-flood level of protection by regrading the slope to 2H:1V and adding new armoring to protect the structure from scour. Site 1 has a 42-inch metal culvert with Tideflex duckbill gate and a concrete headwall. The culvert is not damaged, but the downstream transition will most likely encroach on the headwall. This will require that the precast concrete headwall, the Tideflow duckbill gate, and about a 20 foot section of culvert be replaced. See the design drawings in Appendix B.

c. Non-Structural Alternative:

This alternative would relocate all existing structures, utilities and other infrastructure within the damage area protected by the levee. This was not a viable alternative for our sponsor. The costs and low feasibility associated with this alternative were deemed too high for the level of benefit associated with this alternative.

10. Recommended Alternative:

The recommended alternative is: b. Repair to Pre-flood Level of Protection. The proposed repair will entail replacing a total of 850' of the levee toe and repairing the slope that has been damaged. Included in the total length is the transition required to meet the existing levee adjacent to the up and downstream segments. All governing regulation and pertaining requirements will need to be followed. See Appendix B for design drawings and maps, and Appendix C for photos. Confirmation of the preferred alternative and finalization of the design, including NEPA/ESA recommendations, will occur during the Engineering and Design phase and prior to construction.

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11. Real Estate.

Lands, Easements, Rights-of-Ways, Relocation, and Disposal (LERRD's)

The project is located in the City of Auburn, WA in Sections 7/8, Township 21 North, Range 5 East, Willamette Meridian, in King County, Washington. The Dykstra Levee Rehabilitation Project would repair 3 separate sites consisting of approximately 850 LF to address toe erosion and bank sloughing (See Appendix B).

In order to proceed with the rehabilitation effort, the NFS must make the required local project lands available prior to solicitation for the construction contract. See the proposed project schedule under Section 15 of this report.

To meet the real estate requirements, the Public Sponsor will need to demonstrate that it has the below minimum real property interests for the entire Dykstra Levee Rehabilitation Project:

PERPETUAL FLOOD PROTECTION LEVEE EASEMENT ESTATE

A perpetual and assignable right and easement in the land delineated on the attached location map, Exhibit _____, by this reference made a part hereof, to construct, maintain, repair, operate, patrol and replace a flood protection levee, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired.

Proposed access (both ingress and egress) to the Rehabilitation Effort site is available from public streets onto the levee. The Public Sponsor will need to demonstrate that it has the below real property interests for access to the levee easement footprint for construction, operation and maintenance of the Dykstra Levee Rehabilitation Project.

PERPETUAL ROAD EASEMENT

A perpetual and assignable easement and right-of-way in, on, over and across the land delineated on the attached location map, Figures _____, for the location, construction, operation, maintenance, alteration and replacement of (a) road(s) and appurtenances thereto; together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the grantors, their heirs and assigns, the right to cross over or under the right-of-way as access to their adjoining land; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

A temporary work area for construction staging is proposed within the Levee Easement. The Public Sponsor will need to demonstrate that it has the below real property interests for the proposed temporary work area.

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TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, on, over, and across the land delineated on the attached location map, Figures _____, for a period not to exceed _____, beginning with date possession of the land is granted to the Grantee for use by the United States, its representatives, agents, and contractors as a work area, including the right to deposit fill thereon, move, store, and remove equipment and supplies, and erect and remove temporary structures on the land, and to perform any other work necessary and incident to the construction of Dykstra Levee Rehabilitation Project Job No. GRN-02-14, together with the right to trim, cut, fell, and remove there from all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads.

The Public Sponsor may also need to provide a suitable disposal site by acquiring a temporary disposal area (using the above temporary work area easement); however, if the Public Sponsor is unable to provide a suitable disposal area, then the material will be taken to a commercial site for disposal.

The final location of temporary work area easements and disposal sites to support the construction of the Rehabilitation Effort, including access routes for ease of construction, will be determined in the next phase – Engineering & Design (E&D). Also as part of the land certification process for the levee rehabilitation effort and the entire Dykstra Levee Rehabilitation Project, the Public Sponsor will need to provide title reports, not more than 90 days old at the time of land certification demonstrating its interest in the Levee Project lands.

Any questions regarding types of property interests needed for the proposed project should be coordinated with COE, Real Estate Division.

12. Economic Evaluation

The objective of the economic evaluation is to determine if the project is economically justified.

The economic analysis is conducted in accordance with ER and EP 500-1-1. Some key points are as follows:

a. Discount Rate. Economic justification analysis will use the current Federal discount rate for water resources evaluation. Currently the discount rate is 3.5%.

b. Level of Detail. The benefits of project rehabilitation are determined by comparison of the with and without project conditions. The economic analysis will be prepared in level of detail commensurate with the complexity of the project. Also in the

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analysis, the greater the effect a particular benefit item has on project justification, the greater the level of detail of its evaluation. It is not intended that the analyses for rehabilitation projects be exhaustive, but should provide sufficient data to document the steps used in formulating the proposed plan of rehabilitation.

c. Period of Analysis. The same period of time over which all project costs and benefits are analyzed is used for all alternatives. The period of analysis for rehabilitation work should not exceed the remaining physical life of the entire project. Any exception to the above will require justification in the PIR.

1) Federal Projects. The economic life of federally constructed projects shall be the shortest time period determined by the following criteria:

a. Fifty years.

b. The degree of protection afforded by the project in the rehabilitated condition.

c. The anticipated remaining life of the project assuming ordinary maintenance without major component rehabilitation (e.g. pumping plants, earth fill levees, riprap protection, etc.)

2) Non-Federal Agricultural Projects. Ten years, or the degree of protection provided, whichever is less.

3) Non-Federal Urban Projects. Use same criteria as for Federal projects.

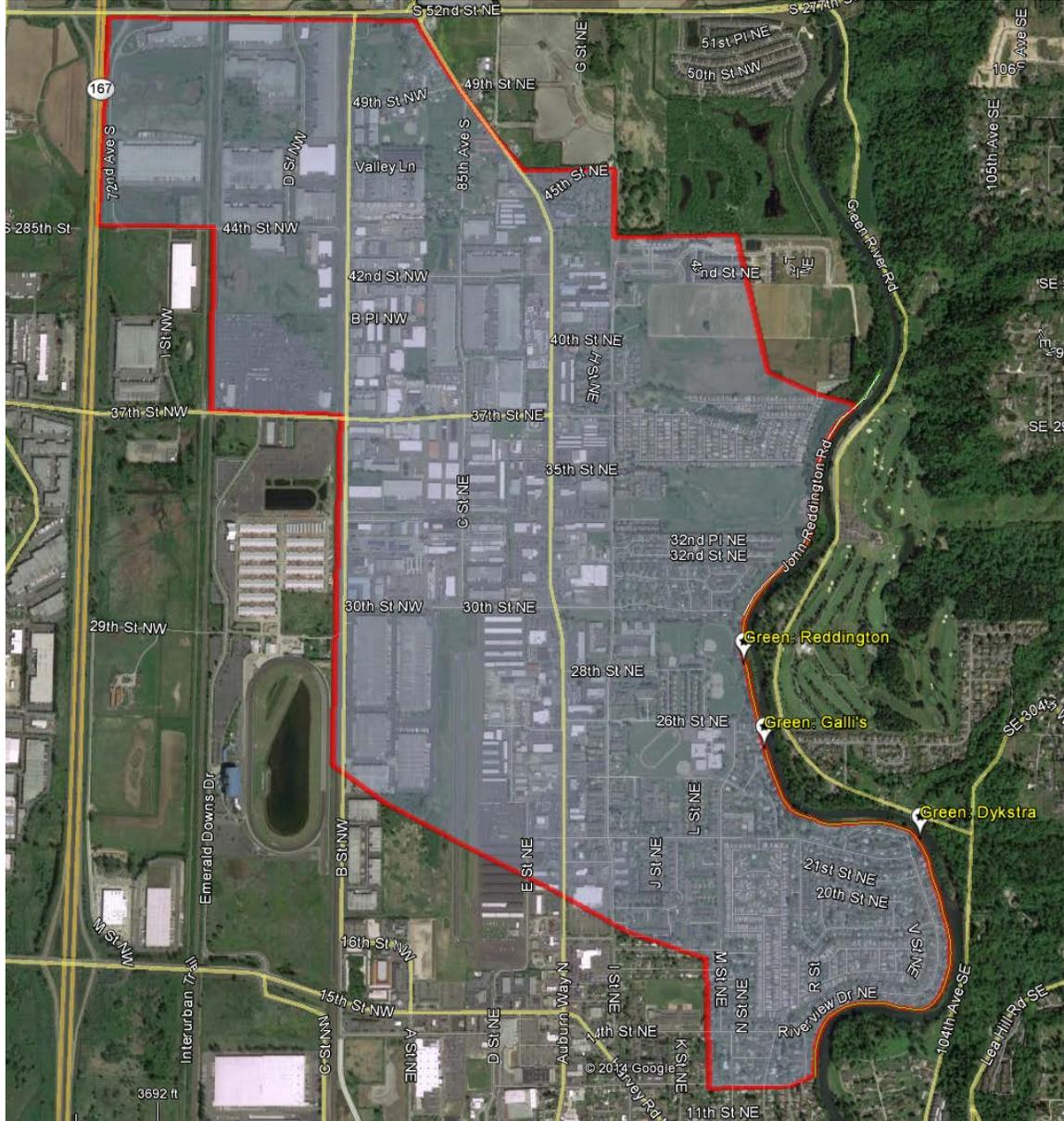
Based on the criteria in c. (1-3), the Period of Analysis for this analysis will be fifty years.

Location: The Dykstra Levee is a segment of the Galis/Dykstra/Reddington Levee system. It is on the left bank of the Green River, beginning about two and a half miles downstream of the Hwy 18 Bridge and extending another two miles downstream.

Protected area: The leveed or protected area extends about a mile to the east is about 2.26 square miles of highly developed warehousing, light industrial, retail, and about a third of it is residential. According to the Levee Screening Tool (LST), which pulls its data from the Census, daytime population is estimated at about 7,200; night time about 5,700. The LST also estimates about 1780 structures with a value of about \$886M. See Figure 1.2.

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Figure 1 Lower Green River Right Bank Leveed Area (magenta polygon), Kent, WA



a. Without-Project Condition: NWS engineering staff has estimated that the levee's level of protection has been reduced from 200 years (.005 annual exceedance probability) to a 1 year or annual event (.9999 annual exceedance probability). According to the Levee Screening Tool (LST), an event that overtops the levee (maximum level of protection) is about a 200-year event, which would inundate over 1400 acres and 1780 structures valued at \$885M to depths of over 21 feet.

With-Project Condition: Repair of the levee would restore the estimated level of protection to approximately a 200-year event. Therefore, flooding of the residential and

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commercial structures and inventory would not be expected before the 200-year event for the with-project condition.

b. Benefits Evaluation. In accordance with ER 500-1-1, the economic analysis is prepared to a level of detail sufficient to demonstrate a high probability that the annualized economic benefits of the repair exceed the annualized costs.

This levee has been screened by the levee screening process and the LST has information about the extent of the protected area, property values, and inundation depths that has been reviewed extensively.

The LST includes a graph with information about population, number of structures, area (in square miles), and structure value associated with ground and water surface elevations. Figure 2 below is a screen shot from the LST of the Dykstra levee screening.

Figure 2 Dykstra Elevations vs. Property values



Table 1 tabulates the characteristics by ground elevation.

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Table 1 Leveed Area Characteristics

Approx Ground Elevation	Flood Plain Area (Square Miles)	Est Pop (Day)	Number of structures	Value of Structures
40 (invert)	0	0	0	0
52.5	0.54	502.63	135.63	\$ 156,287,000
53.5	0.68	968.06	182.71	\$ 195,506,030
54	0.79	1242.9	223.9	\$ 218,070,840
55	0.95	1806.59	346.72	\$ 260,274,820
56	1.16	2511.28	543.32	\$ 341,147,630
57	1.39	3433.53	848.76	\$ 469,069,220
57.5	1.53	4031.43	1034.89	\$ 547,479,020
58	1.89	5629.59	1270.6	\$ 725,039,110
58.5	2.01	6000.86	1377.07	\$ 769,035,800
61.5	2.24	7131.37	1744.89	\$ 874,623,240
Maximums	2.26	7220	1778	\$ 885,878,120

The purpose of the LST is to evaluate risk to life and property; hence its purpose is to capture potential consequences rather than estimating damages. Thus, it does not provide a depth damage curve which is critical to estimating expected annual damages or EAD.

Damages are typically estimated based on the relationship between the depth of inundation, which is the difference between the estimated Water Surface Elevation (WSE) and the First Floor Elevation (FFE), and the percentage of damage to the structure based on that inundation depth and the depreciated replacement value of the structure. Both FEMA and the Corps of Engineers rely on depth percent damage tables that have been developed from statistical analysis and expert opinion elicitation studies from decades of flooding experience. FEMA has a curve for a consolidated or generic building that is a composite of commercial and residential structures. Table 2 consolidates and shows estimates of damage to structures grouped by ground elevations for an event approximating the maximum with project level of protection internal to the Dykstra Levee.

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Table 2 Estimated maximum inundation depths and damages for Dykstra structures by ground elevation groups

Approx Ground Elevation	Value of Structures by Ground Elevation Groups	WSE (Dykstra Segment Minimum)	Average Depth (feet)	Average First Floor Elevation	Average Structure Inundation Depth	FEMA Depth % Damage for Consolidated Buildings	Estimated Damage to Structures
40	0	61.2	21.2	2	19.2	50%	\$ -
52.5	\$156,287,000	61.2	8.7	2	6.7	42%	\$ 65,449,870
53.5	\$ 39,219,030	61.2	7.7	2	5.7	37%	\$ 14,562,810
54	\$ 22,564,810	61.2	7.2	2	5.2	33%	\$ 7,367,862
55	\$ 42,203,980	61.2	6.2	2	4.2	30%	\$ 12,612,237
56	\$ 80,872,810	61.2	5.2	2	3.2	28%	\$ 22,728,495
57	\$127,921,590	61.2	4.2	2	2.2	25%	\$ 32,359,045
57.5	\$ 78,409,800	61.2	3.7	2	1.7	22%	\$ 17,392,862
58	\$177,560,090	61.2	3.2	2	1.2	18%	\$ 31,964,367
58.5	\$ 43,996,690	61.2	2.7	2	0.7	17%	\$ 7,325,889
61.5	\$105,587,440	61.2	-0.3	2	-2.3	0%	\$ -
Total Estimated Damage to Structures							\$ 211,763,437

The table shows that a 200-year event would be expected to cause over \$200M in damages to the \$885M in property internal to the leveed area.

If repairs are made (the with-project condition), the levee will be restored to a 200-year level of protection. However, the levee is not designed to provide protection from events that exceed a 200- year event; thus any events that exceed in severity a .005 exceedance probability event would result in more severe consequences. Those consequences will not be estimated, but truncated at the maximum WO Project estimate.

Since the LST does not provide estimates of inundation depths at more frequent events that would be expected to breach the levee in the without project condition an assumption is made that the damage curve is a linearly increasing function with higher damages associated with lower probability events. The area under the curve of this function is the sum of the expected value of all events between the zero damage event (.5 annual exceedance probability) and the design Level Of Protection or the 200- year event. This sum is considered a reasonable approximation of is the EAD that will be prevented in the with project or rehabilitated condition. For a detailed explanation of the procedure used to calculate EAD see IWR88-R-2 IWR Urban Flood Damage Manual; Page V55. Table 4 shows the results of applying that process to calculate the With and Without Project EAD, rounded to the nearest \$1,000.

The comparison of the without-project and with-project damages is presented in Table 3 below.

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Table 3 Comparison of Without-Project and With-Project Damages - Project Annual Benefits

EAD W/O Rehab	\$104,622,000
EAD W/ Rehab (Truncated)	\$318,000
Rehab Benefits	\$104,304,000

Project Costs:

The Total Project Cost estimate is \$1,905,900. This cost is converted to annual costs by amortizing it over the project lifetime of 50 years at the current federal interest rate of 3.5%, then adding the annual estimated O&M cost of \$2,000. Table 4 Annualized Costs displays the summary of the annual costs.

Table 4 Annual Costs

Total Project Cost	\$ 1,905,900
Principle and Interest (50 yrs @ 3.5%)	\$ 81,300
O&M	\$ 2,000
Total Annual Cost	\$ 83,300

Summarized Financial and Economic Data: Displayed in Table 5

Table 5 Summarized Financial and Economic Data (rounded)

Construction Cost	\$ 1,550,000
S&A	\$ 93,000
Contingency (10%)	\$ 155,000
Total Construction Cost	\$ 1,798,000
Engineering and Desion (6%)	\$ 108,000
Total Project Cost	\$ 1,906,000
Federal Project Cost (80% construction cost + E&D)	\$ 1,546,000
Sponsor Project Cost (20% construction cost)	\$ 360,000
Project Annual Costs (50 years @ 3.5%)	\$ 83,000
Project annual Benefits	\$ 104,304,000
Benefit-Cost Ratio	1,257

Benefit/Cost Ratio: The Benefit Cost Ratio, BCR is \$104,304,000/\$83,300 (rounded to \$1,000's) or 1257..

c. Benefit Checks: Benefit checks are summarized in Table 6.

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Table 6 Checks

Check	Check Met?
Property value \$886M First costs: \$1,906,000	Yes
Crop benefits per acre do not exceed 5% of land value per acre	Not applicable
Crop benefits do not exceed net crop income	Not applicable
Each property owner accounts for less than 25% of the benefits	Yes

This project is economically justified

13. Environmental.

a. General: There are 3 project locations along the Dykstra levee. The most upstream site includes a slumped area, largely covered by blackberries. Eight alders (approximately 6 to 14 inch DBH) and one willow thicket exist in the project site that may need to be removed for the construction. The opposite bank is the North Green River Park, with a largely forested bank and a small shallow beach river access point.

The middle site includes scattered trees and is predominately covered by blackberry and reed canarygrass with a few rose and snowberry. Two large Douglas fir trees (approximately 18 to 20 inch DBH), a plum tree, an ornamental maple sapling, a willow thicket and a large multistemmed cedar (five stems, each about 10 inches DBH) may need to be removed to complete the repair. This site is opposite the only natural off-channel habitat in the lower Green River. The in-channel vegetated island provides important fish and wildlife habitat in this reach.

The final site is located near Dykstra Park. This site is a grass lined slope. Runoff from the roof of adjacent homes is piped over to the levee slope in the project area and a very large four-foot outfall is located at the downstream end of the project site. The outfall's concrete apron is undermined. If this is to act as a tie-in location, the undermining will need to be addressed. This could include construction of a small coffer dam and use of concrete. The opposite bank is Isaac Evans Park and is a forested bank.

All three sites included armoring prior to the damaging event. Also at all three sites the landward side of the levee has been filled so that the elevation is now even with the levee crown. The backside of the levee is a residential area with well maintained lawns, ornamental plantings, and scattered trees.

The Green River contains spawning populations of fall Chinook, coho, pink, and fall chum salmon, and winter and summer steelhead. Small numbers of sockeye salmon are also found. Bull trout use the lower river for feeding and rearing. The project area has documented Chinook, chum, sockeye, pink, and steelhead spawning, as well as coho rearing.

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b. Endangered Species Act: The following species listed under the Endangered Species Act as endangered (E) or threatened (T) and their designated critical habitat (CH) or proposed critical habitat (PCH) could occur within the project area vicinity.

1. Coastal/Puget Sound Bull Trout (*Salvelinus confluentus*) (T) (CH)
2. Puget Sound Chinook (*Oncorhynchus tshawytscha*) (T) (CH)
3. Puget Sound Steelhead (*O. mykiss*) (T) (PCH)
4. Marbled Murrelet (*Brachyramphus marmoratus*) (T)

Any potential effects of the proposed work on threatened and endangered species and designated critical habitat will be addressed in separate compliance documentation in accordance with Section 7 of the Endangered Species Act.

The removal of trees could result in a decrease in shading to the river. This can have two impacts, including decreased protection from artificial lighting and solar radiation.

The work window for this location is 1 August to 31 August. This window misses the most sensitive periods for fish. Impacts to fish would be mitigated by the following: 1) any in-water work associated with repairs and rehabilitation of the levee would occur during the fisheries work window; 2) use of clean fill material; 3) minimizing tree loss to the extent possible, and 3) following Best Management Practices. It is anticipated that mitigation will be required for the removal of trees and the proposed in-water work.

c. Environmental Considerations During Construction:

-Water Quality: Short-term, discountable adverse impacts may result from the repairs to the levee. A temporary increase in turbidity due to fill placement may occur. Turbidity will be monitored during construction. If turbidity exceeds water quality standards, construction will recommence when turbidity returns to acceptable levels. The removal of trees could result in a decrease in shading to the river which could have a minor impact on water quality by decreasing nutrient input and shading. The loss of shading could contribute to increased water temperatures. The use of concrete at or below the waterline would be done using best management practice to limit the potential for water quality impacts.

-Fish and Wildlife: When completed, this levee repair is not intended or expected to generate appreciable change in habitat conditions as compared with pre-existing conditions. Repair construction work may cause indirect impacts to fish and wildlife. There may be a temporary increase in turbidity due to rock placement or in-water work. Working during the work window will limit this impact on fish.

Short-term impacts to wildlife could occur from levee repair construction activities. Noise from construction activities may temporarily disturb and displace birds and mammals that occur within and adjacent to the project area. Animals in this urban area are expected to be tolerant of human presence and would be expected to use

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nearby areas if displaced during construction, and would be expected to return soon after construction was completed.

Care will be taken during design and construction to ensure that there is no increased energy directed at the opposite bank. This is especially important at the site opposite the instream island which provides important habitat for the lower Green River.

-Wetlands: A wetland biologist will survey the sites, particularly the site near Dykstra Park. The riverward bench at the upstream end of the site, where the repair is likely to tie in requires a survey to ensure impacts are avoided or minimized.

d. Cultural Resources: The Corps completed a records search and literature review of information on file at the Washington State Department of Archaeology and Historic Preservation. The review indicated that there are no known archaeological resources in the project's area of potential effects (defined as the zone directly affected by the levee restoration), and no historic era structures eligible for listing on the National Register for Historic Places (NRHP).

Prior to approval of the proposed project, the Corps would conduct a cultural resources survey of the project area to determine whether there are historic properties within the area of potential effect and whether there is a potential for the proposed project to cause effects to historic properties that may be located in or adjacent to the project area. The Corps would also consult with the Muckleshoot Indian Tribe to determine if there are properties of religious or cultural significance that might be affected. The results of the cultural resources investigation and the Corps' findings of effect on historic properties would be submitted to the Washington State Historic Preservation Office (SHPO) and the Muckleshoot Indian Tribe for their review and comment. Should the project have an adverse effect on a historic property, the adverse would be resolved prior to project approval in accordance with the regulations implementing Section 106 of the National Historic Preservation Act (NHPA).

e. Recreation: All three Dykstra repair sites are not accessible to the public and are not available for general recreation. Two of the sites however are adjacent to and/or opposite public parks. Access to the downstream site will likely occur through Dykstra Park. Dykstra Park would be impacted during construction by the presence of machines, increased noise, and partial closure for safety. The parks on the opposite side of the river could also be impacted by the presence of machines and increased noise. No permanent impact to recreation is expected.

f. Cumulative Effects: No other projects are known for these areas. A full cumulative effects analysis will be completed during the NEPA process in E&D.

g. Coordination: The proposed work is formally coordinated throughout the planning, design, and construction phases with the following tribes and agencies:

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- (1) U.S. Fish and Wildlife Service
- (2) National Marine Fisheries Service
- (3) U.S. Fish and Wildlife Service
- (4) Muckleshoot Indian Tribe
- (5) State Historic Preservation Office
- (6) Washington Department of Ecology
- (7) King County

Recommendations from the above listed agencies will be considered and implemented as appropriate. Any suggested revisions to the design as a result of agency review will require design, cost, and technical review prior to construction. Environmental effects of the proposed levee rehabilitation will be considered during the planning process in accordance with ER 200-2-2, Procedures for Implementing NEPA, paragraph 8, Emergency Actions.

h. Further Compliance: An environmental assessment (EA) will be prepared to evaluate probable impacts of the project on the existing environment. Factors addressed by the evaluation include, but are not limited to: public safety, water quality, wetlands, threatened and endangered species, noise, economics, fish, and wildlife. The EA will be coordinated with applicable Federal and State resource agencies and tribes. The NEPA process will be concluded as pursuant to requirements in ER 200-2-2. In addition, the requirements for compliance with the Endangered Species Act will be completed.

Pursuant to 33 U.S. Code section 1344(f)(1)(B), emergency reconstruction of recently damaged parts of levees does not require a Clean Water Act Section 404 evaluation provided that the work is conducted for maintenance purposes. Analogizing to the Code of Federal Regulations Title 33, Section 323.4(a)(2), the rehabilitation may be exempted from requirements of Section 404, provided the rehabilitation does not include any modifications that change the character, scope, or size of the original fill design. Concerning scope and size, the proposed repair would not require a Section 404(b)(1) evaluation as long as the footprint of the levee repair, which falls within waters of the U.S., is no larger than the pre-damage footprint and wetlands are not temporarily impacted during construction. However, if Section 404 jurisdiction is triggered, a 401 water quality certification might be required.

A Coastal Consistency Determination will be completed prior to construction and will be coordinated with the State Department of Ecology.

i. Environmental Enhancement Features: Project construction may include environmental enhancement features to offset temporary construction impacts. Environmental features proposed by agencies will be fully engineered and reviewed during E&D. Per guidance from Corps Headquarters, 5% of construction cost may be used for environmental features. Likely mitigation could include onsite or offsite plantings.

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14. Interagency Levee Task Force (ILTF)

HQUSACE has not directed activation of an ILTF for the flood event associated with the March 2014 floods in Western Washington. However, informal coordination with FEMA is ongoing.

15. Project Management

a. Funding Authority:

(1) Program and Appropriation: Public Law 84 – 99, Levee Rehabilitation, Flood Control and Coastal Emergencies

(2) Project Funding Class: 320

(3) Project CWIS Number: 146620

b. Project Funds

Construction Subtotal	\$ 1,550,000
S&A (6%)	\$ 93,000
Contingency (10%)	\$ 155,000
Total Construction Cost	\$ 1,798,000
Engineering & Design (6% Federal)	\$ 108,000
Total Project Costs	\$ 1,906,000
Federal Project Costs (80% Construction Cost + E&D)	\$ 1,546,000
Sponsor Project Costs (20% Construction Cost)	\$ 360,000
Project Estimated Annual Benefits	\$ 104,304,000
B/C Ratio	1,257 : 1

c. Project Repair Schedule

The Work Window (work allowed in the water) is 1-31 August. Work performed outside this window will only consist of work that is not in the water.

RESPONSIBLE PARTY	MILESTONE TAKS	MILESTONE DATE
COE	PIR Approval	15 August 2014
COE	E&D complete	31 October 2014
COE	LOA and LER Cert Documents to Non-federal Sponsor, and Designs for Review NLT	5 December 2014
King County	Sign LOA by Non-federal Sponsor	15 January 2015
COE	Environmental Documentation	15 January 2015
King County	Non-federal Sponsor certifies lands	13 February 2015
King County	Non-federal Sponsor provides cash contribution	13 March 2015
COE	RE Division Certifies Lands Available	27 March 2015
COE	Solicit contractors	10 April 2015
COE	Initiate construction	1 August 2015
COE	Complete construction	31 August 2015

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d. Project Authentication

Prepared by: CPT Rex Broderick, (206) 316-3133

Emergency Management approval by: Doug Weber, (206) 764-3406

e. Technical Points of Contact

Emergency Management: Doug Weber, (206) 764-3406

Project Manager: CPT Rex Broderick, (206) 316-3133

Economics: Don Bisbee, (206) 764-3713

Environmental: Bobbi Jo McClain, (206) 764-6968

Cultural Resources: Ashley Dailide, (206) 764-6942

Geotechnical Engineering: Seth Klein, (206) 316-3949

Civil Engineering: Michael Peele, (206) 764-6961

Program Management: Cathie Desjardin, (206) 764-3452

Real Estate: Diane Jordan, (206) 316-4419

Hydraulics and Hydrology: Brendan Comport, (206) 764-3565

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Appendix A: Project Sponsor's request for Rehabilitation Assistance.



King County

Water and Land Resources Division

Department of Natural Resources and Parks

King Street Center
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855

206-477-4800 Fax 206-296-0192

TTY Relay: 711

April 16, 2014

Doug Weber
Chief, Emergency Management Branch
Seattle District, Corps of Engineers
4735 East Marginal Way South
Seattle, WA 98134

Dear Mr. Weber:

Pursuant to your March 17, 2014, notice to levee sponsors, I am writing to request rehabilitation assistance for flood-damaged levees under the authority of Public Law 84-99. Specifically, I request assistance with the following damages to King County levees that were identified after flood conditions receded in March 2014:

1. Desimone levee on the right bank of the Green River in the City of Tukwila, River Mile (RM) 14.5-14.6, between Cascade Avenue South and the West Valley Highway (SR 181). Slumping of the riverward levee slope has undermined its rock armor and exposed its subgrade materials.
2. Segale levee on the left bank of the Green River in the City of Tukwila, RM 15.1, between Riverside Drive and Todd Boulevard South (if both were extended). Steep fill slope at an access ramp transition is slumping.
3. Holiday Kennel levee on the right bank of the Green River in the City of Kent, RM 18.5-18.7, between South 218th Street and South 221st Street (if both were extended). Slumping of the riverward levee slope has undermined its rock armor and exposed its subgrade materials.
4. Russell Upper levee on the right bank of the Green River in the City of Kent, RM 19.4-19.9, between South 232nd Street and South 237th Street (if both were extended). Slumping of the riverward levee slope has undermined its rock armor and exposed its subgrade materials.
5. Signature Pointe levee on the right bank of the Green River in the City of Kent, RM 23.0, roughly where 66th Avenue South would intersect the river. Slumping of the riverward levee slope has exposed subgrade materials.



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Doug Weber
April 16, 2014
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6. Nursing Home levee on the right bank of the Green River in the City of Kent, RM 25.9, roughly where South 262nd Street would intersect the river. Rill erosion of the riverward levee slope.
7. Dykstra levee on the left bank of the Green River in the City of Auburn, RM 29.7, roughly where Pike Street Northeast would intersect the river. Slumping of the riverward levee slope has undermined its rock armor and exposed its subgrade materials.
8. Dykstra levee on the left bank of the Green River in the City of Auburn, RM 30.2-30.3, roughly where 19th Drive Northeast would intersect the river. Slumping of the riverward levee slope has undermined its rock armor and exposed its subgrade materials.

These levees were damaged in the flooding of March 2014. Each of these damaged levees is currently eligible for rehabilitation assistance. All are maintained by King County on behalf of the King County Flood Control District.

I should mention that the Segale levee (#2 above) is part of the Tukwila 205 federal levee for which the City of Tukwila serves as local sponsor. We partner with the city in maintenance of the Segale levee.

I should also mention that the Nursing Home levee (#6 above) is part of the Horseshoe Bend 205 federal levee, for which the King County Flood Control District is the local sponsor.

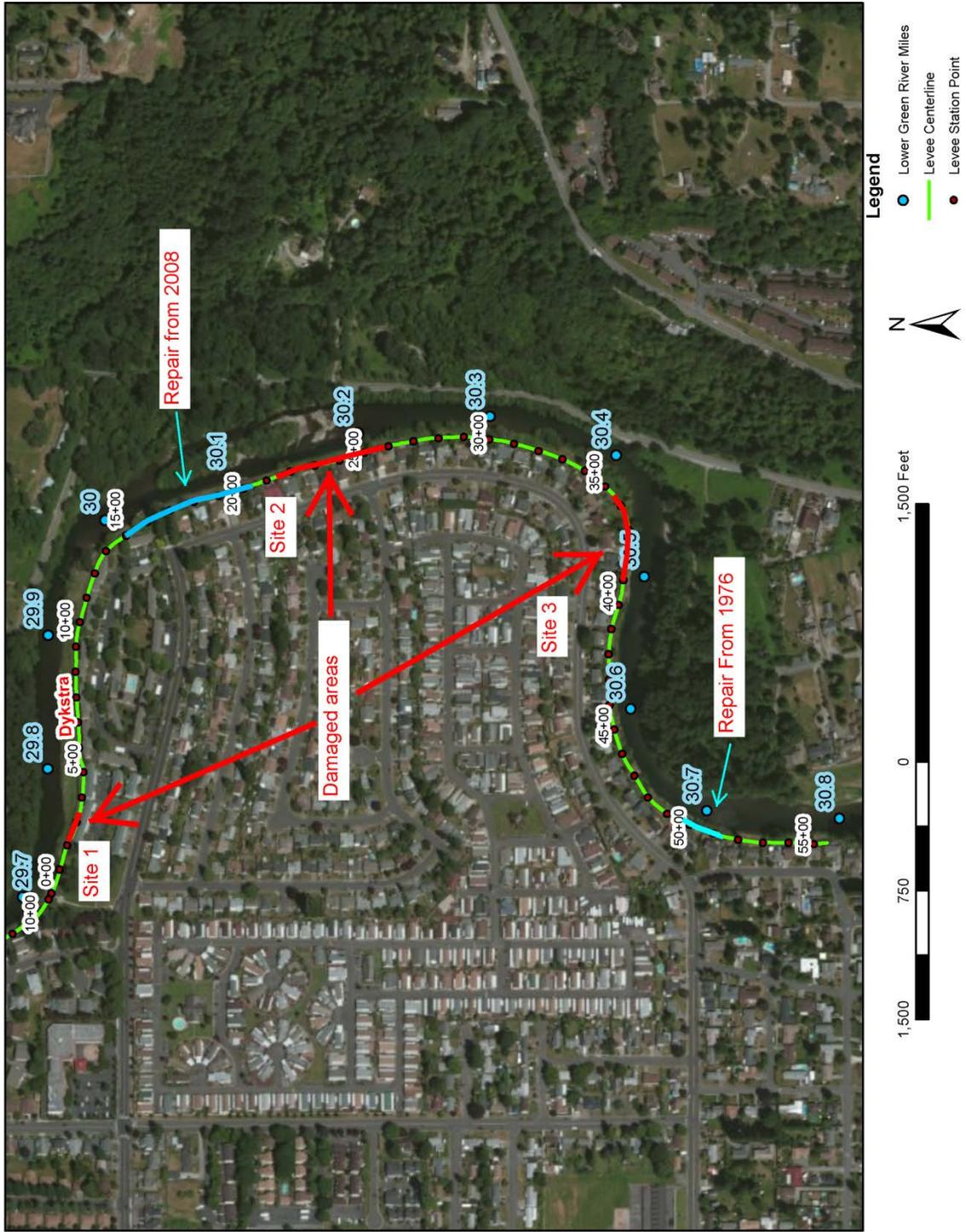
I have directed Tom Bean to serve as our point of contact for this work. He can be reached by telephone at 206-477-4638 and by email at tom.bean@kingcounty.gov. Please work with Mr. Bean to achieve rehabilitation of these damaged levees.

Sincerely,



Steve Bleifuhs, Manager
River and Floodplain Management Section

cc: Bob Giberson, Director of Public Works, City of Tukwila
Tim LaPorte, Public Works Director, City of Kent
Kevin Snyder, Community Development and Public Works Director, City of Auburn
Lorin Reinelt, Green River Basin Supervising Engineer, King County River and
Floodplain Management Section (RFMS)
Tom Bean, Special Projects Engineer, RFMS



Appendix B: Project location vicinity, maps, and drawings.
Figure B-1: Site map with proposed and past repair sites.

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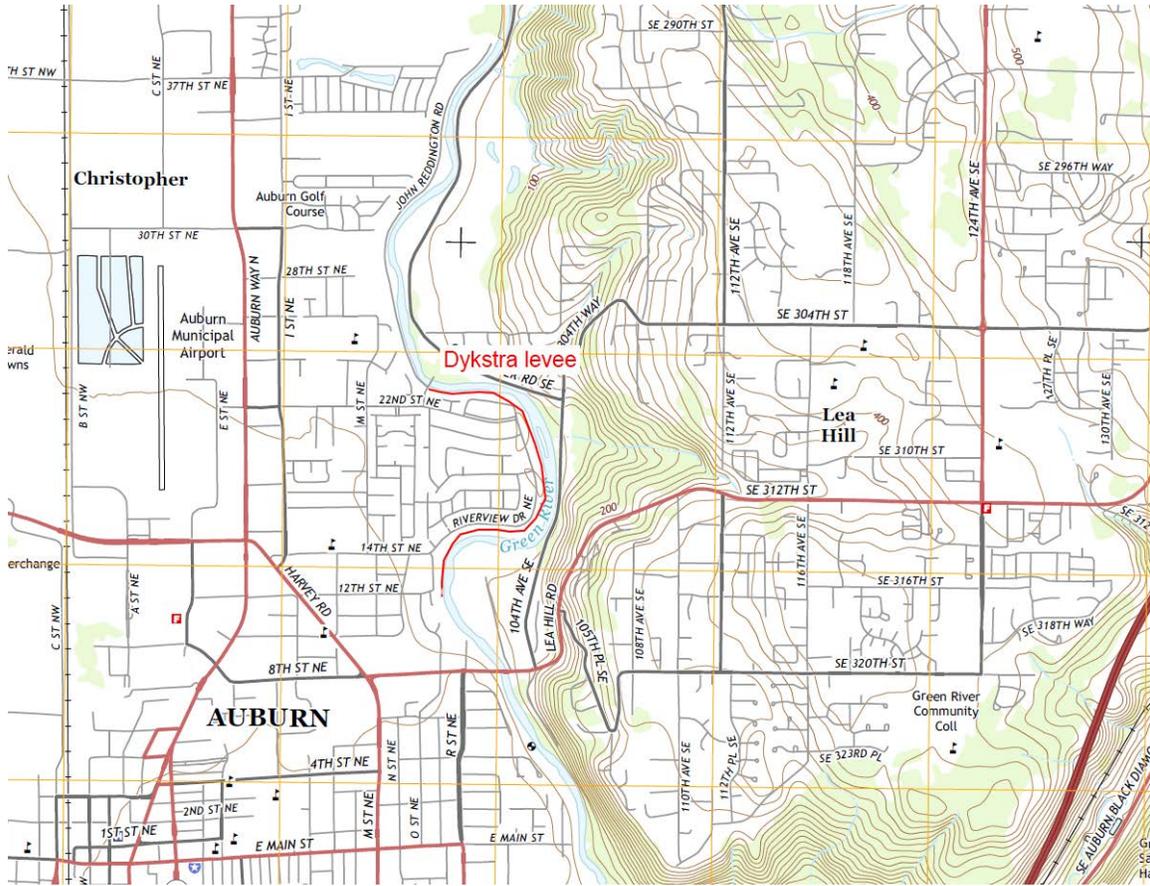


Figure B-2: Project location

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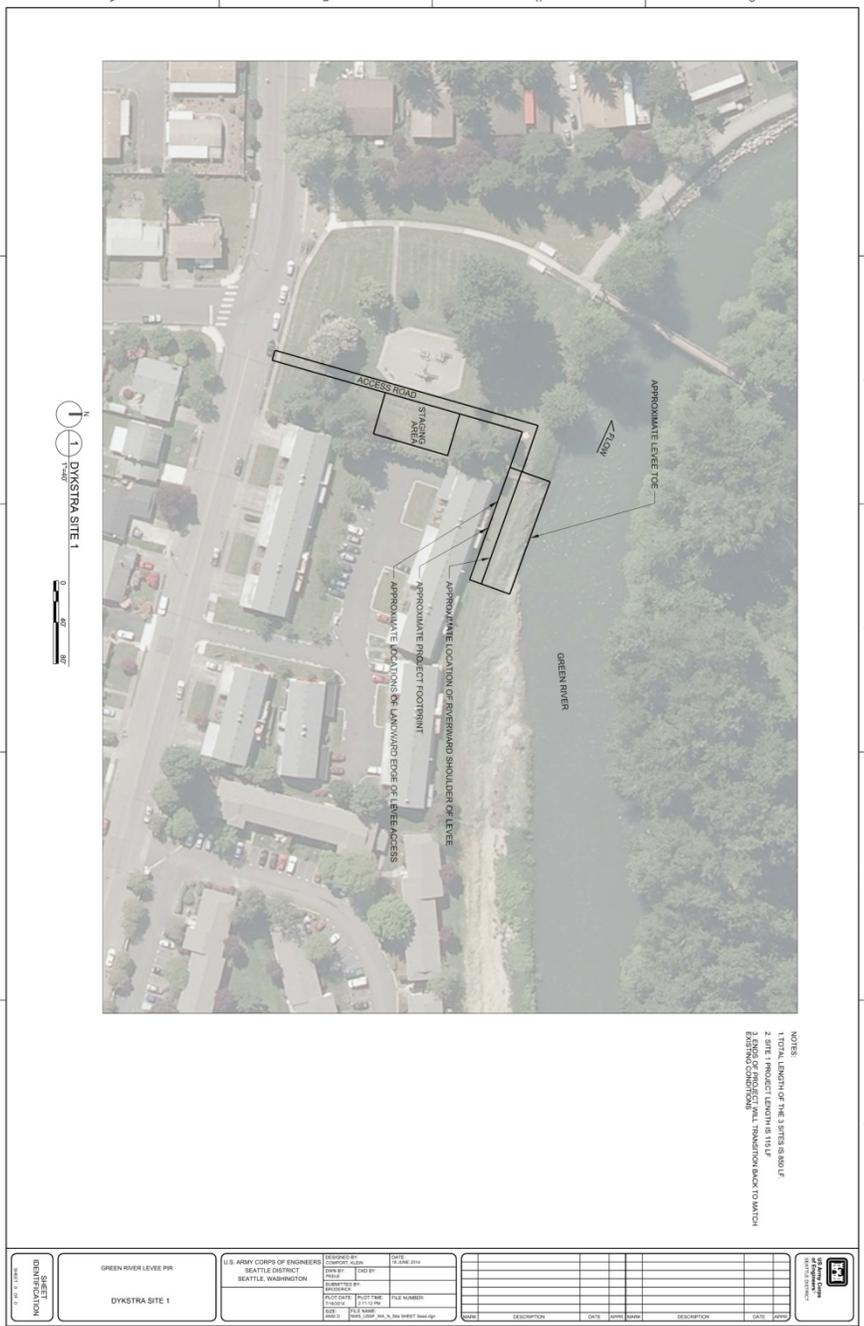


Figure B-3: Project site plan 1



Figure B-4: Project site plan 2

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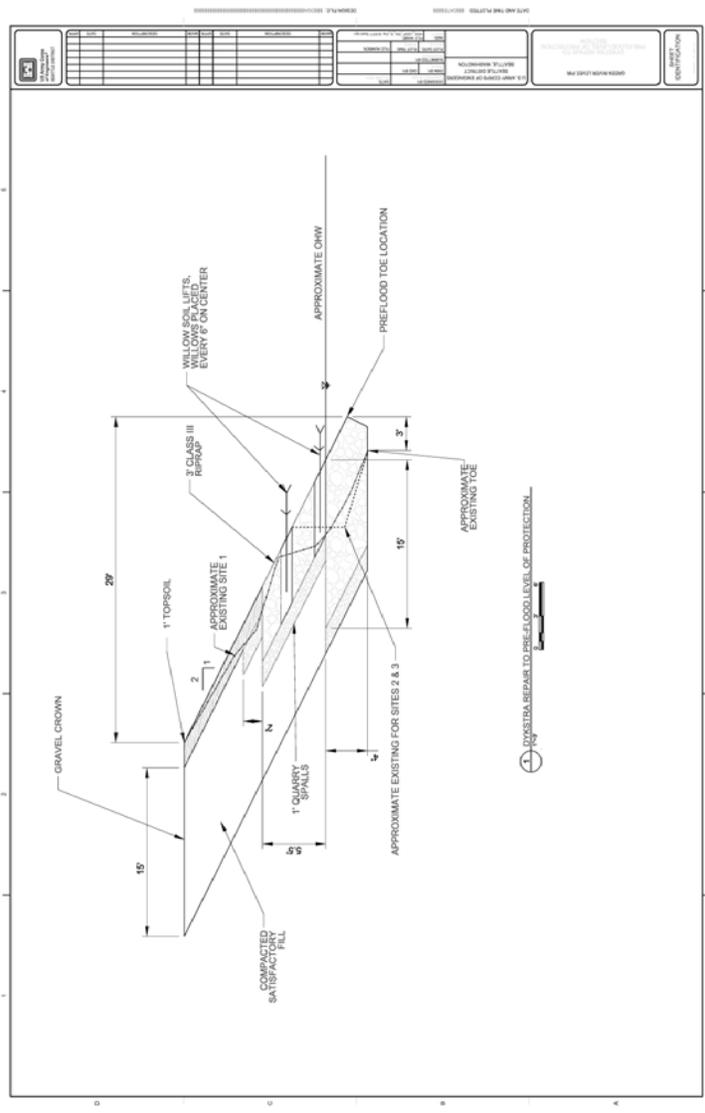


Figure B-6: Dykstra Typical repair section.

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Appendix C: Photos of damaged area



Photo C-1: Damaged portion near downstream end of levee (site 1). Station ~2+50 - Looking upstream. (Corps photo).



Photo C-2: Damaged section looking downstream (site 1). Station ~2+50 (Corps photo)

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Photo C-3: 42" CMP culvert that will need to be partly replaced during the repair to site 1. Looking upstream

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Photo C-4: Close up of culvert from Photo C-3, approximate Station 2+00.

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Appendix Z: PIR Review Checklist

**Dykstra Levee Repair
 PIR Review Checklist for Repair of FCW Rehabilitation Projects**

YES	NO	N/A	
1. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The project is active in the RIP. [ER, 5-2.a.]
2. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The project was damaged by flood(s) or coastal storm(s). [ER, 5-2]
3. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Public Sponsor has requested Rehabilitation Assistance in writing. [ER, 5-10.b.]
4. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The public sponsor has agreed to sign the Cooperation Agreement, which will occur before USACE begins rehabilitation work. [ER, 5-10.]
5. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The estimated construction cost of the rehabilitation is greater than \$15,000, and is not considered sponsor maintenance. [ER, 5-2.q.]
6. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The repair option selected is the option that is the least cost to the Federal government, or, the sponsor's preferred alternative is selected with all increases in cost paid by the public sponsor. PIR includes justification for non-selection of the least cost alternative. [ER, 5-2.h. and 5-11.e.(3)]
7. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The public sponsor is aware of the opportunity to seek a nonstructural alternative project, and has decided to proceed with a structural rehabilitation. [ER, 5-16.]
8. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The cost estimate in the PIR itemized the work to identify the Public Sponsor's cost share. [ER, 5-11.]
9. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The rehabilitation project has a favorable benefit cost ratio of greater than 1.0:1. [ER, 5-2.r.]
10. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The proposed work will not modify FCW to increase the degree of protection or capacity, or to provide protection to a larger area. [ER, 5-2.n.]
11. <input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Betterments are paid 100 percent by the Public Sponsor [ER 5-2.o.]
12. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The CA contains a provision for 80% Federal and 20% local cost share for non-Federal projects [ER, 5-11.a.]
13. <input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Cost for any betterments are identified separately in the cost estimate. [ER, 5-2.o.]

