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THE COLUMBIA RIVER AND TRIBUTARIES STUDY, INTERIM REPORT, YAKIM--ETC(U)
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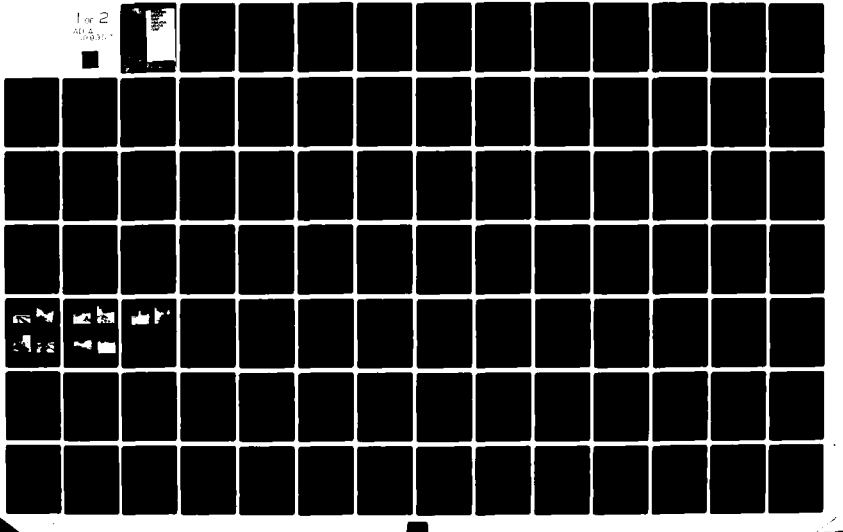

YAKIMA-UNION GAP

YAKIMA-UNION GAP

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

There are six basic components of the proposed plan for flood damage reduction; 4 which are levee improvements and 2 control structures. Project construction will take approximately 15 months to complete. This report defines the environmental settings of Yakima-Union Gap area and analyzes the impacts of the proposal project; most of which are identified as short-term impacts.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

FINAL ENVIRONMENTAL IMPACT STATEMENT

THE COLUMBIA RIVER AND TRIBUTARIES STUDY

INTERIM REPORT

YAKIMA-UNION GAP FLOOD DAMAGE REDUCTION,

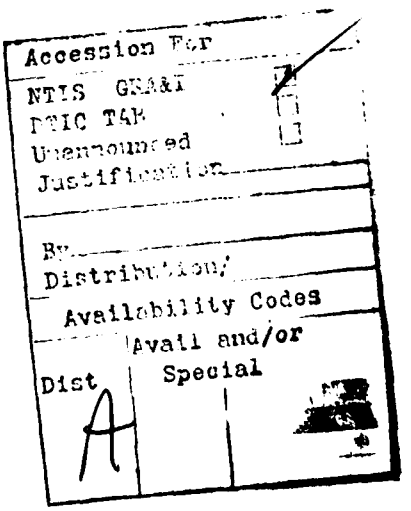
YAKIMA RIVER BASIN, WASHINGTON

Prepared By

U.S. Army Engineer District, Seattle

Seattle, Washington

1980



THE COLUMBIA RIVER AND TRIBUTARIES STUDY
INTERIM REPORT
YAKIMA-UNION GAP FLOOD DAMAGE REDUCTION,
YAKIMA RIVER BASIN, WASHINGTON

( ) Revised Draft Environmental Statement (EIS) (x) Final EIS

Responsible Office:

Colonel Leon K. Moraski, District Engineer
U.S. Army Engineer District, Seattle
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1. Name of Action: ( ) Administrative (x) Legislative

2. Description of Action: The proposed project in Yakima County, Washington, involves the improvement of 9 miles of existing right and left bank levees along the Yakima River, extending from the confluence of the Naches and Yakima Rivers downstream to the Highway 24 Bridge. The project also involves the construction of new levees and flood control structures immediately downstream of the Highway 24 Bridge, including a 2.7-mile left bank levee, primarily to protect farmland and residences, and a 1.1-mile right bank levee to protect the Yakima Sewage Treatment Plant. One-half mile of bank protection for Interstate Highway 82 (I-82) and two control structures for culverts to protect the city of Union Gap, Washington, would also be constructed.

3. a. Environmental Impacts: The proposed project would involve construction on about 66 acres of land, altering an area of natural vegetation, pasture, and existing levees. The existing levees would be improved to provide protection from the 200-year flood event above the Washington State Highway Department Highway 24 Bridge. The proposed new levees would provide protection from the 200-year flood event below the bridge, and the Highway I-82 bank protection and the two control structures would provide protection from the 100-year flood event. Property, lives, agricultural land, businesses, and public roads and facilities would all be protected during flood events. In addition, should plans for a Yakima Floodway Park be realized, the levees could also serve as a trail system linking all sections of the park together.

b. Adverse Environmental Impacts: Project construction would have short-term impacts on local traffic and noise. Contruction on 66 acres of land would eliminate about 20 acres of important wildlife habitat and also wildlife; however, after planting of various species of grasses and forbs on the levee slopes and tops, and some planting of native shrubs on land immediately adjacent to the levees, wildlife populations would begin to recover. Short-term losses of wildlife would adversely impact hunters and those who enjoy observing wildlife. Removal of streamside vegetation

and addition of rock riprap would adversely affect fish populations, and rocked banks would hinder fisherman access. Improved levees and new levees would cause flood-plain lands to take on a less natural and more man-influenced appearance; this would be an adverse aesthetic loss to some people within the community. Historical and prehistorical resources which could exist within the project area may be destroyed if not salvaged prior to construction.

4. Alternatives: Do nothing, flood-plain management alone, flood-plain management with additional upstream storage, flood-plain management with channel modification, purchase of development rights, and purchase of floodway.

5. a. Comments Received (District Review): In January 1977, the draft environmental impact statement was sent to appropriate governmental agencies and interested citizens for their review and comment. Letters from the following agencies and citizens were received:

U.S. Environmental Protection Agency
U.S. Department of the Interior
  Fish and Wildlife Service
  National Park Service
  Bureau of Outdoor Recreation (now Heritage Conservation and Recreation Service)
  Bureau of Reclamation (now Water and Power Resource Service)
  Bureau of Mines
U.S. Department of Agriculture
  Soil Conservation Service
U.S. Department of Commerce
  National Marine Fisheries Service
Advisory Council on Historic Preservation
Washington State Department of Ecology
Washington State Highway Commission (now Washington State Department of Transportation)
Washington State Parks and Recreation Commission
Yakima County Clean Air Authority
Associated Students University of Washington
Robert G. Card

b. Comments Requested (Department Review): In December 1978 departmental review comments on the revised draft environmental impact statement were requested from Yakima County, the State of Washington, and Federal agencies at the Washington, D.C. level. Comments were provided by the following:

Department of Agriculture
Department of Commerce
Department of Health, Education, and Welfare
Department of Housing and Urban Development
Department of the Interior

Department of Transportation
Environmental Protection Agency
State of Washington
Yakima County

6. Draft Statement to CEQ on 22 December 1976.
Revised Draft Statement to EPA on 28 December 1978.
Final Statement to EPA on 14 MAY 1981.

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1.0 PROJECT DESCRIPTION

1.01 Location. The proposed project is within Yakima County, Washington, along approximately 8.5 miles of the Yakima River between the confluence of the Naches and Yakima Rivers downstream to a physical feature known as Union Gap. The cities of Yakima and Union Gap are just west of the proposed project (see plate 2).

1.02 The proposed project is within the Yakima River drainage basin, which has an area of about 6,000 square miles in Yakima, Kittitas, and Benton Counties of south - central Washington (see plate 1). The Yakima River rises above Keechelus Lake (elevation 2,475 feet) and flows southeastward for 200 miles to its confluence with the Columbia River near Richland.

1.03 Authority. Current investigations by the U.S. Army Corps of Engineers of the Yakima River and its major tributaries began in 1972. The report is being prepared as an Interim Report to the Columbia River and Tributaries Study (CR&T) and also in partial response to a 1966 Senate Public Works Committee resolution. The authority for this study permits an investigation of the total Yakima River Basin in the interest of flood damage reduction and related purposes. However, the scope of this particular study and environmental impact statement is limited to the reach of the Yakima River between Yakima and Union Gap.

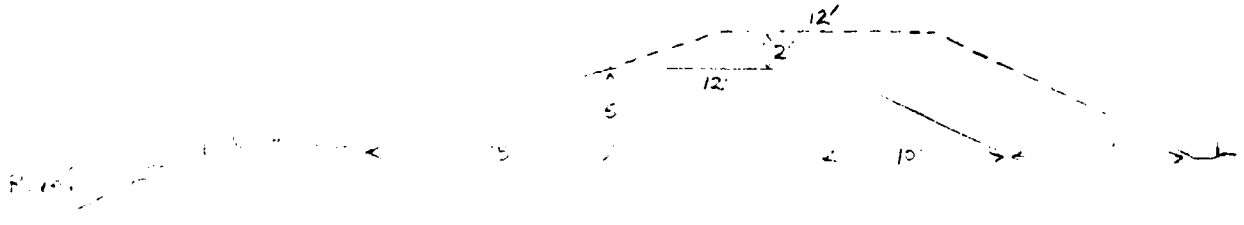
1.04 Project Purpose. The project purpose is reduction of flood damages along the Yakima River from the city of Yakima to Union Gap.

1.05 Project Plans. Several changes have been made in the plan as presented in the draft environmental impact statement (EIS). These include increasing the levee heights downstream of the Highway 24 Bridge (also known as the Moxee Bridge) to provide 200-year protection; increasing the levee freeboard immediately above Moxee and Terrace Heights Bridges by 1 foot to accommodate swell heads and by an additional foot above Terrace Heights Bridge to allow for future aggradation; provision of additional riprap due to the meandering nature of the river; and inclusion of the proposed mitigation measures as good environmental design rather than mitigation.

1.06 There are six basic components of the proposed plan: the improvement of the existing left (east) bank levee upstream of the Moxee Bridge (see plate 5), the improvement of the existing right (west) bank levee upstream of the Moxee Bridge (see plate 5), the construction of a new left bank levee downstream of the bridge (see plate 6), the construction of a new right bank Yakima Regional Sewage Treatment Plant levee downstream of the bridge (plate 6), bank protection along Interstate Highway 82 (I-82) (plate 6), and two control structures for culverts on Spring Creek to provide protection for the city of Union Gap (plate 6). The following paragraphs present details of the six project components. Project construction would probably take 15 months to complete.

1.07 Left Bank Improvement Above Moxee Bridge (see plate 5) consists of improving the existing east bank levee system which consists of the following sections: the most upstream section which extends from the Moxee County canal about 2,500 feet downstream (built by the U.S. Water and Power Resource Service (WPRS)), a short section which extends along the Burlington Northern Railroad tracks (built by the Corps of Engineers), the embankments along both sides of the Roza Wasteway (built by the WPRS), and the remainder of the levee system which extends from the Roza Wasteway downstream to the Moxee Bridge (built by the Corps of Engineers in 1948). The proposed improvements call for the raising of 2.0 linear miles of levee (represented by the red line on plate 5) and the addition of rock riprap along 2.0 miles (represented by the jagged red line). The levee would be raised between 1 and 6 feet, averaging between 2 and 3 feet.

1.08 The existing levees have a 1:3 riverward slope (1 vertical foot for every 3 horizontal feet) and a 1:2 landward slope. These slopes will be preserved on the levee sections to be raised. If an existing levee section is 5 feet high and it is to be raised 2 feet, the landward extension of the levee would be 10 feet (see diagram below). All levee sections to be raised will be extended on the landward slope so as not to encroach upon the river. A construction easement and cleared path for construction vehicles beyond the proposed horizontal extension would not be necessary because much of the construction work could be accomplished from the top of levee. The existing levee sections already have rock riprap from the levee toe to generally a little more than halfway up the slope on the riverward side (see photos at end of chapter 4). The proposed plan calls for additional rock riprap (refer to jagged red line on plate 5) to cover most of the entire riverward slope, except for a few sections in which the rock would not be placed at the top 3 vertical feet of the levee.



1.09 The present landscaping plan has the following elements. Six inches of topsoil would cover the levee slopes, and the slopes would be seeded with various species of grass seed and forbs. No trees or shrubs would be planted on the levee slopes. Rock riprap along a section of Sportsman's State Park would be covered with soil; the topsoil would fill

rock voids above normal high flows. This soil would then be seeded with grasses and forbs. No other levee section would receive soil on the riprap. Other landscaping plans would be studied during post-authorization planning. The possibility of planting trees and shrubs adjacent to the levee on permanent or temporary easements would be explored. Plantings on temporary easements would have to be protected after easements are relinquished to guard against future tree remove. This could be accomplished by agreements with land owners. Trees and shrubs could be planted on landward easements, but to protect levee integrity only grasses and other small plants could be planted on riverward easements. In addition to this possibility, the Corps of Engineers will study the feasibility of "overbuilding" particular levee sections, especially the state park levee. A larger levee would enable trees and shrubs to be planted safely on the levee slopes without compromising levee integrity. No matter which landscaping scheme is finally chosen, shrub and tree species would be chosen with the aid of the U.S. Fish and Wildlife Service (FWS) and Washington Department of Game (WDG). In the vicinity of the state park, the Corps of Engineers would also coordinate closely with the Washington State Parks and Recreations Commission.

1.10 The following amounts of material and clearing would be needed for the left bank improvement:

Clearing of trees and brush	0.2 ac.
Earth borrow material	53,220 c.y.
Rock riprap	23,320 tons
Excavation (in river)	1,700 c.y.
Backfill (in river)	700 c.y.
Excavation (dry)	1,900 c.y.
Backfill (dry)	700 c.y.

1.11 Four ungated culverts exist under the levee above the Terrace Heights Bridge. At this time, it is anticipated that flapgates will be installed on these culverts.

1.12 Right Bank Improvement (see plate 5) consists of the rehabilitation of the existing west bank levee system, also built by the Corps of Engineers in 1948, which extends from the confluence of the Yakima and Naches Rivers along the Yakima River to the Moxee Bridge. The plan of improvement would be very similar to the plan for the left bank improvement. About 2.8 miles of levee would be raised, and about 4.1 miles of levee would receive additional riprap. Levee sections would generally be raised from 1 to 3 feet, averaging between 1 and 2 feet. Sections to be riprapped would extend either to the top of the riverward side of the levee or to 3 feet below the top.

1.13 Landscaping treatment would be similar to the left bank levee; however, no section of riprapped slope would be covered with soil.

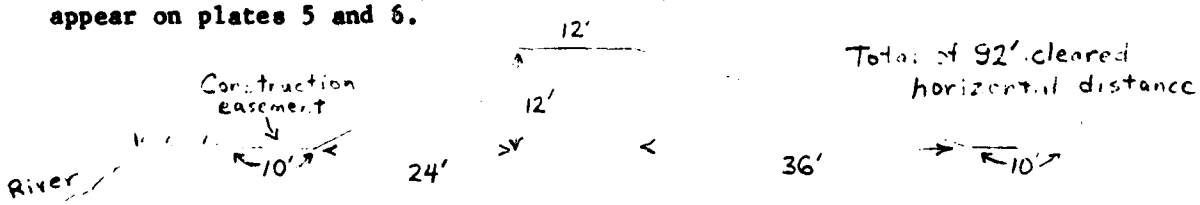
1.14 The following amounts of material and clearing would be needed for the west bank improvement:

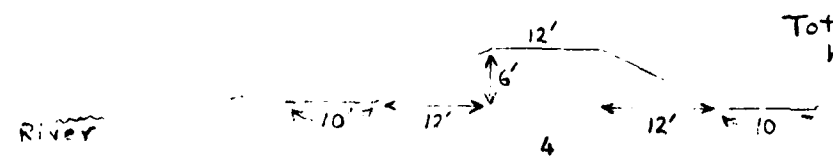
Clearing of trees and brush	0.2 ac.
Earth borrow material	34,400 c.y.
Rock riprap	27,820 tons
Excavation (in river)	800 c.y.
Backfill (in river)	300 c.y.

1.15 Left Bank Levee Below Moxee Bridge (see plate 6) consists of the construction of a new east bank Yakima River levee from the Moxee Bridge to an area just north of Union Gap, a total of about 2.9 miles (2.0 miles of which would be rocked). The levee would vary in height from about 4 feet to a maximum of 13 feet as described in the following paragraph.

1.16 Starting from the north and working south, little construction would occur along the 900 feet of Highway 24 embankment. South of the embankment, the first 1,200 feet of levee would be about 9 feet high and 48 feet wide at the base. The next 2,000 feet would vary between 6 and 13 feet high and 36 and 77 feet wide at the base. The next 3,500 feet of levee would average between 6 and 9 feet high and 36 and 48 feet wide at the base. Then the next 2,200 feet of levee would be built on higher ground and thus be 4 to 6 feet high and 28 to 36 feet in width. The final 5,400 feet of levee would leave higher ground, continue south with a height of about 6 feet, and then turn east. The levee height would gradually taper off to zero as the height of the ground increases. The entire levee segment parallel to the river between the highway embankment and the point where the levee alinement turns east, would be armored. Ten-foot-wide construction easements would generally be needed on both sides of the levee. Where brush and trees exist on these easement strips, the strips would be cleared to facilitate the movement of construction vehicles.

1.17 The following diagrams depict levee widths for a 12-foot- and 6-foot-high levee. A levee height of 10 feet or less has a 1:2 slope on the landward side; a height over 10 feet requires a 1:3 slope. In both cases a riverside slope of 1:2 is used. For detailed information on levee cross sections, refer to plates 7 and 8. The various levee cross sections are identified by Roman numerals; these Roman numerals also appear on plates 5 and 6.





1.18 Landscaping treatment would be similar to the upstream levee treatment, and some rock riprap would be covered with soil to fill rock voids.

1.19 The following amounts of material and clearing would be needed for the left bank levee below Moxee Bridge:

Clearing of brush and trees	3 ac.
Earth borrow material	127,400 c.y.
Rock riprap	69,343 tons
Excavation (dry)	74,800 c.y.
Backfill (dry)	48,100 c.y.

1.20 Three drainage control structures would be required for this levee: two culverts with flapgates and one pressure pipe. The gated culverts (see plate 6) would be of 54-inch and 36-inch diameter. In a flood event pressure would close the gates, possibly causing some ponding on the landward side of the levee. About 1,500 feet of 24-inch pipe would be placed in an existing drainage ditch located at the upper tie-in of the levee to avoid backwater ponding during major flood events. About 10,850 feet of this levee would be riprapped (see plate 6).

1.21 The Yakima Regional Sewage Treatment Plant Levee (see plate 6) consists of the construction of a right bank Yakima River levee from the Moxee Bridge south along the Yakima Sewage Treatment Plant spray irrigation field, a total of about 1.2 miles (.9 miles of which would be rocked). The levee would vary in height from 5 to 7 feet.

1.22 Landscaping treatment would consist of 6 inches of topsoil on the levee slopes and seeding with various species of grass seed and forbs. The possibility of planting trees and shrubs adjacent to the levee would be explored during post-authorization planning.

1.23 The following amounts of material and clearing would be needed for the Yakima Sewage Treatment Plant levee:

Clearing of trees and brush	0.5 ac.
Earth borrow material	40,800 c.y.
Rock riprap	33,324 tons
Excavation (dry)	17,800 c.y.
Backfill (dry)	10,500 c.y.

1.24 The only drainage control structure required for this levee would consist of a 15-inch pressure pipe which would pass the outflow from the pond at the south end of the spray irrigation field. The pipe would function in the manner described in section 1.20. The existing berm around the pool would be raised as required to provide enough head to assure flow during the 200-year event.

1.25 Interstate 82 (I-82) Bank Protection (see plate 6) consists of the improvement of bank protection along 0.5 miles of I-82 near Union Gap. No levees are proposed in this area, only the addition of rock riprap. Rock would be placed from the top of the embankment.

1.26 The following amounts of material and clearing would be needed for the highway protection:

Rock riprap	16,400 tons
Excavation (dry)	14,100 c.y.
Backfill (dry)	9,000 c.y.
Excavation (in river)	19,000 c.y.
Backfill (in river)	0 c.y.

1.27 Spring Creek Control Structures (see plate 6) consist of the addition of drainage control structures only to protect the town of Union Gap. Two culverts on Spring Creek would be gated. The north, or upstream culvert, would require a slide gate, since the normal direction of flow in the stream is from the river to the landward side of the I-82 embankment. Two flapgates would be installed on the downstream culverts where normal flow is toward the river. During a flooding situation, the slide gate would be closed as required to prevent flooding along Spring Creek. Wide Hollow Creek would not be gated, since a relatively small area is inundated and large creek flows would negate most benefits from the gate.

1.28 Level of Flood Protection. Improving the existing levees upstream of the Moxee Bridge and building new levees downstream of the bridge would provide protection from the 200-year flood, a flood which has a 0.5 percent chance of occurring or being exceeded on any given year. For the project reach of the Yakima River, a 200-year flood has been computed to be 70,000 cubic feet per second (c.f.s.). Construction of the I-82 bank protection and the Spring Creek control structures downstream of the Moxee Bridge would provide protection from the 100-year flood (55,000 c.f.s), a flood which has a 1.0 percent chance of occurring or being exceeded on any given year. This lower level of protection is required because any greater level of protection would require a portion of the interstate highway to be raised in elevation at a very high cost. Plate 3 depicts the 200-year flood-plain limits above the Moxee Bridge and plate 4 depicts flood-plain limits below the bridge. The 200-year and 100-year floods were chosen because these levels of flood protection would provide protection to the highest level that is economically feasible.

1.29 Borrow Sources. Earth material would probably be taken from either the existing city-owned borrow site near Union Gap or from existing commercial borrow sources within the general project area. A total of 255,820 cubic yards (c.y.) of earth material would be needed for all five project components. The rock source would probably be either the Horseshoe Bend Quarry about 25 miles from Yakima, or the Yakima Firing

Range Quarry about 15 miles northeast of Yakima. A total of 170,207 tons of rock would be needed for all five project components.

1.30 Ponding Landward of the Levees. Local drainage which causes ponding in the project area during a flood event has historically not been a significant problem due to the semipervious quality of the alluvial soils along the Yakima River, the comparatively light rainfall and snowmelt which occurs during winter storms, and the lack of heavy thunderstorms in the local valley area. Proposed project components would be designed with flapgates or slide gates for culverts, and pressure pipes, to alleviate possible damaging ponding behind the levees (see paragraphs 1.11, 1.20, 1.24, and 1.27). With the exception of only one area, the proposed project should not increase the depth of any ponding which presently occurs in the project area during high streamflows. The one exception is at the southernmost end of the proposed left bank levee below the Moxee Bridge at the angle point where the levee turns east. During a severe storm and flood on the mainstem, water could pond over about 50 acres of land in this area, reaching a maximum depth of 5 feet along the levee. Depths could slightly exceed preproject conditions; however, velocities would be near zero as compared to high velocity under preproject conditions. The land is presently in pasture. A real estate easement would be required for this ponding area.

1.31 Project Operation. The local sponsor would be responsible for all project operation. Whenever high-water conditions threaten, flapgates would be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves would be closed as necessary to prevent inflow of floodwater. All drainage structures in levees would be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps would be taken to correct any adverse condition. In addition, local interests are responsible for any sandbagging or berm building which is part of the plan. Plate 5 identifies such an emergency protection area on the right bank near the Boise Cascade Mill, and plate 6 identifies such an area on the right bank near Union Gap.

1.32 Project Maintenance. All project maintenance would be the responsibility of the local sponsor. Because the levees are designed to handle velocities associated with design floods, relatively little maintenance outside of the current program for debris removal and vegetation control would be necessary. Maintenance measures would include (but not be limited to) the following: The routine removal of trees and bushes on the levee proper, the removal of burrowing animals which are threatening the integrity of the levee, and the removal of encroachments on the levee which threaten the levee or which would hamper the movement of men and machinery during a flood emergency. Any vegetation planted adjacent to the levee for wildlife mitigation would, of course, not be subject to removal. Should the levee be damaged, repairs would be made as soon as possible to prevent enlargement of damaged areas. On lands between the levees (the floodway), no maintenance would be required downstream of the

Moxee Bridge. As called for in the Operations and Maintenance Manual for the existing Corps of Engineers' levee project, the local sponsor would still be required to remove trees and shrubs from a portion of the floodway upstream of the Moxee Bridge in order to pass the design flood. The existing maintenance manual will be reviewed to determine if there should be any change in the areas of vegetation removal.

1.33 The Local Sponsor would be required to share project construction costs; provide necessary lands, rights-of-way, and easements; and assume all project maintenance. The local sponsor for the proposed upstream levee improvements and the new left bank levee downstream of the bridge would be Yakima County. The local sponsors for the sewage treatment plant levee and the Spring Creek control structures would be the city of Yakima and the Washington State Department of Transportation, respectively.

1.34 Project Economics. Economic evaluation of the recommended plan was based on a comparison of costs and benefits. Economic justification of the proposed improvements was determined by comparing the equivalent average annual charges with an estimate of the equivalent average annual benefits over the 100-year period of analysis. Economic benefits were based on flood damage reduction, project employment, elimination of flood proofing costs, and intensification benefits that would result from the recommended plan.

1.35 Benefits and costs are based on 1976 prices. An interest rate of 6-3/8 percent, applicable to water resource projects, was used in this report. For the purpose of economic analysis, project year one (the first year of project operation) is assumed to be 1982.

1.36 Existing flood damage prevention benefits were derived employing standard Corps of Engineers' methods; these included detailed field assessment of damage potential based on computer-simulated water-surface profiles associated with given floods. Benefits attributable to reduction of future flood damages and other benefits were evaluated in conformance with ER 1105-2-351 (Evaluation of Beneficial Contributions to National Economic Development for Flood-Plain Management Plans, 13 June 1975). Flood damage prevention benefits were based on an analysis of damages under with and without project conditions. For more detailed information concerning the economic analysis, refer to appendix F of the feasibility report for the Corps of Engineers' Yakima-Union Gap Flood Damage Reduction Study Interim Report of the Columbia River and Tributaries Study.

1.37 Table 1 presents the Federal and non-Federal construction costs for both components of the recommended plan, along with a benefit/cost

comparison for each component. This analysis assumes there would be benefits from the proposed project throughout the 100-year economic life (1982-2082) and that there would be area redevelopment benefits as well as inundation reduction benefits. Area redevelopment benefits are based on the premise that some locally unemployed people would be employed during project construction, and since Yakima County qualifies as an area of persistent unemployment, reduction of local unemployment would constitute a benefit to the local and national economies.

1.38 On 6 June 1978 President Carter proposed several changes in cost sharing for water resources projects to allow states to participate more actively in project implementation decisions and to equalize cost sharing between structural and nonstructural flood control projects. These changes include a cash contribution from benefiting states of five percent of construction (first) costs associated with nonvendible outputs and 10 percent of costs associated with vendible outputs. Application of this policy to the Yakima-Union Gap project would require the State of Washington to contribute an estimated $258,400 in cash (five percent of the $5,168,000 total estimated project first cost based on 1976 price level). The President also proposed that the present cost-sharing requirements for flood control projects be modified to require a cash or in-kind contribution equal to 20 percent of the project first costs associated with flood control benefits. Application of this policy to the Yakima-Union Gap project would require that non-Federal interests make, in addition to the state contribution, a cash or in-kind contribution of an estimated $1,033,600 (20 percent of $5,168,000). The combined non-Federal share would be 25 percent of project first cost, and non-Federal costs shown in table 1 would increase from $106,000 to $1,292,000. The Chief of Engineers has recommended authorization of the Yakima-Union Gap project in accordance with the President's proposed cost-sharing policy.

1.39 Section 404 of Public Law 92-500. Federal regulations require an evaluation of the effects of activities involving the discharge of dredged or fill materials on aquatic ecosystems in compliance with U.S. Environmental Protection Agency guidelines. Studies and evaluations to date have been conceptual for this study; a full Section 404 Evaluation will be accomplished during post-authorization planning when project details have been firmed up.

1.40 Interrelationship and Compatibility with Existing or Proposed Corps of Engineers or Other Agency Projects. The proposed project would improve and expand an existing Corps of Engineers flood control project. The WPRS is working with FWS personnel in evaluating problems and solutions to fisheries resources involving the Roza Wasteway. Any solution to this fisheries problem could be affected by the proposed left bank improvement north of the Moxee Bridge. The Washington State Parks and Recreation Commission (PRC) has expressed concern that the left bank improvement through the Yakima Sportsman Park may affect visitor enjoyment of the park. The Washington State Department of Transporation is planning to improve I-82 by construction of a connection to SR-97 in the vicinity of Union Gap. This proposed improvement will fall within the limits of the subject proposal. The Corps of Engineers would work closely with the WPRS and PRC and Dept. of Transportation during post-authorization planning.

TABLE 1
Yakima-Union Gap Levees
Benefit-Cost Analysis
(1976 Prices, 6-3/8 percent, 100-year Life)

	Left Bank	Right Bank	All Projects
First Costs:			
Federal Costs	$2,906,000	$2,156,000	$5,062,000
Non-Federal Costs	85,000	21,000	106,000
Total (rounded)	$2,991,000	$2,177,000	$5,168,000
Average Annual Costs:			
Interest and Amortization	$191,000	$139,100	$330,100
Operation and Maintenance	3,500	3,000	6,500
Subtotal	$194,500	$142,100	$336,600
Unmitigated Fish and Wildlife Costs	$2,100	$2,100	$4,200
Total	$196,600	$144,200	$340,800
Average Annual Benefits:			
Existing Conditions	$202,100	$244,100	$446,200
Future Conditions	262,100	278,200	540,300
Benefit-to-Cost Ratio:			
Existing Conditions	1.03	1.7	1.3
Future Conditions	1.3	1.9	1.6

2.0 ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.01 Many of the sections below begin with a description of a general geographic area and conclude with a description of the smaller project area. The general area used in population, social, and economic sections is Yakima County, Washington. Special emphasis has been placed on the Yakima County cities of Yakima and Union Gap because these cities are adjacent to the project site. The general area used in all other sections is the Yakima drainage basin, which is composed of parts of Yakima, Kittitas, Benton, and a very small part of Klickitat County, Washington (see plate 1). In all cases, the project area is that area which would be directly affected by the proposed project, the 200-year flood plain between Selah Gap and Union Gap (see plates 3 and 4). Since the proposed I-82 bank protection would offer only 100-year flood protection, that small portion of the project area would only be the 100-year flood plain.

Population and Historic Growth

2.02 General Area. Yakima is the second largest county in Washington and in 1976 ranked sixth in population with 153,300 persons. The population increased steadily from 1940 to 1960 and then only slightly between 1960 and 1970. Between 1970 and 1976 population increased 5.6 percent. The county's average annual growth rate between 1940 and 1976 was 1.22 percent compared to 2.02 percent for the state during the same period. The cities of Yakima and Union Gap accounted for 34 percent of the total county population in 1976 and had a combined average annual growth rate of 1.70 percent between 1940 and 1976.

2.03 Table 2 presents historic population growth for Washington, Yakima County, and the cities of Yakima and Union Gap.

TABLE 2
Historic Population Growth
1940-1975

	1940	1950	1960	1970	1976
Washington	1,736,200	2,379,000	2,853,200	3,413,200	3,571,600
Yakima County	99,000	135,700	145,100	145,200	153,300
Yakima	27,200	38,500	43,300	45,600	49,100
Union Gap	1,000	1,800	2,100	2,000	2,600

2.04 Project Area. The 1976 Corps of Engineers' estimate of the project area population is 2,380 persons. Number of residential units is 591 above the Moxee Bridge and 210 below the Moxee Bridge.

Population Projections.

2.05 General Area. Population projections were calculated for Yakima County and the cities of Yakima and Union Gap. The projected average annual growth rate of 1.2 percent was based on Battelle Northwest projections for Yakima County.1/ This growth rate conforms closely to historical Yakima County population growth. The resulting population projections are provided in table 3.

TABLE 3

Population Projections
1976-2020

Average Annual Growth Rate 1.2%	1976	1990	2000	2020
Yakima County	153,300	181,200	204,100	259,100
Yakima	49,100	58,000	65,400	83,000
Union Gap	2,600	3,100	3,500	4,400

2.06 Project Area. No changes were expected in the agricultural zoning classifications of the flood plain, with or without the project. Minimum lot size restrictions would prevent most alternative uses of the project area. Population growth was, therefore, assumed to be the same with or without the project, 1.2 percent as shown in table 3.

Population Characteristics

2.07 General Area. The median age of Yakima County residents in 1970 was 28.7 years, exceeding the state average by 1.2 years. The population in 1976 was 82.6 percent White, 10.9 percent Spanish surnamed, 1.1 percent Black, 4.0 percent American Indian, and 1.3 percent Oriental and other racial groups. The median years of education of county residents 25 years old and over in 1970 was 12.0 compared to 12.4 in the state.

2.08 Yakima County per capita income in 1974 was $5,189; Washington State per capita income was $5,713. Yakima County has not kept pace with the growth of income in the state since 1950. The county's contribution to total state personal income has declined from 4.4 percent in 1950 to 4.0 percent in 1974.

2.09 The county has had a persistently high rate of unemployment. State Employment Security figures for 1975 indicate that county unemployment averaged 10.4 percent compared to 9.5 percent for the

1/Evaluation of Yakima County's Growth Prospects to 1980, Economic Analysis Section, Battelle Northwest, Richland, Washington, 1969.

state and 8.5 percent for the United States as a whole. Due to the seasonal nature of agricultural and related employment in the county, the unemployment rate varies considerably throughout the year.

2.10 The city of Yakima, incorporated in 1886, is the county seat of Yakima County. In 1970, the city population was 95.8 percent White and Spanish surnamed, 2.4 percent Black, 0.9 percent American Indian, and 0.9 percent Oriental and other racial groups. Between 1960 and 1970 the city of Yakima experienced a net migration of plus 5.3 percent. This is accounted for in part by persons leaving rural areas to seek better-paying jobs and a wider choice of career opportunities in the city of Yakima. The median age of city residents in 1970 was 31.6, exceeding the county by 2.9 years. The 1970 median years of education for persons 25 years and older in Yakima was 12.2, only slightly exceeding county averages.

2.11 Incorporated in 1883, the town of Union Gap is a small community adjacent to Yakima. Union Gap had a 1976 population of 2,600. Population characteristics closely resemble county characteristics.

2.12 Project Area. The flood-plain residents appear to be more representative of the Yakima County and Union Gap population characteristics than the city of Yakima population characteristics.

Public Facilities and Services

2.13 General Area. The county and city of Yakima have a normal complement of community services, such as hospitals, schools, churches, law enforcement, fire, and welfare service. Numerous public organizations are also service oriented. The seat of county government is the city of Yakima, which also serves as the headquarters for various state and Federal agencies with business in the county. The city of Yakima obtains domestic water supplies from the Naches River and four wells. Secondary sewage treatment is provided by the city of Yakima. Cascade Natural Gas Corporation provides natural gas service and Pacific Power and Light provides electricity. Telephone service is provided by Pacific Northwest Bell.

2.14 Project Area. Public facilities on the right bank which would be protected by project components include the Yakima Regional Waste Treatment Plant and the Union Gap Sewage Treatment Plant, both downstream of the Moxee Bridge. The Yakima plant treats 12 to 18 million gallons per day (m.g.d.) of municipal wastes throughout the year, and 2 to 3 m.g.d. of effluent from vegetable and fruit processing plants during the months of August and September. After processing, the vegetable and fruit effluent is sprayed over about 120 acres of hayfields adjacent to the treatment facilities in the flood plain. Municipal wastes are not sprayed over the pastures. The Yakima plant is expected to become the treatment plant for the Yakima region. The Union Gap plant is a much smaller facility and is expected to be phased out of operation in the

near future. The FAA VORTAC, an air guidance system for planes coming into Yakima, would be protected by the proposed left bank levee downstream of the Moxee Bridge.

Industry and Employment

2.15 General and Project Area. The economic base of Yakima County and the city of Yakima is comprised of four major industries: (1) agriculture and forestry, (2) manufacturing, (3) wholesale/retail trade, and (4) services.

Agriculture - General

2.16 General Area. The economic base of Yakima County is founded on a highly developed and diversified agricultural sector. Most notably, the area is recognized for its production of fruits (ranking first nationally in apple production), vegetables, field crops (ranking first nationally in hop and mint production), livestock and livestock products, and forest products.

2.17 Project Area. Most of the agricultural land within the project area flood plain is used for alfalfa hay and native pasture. A small amount of vegetables and oats are also grown. About 425 acres of agricultural land exist upstream of the Moxee Bridge and about 1,958 acres downstream of the bridge (which includes 108 acres of the Yakima spray irrigation field used as pasture).

Agriculture - Prime and Unique Farmland

2.18 Project Area. The U.S. Department of Agriculture (USDA), Soil Conservation Service, has stated that there are no USDA designated unique farmlands near the project area. However, the following prime lands are close to the proposed levee alinement: Esquatzel silt loam, 0 to 2 percent slope; Toppenish silt loam, 0 to 2 percent slope; Wenas silt loam, 0 to 2 percent slope; and Yakima silt, 0 to 2 percent slope.

Forestry

2.19 General Area. Approximately 42 percent of the county, or 1,147,000 acres, was classified as forest land in 1968. In 1972, Yakima County was the largest timber-producing county in eastern Washington and the 12th leading timber-producing county in the state. Most of the harvest comes from the ponderosa pine and Douglas fir species.

2.20 Project Area. There is no commercial forest land or U.S. Forest Service (USFS) land within the project area.

Manufacturing

2.21 General Area. Employment in manufacturing accounted for 13 percent of all employment in the county and 12 percent in the city in 1970 (source: U.S. Census). Manufacturing in the county and city of Yakima is dominated by a prominent and highly diversified food processing group, an established lumber industry, printing and publishing, and an emerging textile and apparel industry. 1/ Other manufacturing industries produce commodities used by the agricultural sector, such as irrigation equipment, pesticides, and farm machinery. There are some foundaries, and specialty manufacturers produce machine tools, electrical equipment, sporting goods, and aircraft parts.

2.22 Project Area. Within the project area there are such manufacturing businesses as a food processor, a lumber mill, a concrete and asphalt plant, a gravel extraction operation, a honey processing plant, and a company which manufactures camping trailers.

Retail Trade

2.23 General Area. Employment in wholesale and retail trade was 29 percent of city of Yakima total employment and 23 percent of Yakima County total employment in 1970. The importance of Yakima as a regional commercial center was demonstrated by the significant increases in retail sales between 1967 and 1972. Retail sales increased 52 percent to reach $213.3 million in 1972 in the city, reflecting an average annual growth rate of 4.0 percent in real terms (i.e., after conversion to constant dollars). In Yakima County, retail sales increased 36 percent to reach $325.8 million in 1972, an average annual real increase of 1.6 percent.

2.24 Project Area. The following retail businesses are within the project area flood plain: lumber sales, machinery sales, door sales, farm equipment sales.

Services

2.25 General Area. The service industry in 1975 was the largest employer of both city and county residents. The service industry includes automobile and miscellaneous repairs, personal and business services, entertainment, and health and education. Sales of selected services in Yakima County amounted to $41.5 million in 1972, a 54 percent increase over 1967 receipts or an average annual real increase of 4.3 percent. The city experienced a 59 percent increase over 1967, or an average annual real increase of 4.9 percent, reaching a total of $29.4 million in 1972.

1/Yakima County Overall Economic Development Program (Draft), August 1974.

2.26 Project Area. A widely diversified service industry exists within the project area flood plain. The service industry includes such businesses and facilities as auto repair, metal can recycling center, radio and television stations, skating rink, raceway, cemetery, funeral chapel, dog training school, freight hauling company, moving and storage company, and motels.

Outdoor Recreation

2.27 General Area. The outdoor recreation industry is also important to the basin. There are four state parks within the basin, the closest to the city of Yakima being Indian Rock Paintings Park, 5 miles west of Yakima, and Sportsman's State Park, one-half mile north of the Moxee Bridge. The only Yakima County park is Eschback Park, 5 miles west of Yakima. There are a total of 23 city of Yakima parks within 142 developed acres, including 5 public swimming pools. Other designated recreation areas include the Snoqualmie National Forest in the northwestern corner of the basin, over 100 miles of the Pacific Crest National Scenic Trail along the western boundary of the basin, nearly 25,000 acres of the Goat Rocks Wilderness area, approximately 25 miles of the scenic Yakima Canyon from just south of Ellensburg to just north of Selah, and several scenic reservoirs that are used for recreation.

2.28 The basin provides important hunting and fishing resources for in-basin and out-of-basin residents. Anadromous and resident game fish found within the basin include chinook and coho salmon, steelhead, rainbow, cutthroat, brook and brown trout, Dolly Varden, kokanee, mountain whitefish, small mouth bass, and crappie. Big game mammals include deer, elk, black bear, mountain lion, and mountain goat. Upland game species include ring-necked pheasant, Hungarian partridge, chukar, bobwhite, valley quail, ptarmigan, several species of grouse, Wilson's snipe, band-tailed pigeon, mourning dove, and cottontail. The commonly trapped fur animals include beaver, muskrat, and mink. The basin is also important to waterfowl, and the principal species which are harvested include mallard, gadwall, American widgeon, green-winged teal, blue-winged teal, cinnamon teal, shoveler, pintail, redhead, canvasback, scoup, goldeneye, bufflehead, ruddy duck, coot, snow goose, white-fronted goose, and Canada goose.

2.29 Three areas are particularly important to hunters, fishermen, and fish and wildlife resources: The 200,000-acre L. T. Murray, Wenas, and Oak Creek Wildlife Recreation Area (WRA); the 1,650-acre Sunnyside WRA; and the 1,760-acre Toppenish National Wildlife Refuge. The southernmost portion of the L. T. Murray complex is about 8 miles north of Yakima, the Sunnyside WRA is about 25 miles southeast of Yakima, and the Toppenish National Wildlife Refuge is about 16 miles south of Union Gap. Another area, the Moxee Game Reserve, is also important to hunters. It is located in the southeastern part of the project area. Although smaller than the three previously mentioned areas, the Washington State Department of Game states that it has duck populations which contribute

about 12,000 waterfowl to the Yakima County total harvest of between 60,000 to 100,000 waterfowl yearly. The approximately 12,000 waterfowl from the Moxee Reserve result in about 10,000 man/days of hunting in Yakima County with an estimated value of $261,000 based on direct spending. In addition to these areas, the State Department of Game maintains fish hatcheries and many public access areas for stream fishing along the Naches and Yakima Rivers.

2.30 Project Area. Designated outdoor recreation areas within the flood plain include the Yakima City Arboretum (identified on plate 5) which would be protected by the proposed right bank improvement. The proposed left bank improvement would protect a private campground just north of the Moxee Bridge, a WDG fishing access spot on the west bank on Freeway Lake, and the Sportsman's State Park (also identified on plate 5). The 200-acre Sportsman's Park, most of which is undeveloped, has tables and stoves, restrooms, 28 tent campsites, 36 trailer hookups, and hot showers. The major attractions are camping, picnicking, and fishing.

2.31 The following forms of recreation are known to occur on or close to the Yakima River between Selah and Union Gap. Estimates of man-days of hunting and fishing and nonconsumptive wildlife usage were made by the WDG and FWS.

(1) Private duck clubs harvest waterfowl from some of the islands and lands which are presently inaccessible to the general public. Annual usage is about 550 hunter-days for duck hunting along the project reach of the Yakima River.

(2) Fishing for steelhead, whitefish, bass, bluegills, and other nongame fish occurs along the river. Annual usage is about 3,000 angler-days for resident and anadromous fish.

(3) Deer hunting occurs in the riparian woodland area south of the Moxee Bridge. Annual usage is about 20 hunter-days.

(4) Upland game hunting for rabbits, pheasant, quail, dove, and grouse occurs. Annual usage is about 365 hunter-days.

(5) Trapping for commercially important furbearers such as muskrat, beaver, nutria, mink, raccoon, coyote, bobcat, river otter, and skunk occasionally occurs along this reach of the river.

(6) Bird watching and nature observation. Annual usage is about 2,100 man-days for this nonconsumptive pursuit.

(7) Mushroom hunting.

(8) Swimming in the river and in a few warm-water pools away from the main river channel.

(9) Some boating and canoeing occurs, but there are no nearby boat launch facilities. This reach of the river is very treacherous for boaters and swimmers during high-water conditions.

(10) A few private landowners have equestrian trails near the river, especially in the vicinity of the Moxee Bridge.

Although the area has good recreational potential, recreation use is low because the lands are generally inaccessible to the public.

Land Ownership

2.32 General Area. The Yakima River Basin contains 3.9 million acres, with the largest landowner being the Federal Government, owning nearly 2 million acres or 52 percent of the land area. Private ownership amounts to over 1.5 million acres or 40 percent of the total land area. State, county, and municipal ownership make up about 8 percent.

2.33 Project Area. The total project area above the Moxee Bridge comprises 1,755 acres. Of this total, 235 acres (or 13 percent) is in roads and other public facilities; the other 87 percent is in private ownership. The project area below the bridge comprises 2,458 acres. Of this total, 193 acres (8 percent) is in roads and other public facilities; the other 92 percent is in private ownership.

2.34 Most landowners within the project area own less than 1 acre of land. A total of about 248 landowners would be protected by the left bank levee improvement above the Moxee Bridge, about 140 owning less than 1 acre; about 298 landowners would be protected by the right bank levee improvement above the bridge, about 222 owning less than 1 acre; 125 landowners would be protected by the proposed left bank levee below the bridge, 25 owning less than 1 acre and 54 owning between 1 and 4 acres; one public facility would be protected by the Yakima Sewage Treatment Plant Levee; one public facility would be protected by the I-82 bank protection; and 27 owners would be protected by the control structures at Spring Creek, 15 owning less than 1 acre. Most parcels of unprotected land in between the proposed left and right bank levees are also small.

Land Use

2.35 General Area. Within the Yakima Drainage Basin the major land uses are commercial forest land in the east, and cropland and rangeland in the west. Forest land covers 1.5 million acres of the basin, amounting to almost 40 percent of the basin land area. This cover forms a great crescent along the mountainous western and southern borders of the basin. Rangeland also occupies about 1.5 million acres or about 40 percent of the basin land area. Rangeland is concentrated in the eastern part of Kittitas and Yakima Counties. It is interspersed with significant areas of intensive agriculture along the Yakima River and tributary streams. Cropland occupies about 960,000 acres or less than 20 percent

of the basin land area. Approximately 86 percent of the cropland is under irrigation. Although hay, pasture, and grain crops cover the greatest acreage, they are mainly used in the cropping sequence to balance the agricultural enterprise and maintain optimum soil conditions. The major value crops are fruit orchards (mostly apples) occupying about 21 percent of the cropland and row crops (mostly sugar beets and potatoes) along with specialty crops (such as mint, hops, asparagus, and nursery crops) on about 25 percent of the cropland area.

2.36 Project Area. Table 4 on the following page presents a detailed breakdown of the project area land uses.

Transportation

2.37 General Area. The most important highways in the three-county area are: Interstate 90 (I-90), which runs through Kittitas County and serves as the main east-west route through Washington; Interstate 82, which connects Union Gap, Yakima, and Selah with I-90; U.S. Route 97 through Yakima and Kittitas Counties, which serves as the main north-south route through central Washington; and U.S. Route 12 through Benton and Yakima Counties, which connects Kennewick and Richland with I-82 and extends westward into southwestern Washington. Railroads (including daily Amtrak stops in Yakima) and scheduled commercial air service in Yakima and Richland provide contact with other towns throughout the Pacific Northwest. There is no commercial navigation on the Yakima River or its tributaries. Yakima and Union Gap are served by major trucking lines, Greyhound bus lines, and a mass transit system.

2.38 Project Area. I-82 and State Route 24 are the most important highways through the project area. The I-82 bank protection would protect about 2,900 feet of interstate highway from erosion damage on the right bank, and the levees on the left bank would protect State Highway 24 and several miles of county and private roads.

Geologic Setting

2.39 General and Project Area. The Yakima River Basin geology is relatively complex. The eastern portion of the basin consists of a sequence of basalt lava flows which have been deformed into a series of anticlinal ridges and synclinal valleys which trend northwest-southeast and east-west. 1/ The western portion of the basin is comprised of a rugged mountainous topography underlain by a variety of rocks much older than the basalt. The valleys in the eastern portion are filled with as much as 2,000 feet of post-basalt sediments from the eroded mountainous region.

2.40 The Yakima and Union Gap area lies in an east-west trending structural and topographic basin bounded on the north and south by basalt

1/An anticlinal ridge is rocks folded into a hill, and a synclinal valley is rocks folded into a trough.

TABLE 4
PROJECT AREA LAND USES

Area Above Moxee Bridge (200-year flood plain) 1/

Land Use	Right Bank Flood Plain	Left Bank 2/
Residential	130 ac.	115 ac.
Public Facilities and Roads	205	30
Commercial/Industrial	150	105
Railroads	15	30
Agriculture	80	345
Vacant Land	280	270
Total	860	895
	(all 860 ac. protected)	(795 ac. protected)

Area Below Moxee Bridge (200-year flood plain and 100-year flood plain near I-82) 1/

Land Use	Land Protected by Yakima Sewage Treatment Plant Levee	Unprotected Right Bank Land Between Treatment Plant Levee and I-82 Bank Protection	Land Protected by I-82 & Union Gap Control Structures	Left Bank Flood Plain Land 3/
Residential			15 ac.	100 ac.
Public Facilities and Roads			25	30
Commercial/Industrial			15	30
Agriculture			70	2,140
Vacant Land		90 ac.	15	
Total	108 ac.	90 ac.	140 ac.	2,300 ac. (1,680 ac. protected by proposed levee)

1/In addition to these acreage figures above and below the Moxee Bridge, There are also several hundred acres of meandering river, islands, and gravel bars in between the right and left banks which are important as recreational lands and wildlife habitat.

2/Left bank flood plain above the Moxee Bridge actually extends from a point about one-half mile above the Moxee Bridge at river mile (R.M.) 112.3 upstream to R.M. 114.9.

3/Left bank flood plain below the Moxee Bridge actually extends from R.M. 112.3 downstream to R.M. 109.2.

anticlinal ridges. The Yakima River has cut steep-walled canyons through the ridges at Selah Gap and Union Gap. The valley is roughly rectangular with an east-west length of about 30 miles and a north-south width of about 9 miles. The central portion is underlain by 1,200 feet of post-basalt, river-carried lake and wind-blown deposits consisting of poorly indurated to cemented sandstone and siltstone, conglomerate, and uncemented sands, silts, clays, and gravels. 1/

2.41 The Yakima and Union Gap area consists of bottomlands and low-land terraces. Windblown sands and silts mantle much of the surface. The Yakima River flood plain consists of silt and fine sand underlain by alluvial gravels and conglomerate. The Moxee Valley portion of the flood plain to the southeast consists of alluvial deposits underlain by impermeable glacio-lacustrine silt and sand. 2/

Agricultural Soils

2.42 General Area. Almost one-fourth of the Yakima River Drainage Basin is composed of bottomlands and low alluvial terraces with soils that range from gravelly, sandy, and shallow to very deep and silty. Distributed throughout this area are small alkali spots, caliche hardpan lenses, and wet areas. On the north and east parts of the basin another 23 percent consists of rocky, droughty soils formed in glacial materials on terraces and foothills. About 10 percent is on plateaus and canyons on the south side with soils formed in shallow to deep beds of wind-deposited loess over basalt bedrock. The remaining 40-plus percent consists of the high mountainous land on the west side of the basin. Basin soils have developed under scant rainfall and have a high content of fertile mineral elements.

2.43 Project Area. Soils within the project area are moderately deep to very deep with loamy subsoils on a nearly level flood plain. Soils near the main river channels are composed of gravel outwash and not suitable for agriculture, but they are valuable as a source of gravel.

Minerals

2.44 General Area. The most important mineral mined in the basin has been coal from deposits in the Roslyn field located north of the town of Cle Elum, Kittitas County. Other mineral deposits of note have been gold and silver deposits in the Upper Swauk Creek Basin and lateritic iron deposits in the Upper Cle Elum and Teanaway River Basins. Sand and gravel have been one of the most important nonmetallic mineral products in both tonnage and value. The principal sources of sand and gravel are alluvial deposits in the Yakima River Valley.

1/Indurated means hardened by heat and pressure.

2/Glacio-lacustrine silt and sand means silt and sand deposited in glacial lakes.

2.45 Project Area. Sand and gravel deposits are the only mineral resources within the project area, and sand and gravel are actively extracted along the Yakima River north of the Moxee Bridge. Gravel stockpiles exist south of the bridge. Local land-use restrictions and the State Shoreline Management Act could prevent new project area gravel sources from being developed.

Climate

2.46 General and Project Area. The climate of the Yakima Basin varies from desert conditions in the lower valley to a moist alpine type in the higher mountains. To the east and north, the Rocky Mountains shield this area from winter season cold air masses moving southward across Canada. To the west, the Cascades form a barrier to the easterly movement of moist ocean air.

Temperatures

2.47 General Area. During the warmest summer months in the Yakima Basin, afternoon temperatures in the lower elevations range from 85° to 95° F, with minimum temperatures from 45° to 50° F. Maximum temperatures have reached 105° to 114° F in the warmest valleys and 95° to 100° F on the higher slopes. Minimum winter temperatures of -20° to -25° F have been recorded at most basin stations.

2.48 Project Area. The weather station at the Yakima Municipal Airport is about 3.5 miles west of the project area and is the closest station to the project area. The average daily maximum and minimum temperatures for the month of January are 35.5° and 16.4° F, for April 64.7° and 34.3° F, for July 88.3° and 52.6° F, and for October 63.9° and 34.9° F.

Precipitation

2.49 General Area. There is a sharp reduction in precipitation in the Yakima Basin as the elevation decreases in an easterly direction from the summit of the Cascade Range. Annual precipitation ranges from less than 7 inches in the lower valleys to 100 inches or more at the crest of the mountains. Approximately 50 percent of the precipitation falls in the 4 months, October through January, and 75 percent in the period October through March.

2.50 Average snowfall in the lower valleys ranges from 15 to 20 inches annually. Snow can be expected by the first of December and generally remains on the ground for periods ranging from a few days to 6 weeks between mid-December and the last of February. On the higher ridges, snow can be expected by the first of November and generally remains on the ground from mid-November until June or later. Winter snowfall increases from approximately 75 inches at 2,000 feet to 400 inches or more at the crest of the Cascades.

2.51 Project Area. Precipitation and snowfall data for the Yakima Airport is as follows:

Month	Ave. Monthly Total Precip.	Ave. Monthly Total Snowfall
J	1.19	10.2
F	0.87	3.1
M	0.62	2.0
A	0.47	Trace
M	0.54	Trace
J	0.81	0.0
J	0.13	0.0
A	0.20	0.0
S	0.35	0.0
O	0.60	0.1
N	0.96	1.8
D	1.12	8.4
YR	7.86	25.6 in.

The maximum recorded 24-hour precipitation total was 1.40 inches in December 1964. This total accounted for 14 inches of snowfall in one day, which was also a maximum for Yakima.

Air Quality

2.52 General Area. There is a natural particulate dust problem in the Yakima Drainage Basin from Ellensburg downstream to Richland. The dust is caused by sparse ground cover and wind erosion, a problem common to much of eastern Washington. Discussion with a Yakima County Clean Air Authority official reveals that there are a few point source air pollution problems, including a large cattle feed lot at Ellensburg and a large gravel pit operation north of Selah Gap.

2.53 Project Area. The area has air quality comparable to most of the rural areas of Yakima County. There are no serious problems. There are, however, some identifiable point source pollution problems in the city of Yakima from a large sawmill operation, a large gravel crushing and gravel extraction plant, and an asphalt batch plant.

Description of Yakima River Drainage

2.54 General Area. The Yakima River Basin has an area of 6,062 square miles in Yakima, Kittitas, and Benton Counties of south-central Washington (see plate 1). The Yakima River rises above Keechelus Lake (elevation 2,475 feet), and flows generally southeastward for 200 miles to its confluence with the Columbia River near Richland. The upper part of the river is joined by the Kachess, Cle Elum, and Teanaway Rivers and emerges from the Cascade foothills into the Kittitas Valley, flowing past

the city of Ellensburg, before entering a deep canyon. The river emerges from the canyon and passes into the middle valley above the city of Yakima where it is joined by the Naches River, its largest tributary. From Union Gap, located at the lower end of this valley, the Yakima River turns gradually eastward and flows into the lower valley toward the Columbia River. Toppenish and Satus Creeks join the river in this reach. Basin elevations range from over 4,000 feet at the Yakima River headwaters, to about 1,000 feet at Yakima, to about 350 feet at Richland. The WPRS has six irrigation reservoirs in the basin which store water and to some degree regulate natural riverflows during periods of flood discharges.

2.55 Stream channels are wide and comparatively shallow throughout most of the Kittitas and middle Yakima River Valleys. In general, they have sufficient capacity to carry the normal high waterflows. In many places the streamflow is braided, and two or more channels meander downstream some distance before coming together again. Fallen trees, brush, and debris carried by the high flows of past floods are found lodged along these channels, restricting their capacities.

2.56 The largest water diversions from the Yakima River drainage are for irrigation. Diversions for other uses such as industrial, municipal, and hydroelectric power generation are very small in comparison.

2.57 Project Area. Within the project area the Yakima River is composed of meandering channels which flow through an approximately 1.5-mile-wide, 100- and 200-year flood plain. The elevation of the river at Selah Gap (R.M. 117) is 1,070 feet, and the elevation 10 miles downstream at Union Gap is 930 feet. Other than the Naches River, there are no major water tributaries.

Flood and Flood Damage

2.58 General Area. Floods in the Yakima River basin occur in the spring or early summer as the result of melting snow in the mountains and foothills. These floods are characterized by slow rise and long duration of flows. Flooding from rainfall may occur from November to February. Heavy rainfall, occasionally augmented by melting snow, produces the winter floods. Winter flood crests are usually reduced by reservoir storage, as flooding occurs after the irrigation season when storage is available. However, these reservoirs control only a small portion of the entire drainage area, and the space may not be available for a second winter flood if two occur.

2.59 Damaging floods in the Yakima River basin have been recorded as early as 1894. Major floods (26,000 c.f.s. or more) occurred in 1909, 1917, 1921, 1933, 1948, 1959, 1974, and 1975. The flood of December 1933 was the greatest flood of record with a flow of 65,000 c.f.s. recorded at the Parker gage, located just below Sunnyside Diversion Dam. The largest spring flood, May 1948, measured 37,700 c.f.s. at Parker. January 1974

and December 1975 floods were a result of warm winds and rapid snowmelt accompanied by heavy rains. All floods since 1948 have been significantly reduced by storage regulation of the WPRS headwater reservoirs. The following tabulation shows estimates of the damages that the 1909, 1917, 1921, 1933, and 1948 floods would have caused had they occurred in 1976, based on 1976 prices and conditions. Flood discharges listed below reflect reservoir regulations generally consistent with current operating practice. Flood control is not an authorized function at any of the six storage reservoirs listed in table 6.

TABLE 5

HISTORICAL YAKIMA RIVER FLOODS
DAMAGE POTENTIAL, YAKIMA-UNION GAP

Date	Discharge (c.f.s.)	Damages 1976 Prices and Conditions of Development
25 Nov 1909	35,000	$ 3,100,000
30 Dec 1917	52,900	9,900,000
13 Dec 1921	35,800	3,500,000
23 Dec 1933	65,000	13,400,000
29 May 1948	37,700	4,300,000

2.60 During the 1933 flood, 46,000 acres of land were inundated and in 1948, 33,000 acres. In both instances, about 7,000 acres were inundated in the Kittitas Valley near Ellensburg, and over 60 percent of the total land flooded was along the Yakima River below the city of Yakima. Agricultural land was damaged by deposition of floating debris, sand, silt, gravel, and weed seed, and by leaching of the soil. Land was eroded, crops partially or entirely destroyed, and livestock and poultry lost. Buildings and contents, irrigation and flood control facilities, roads, highways, railroads, fences, power and communication lines, water supply, and sewage disposal systems were damaged. Substantial losses were sustained from traffic interruptions. Two lives were lost in the 1933 flood and one in the 1948 flood.

2.61 Project Area. Flooding along the project reach of the Yakima River begins to cause significant damage above the following discharges at the designated areas:

Area	Discharge Measured at Parker Gage (c.f.s.)	Year Event
Right Bank:		
Existing west bank levee upstream of Moxee Bridge	36,500	30
Yakima Spray irrigation field	12,000	2
City of Union Gap	13,000	2
Interstate Highway 82	24,000	8

Left Bank:		
Existing east bank levee upstream of Moxee Bridge	34,750	25
Below Moxee Bridge	16,000	3

Existing Flood Damage Reduction Measures - Flood Control Storage

2.62 General Area. Six reservoirs having a combined active storage capacity of 1,070,700 acre-feet have been constructed for irrigation in the Yakima Drainage Basin. Storage is usually available to assist in controlling winter floods. Table 6 shows storage in the six reservoirs.

TABLE 6

STORAGE RESERVOIRS

Project	River	Active Storage Capacity (acre-feet)
Keechelus Lake	Yakima (above Cle Elum)	157,800
Kachess Lake	Kachess	239,000
Cle Elum Lake	Cle Elum	436,900
Bumping Lake	Bumping	33,700
Clear Lake	North Fork Tieton	5,300
Rimrock (formerly Tieton) Lake	Tieton	198,000
Total		1,070,000

2.63 During the December 1933 flood, irrigation reservoirs are estimated to have reduced the peak discharge on the Yakima River (Parker Gage) from 85,000 c.f.s. to 65,000 c.f.s. For the May 1956 flood, which had the potential of equaling the largest spring flood, the reservoirs are estimated to have greatly reduced peak flow. In December 1959, a flood, which uncontrolled would have been 55,000 c.f.s. (at Parker Gage), was held to 27,400.

2.64 Project Area. There are no reservoirs within the project area.

Existing Flood Damage Reduction Measures - Levees and Channels

2.65 General Area. Major levees on which information is available are listed in table 7. In addition, local interests have constructed numerous short levees along the Kittitas, Naches, and Yakima Rivers. There are 41 miles of levees on minor tributaries. Many levees are riprapped. This has been done on the Yakima River in the vicinity of Cle Elum, Ellensburg, and Yakima; on the Naches River; and along the lower 5 miles of the Teanaway River.

TABLE 7

EXISTING LEVEES

Stream	Location	Description and Builder
Yakima	Cle Elum	Levees totaling 1.4 miles on both banks from Cle Elum to 2 miles downstream. Highway Department, 1965.
Yakima	Ellensburg	Cross levee 1 mile long on left bank 2 miles upstream of Ellensburg. Highway Department, 1967-1968. Levees totaling 10 miles on both banks vicinity of Ellensburg, local interests.
Yakima	Yakima	Levees totaling 8.7 miles on both banks in vicinity of Yakima. Corps of Engineers, 1947-48.
Yakima	West Richland	Levee 1 mile long on right bank. Corps of Engineers, 1963.
Teanaway	Mouth to Mile 9	Levees by WPA and local interests, 1935-37.
Minor Tributaries		41 miles of levees.

2.66 No significant channel improvements for flood control have been undertaken on major streams, but 128 miles of channel have been improved on minor tributaries.

2.67 Project Area. Between the Moxee Bridge and the confluence of the Naches and Yakima Rivers, there is a system of 8.7 miles of levees and miscellaneous drainage control structures. Most of this system was constructed by the Corps of Engineers in 1948. Two left bank sections were built by the WPRS: the most upstream section about 2,500 feet long, and the embankments along the Roza Wasteway. The Corps of Engineers' recommended plan calls for the improvement of the 8.7-mile system to provide flood protection against the 200-year flood. The levees presently provide protection against the 25- and 30-year floods. Along the right bank downstream of the Moxee Bridge, a low-lying levee protects the Yakima Secondary Waste Treatment Plant and spray irrigation field against low frequency floods. A portion of Union Gap is protected by I-82 on the right bank, but flooding could occur about once every 2 years from water flowing through a culvert under the highway. The Diking District No. 1 constructed and maintains a levee composed mostly of river gravel on the

left bank downstream of the Moxee Bridge. The levee provides a low degree of protection and was severely eroded during the 1972 late winter and spring runoff.

Existing Flood Damage Reduction Measures - Watershed Protection

2.68 General and Project Area. More than 500,000 acres of cropland have had effective combinations of practices applied which reduce erosion and sedimentation and assist in the reduction of floods. The most effective practices have included conservation cropping systems, use of crop residue, irrigation water management, and land shaping. Forest land treatment measures have included seeding and gully control work on badly eroding soils and the rehabilitation of existing and abandoned roads and trails. Rangeland practices of particular significance have included seeding thousands of acres to grass, brush control, and controlling excessive
grazing.

Existing Flood Damage Reduction Measures - Flood Forecasting and Emergency Operations

2.69 General and Project Area. The National Weather Service is responsible for the preparation and dissemination of flood warnings and river forecasts. They are prepared by the National Weather Service River Forecast Center, Portland, Oregon, in conjunction with the Columbia River Forecasting Service, a joint effort of the Corps of Engineers, the National Weather Service, and Bonneville Power Administration in Portland. The forecasts are relayed to the Yakima Weather Service Office for dissemination.

Proposed Flood Damage Reduction Measures - Flood Control Storage

2.70 General Area. The Bumping Lake reservoir enlargement project, proposed by the WPRS, would make possible improved flood control operation of the WPRS reservoirs in the Naches and Yakima River watershed by providing increased storage to meet irrigation water commitments and enhanced flows for fish. The proposed project would increase active storage at Bumping Lake from 33,700 acre-feet to 458,000 acre-feet. With the increased storage, reservoirs could be operated more liberally for flood control during the spring runoff periods. However, even with the Bumping Lake enlargement project, control of the 100-year flood at Yakima is not possible.

2.71 Project Area. There are no actively proposed flood control storage projects in the project area.

Proposed Flood Damage Reduction Measures - Levees and Channels

2.72 General Area. The Columbia-North Pacific Report, Appendix VII, June 1971, lists seven locations for possible levee alinements.

Levees near South Cle Elum, Ellensburg, and Toppenish have already been studied by the Corps of Engineers. The North Pacific Report also mentioned the following possible levee sites: Selah area, a levee about 4 miles long on the right (west) bank of the Yakima River near Selah and a levee 3 miles long at the left (east) bank; Naches Valley, 11.25 miles of levees in the Naches Valley on both banks; and Benton City, levee protection for that part of Benton City between the benchland and the bend in the Yakima River. At this time, it is impossible to state whether or not the construction of any of these levees will ever be authorized and funded.

2.73 There are no indications that improvement of existing channels or construction of diversion channels would be a practicable method for flood control in the Yakima River Basin.

2.74 Project Area. The proposed project is the only known levee proposal for the project area.

Water Quality

2.75 General Area. The Yakima River headwaters above Ellensburg and the tributaries to the mainstem Yakima are generally of good quality; however, the mainstem Yakima downstream from Ellensburg has serious water quality problems during the summer low flow months. The minimum flow in the Yakima River occurs near Parker, below the Sunnyside Diversion and below the Prosser Diversion dam. Records show that flows below these diversion points sometimes fall to less than 50 c.f.s. for several days at a time. Return flows result in a substantial recovery, and the flow is increased between Parker and Kiona. The most significant problems are high stream temperatures harmful to game fish production, and the existence of heavy algal growths and bacterial contamination. If the proposed Bumping Lake enlargement project is realized, low-flow augmentation would aid fisheries resources in the Yakima River system.

2.76 Project Area. The July 1973 State of Washington "Continuing Planning Process" document compiled by the State Department of Ecology lists coliform bacteria and temperature violations for the Yakima River from Sunnyside Dam upstream to the confluence with Wilson Creek (which includes the project reach of the Yakima River). These violations are nonpoint source violations. Discussion with Department of Ecology officials reveals that there are also point source coliform bacteria violations from the Yakima and Union Gap Sewage Treatment Plants and excessive turbidity from gravel pits just upstream from the project area.

Vegetation

2.77 General Area. Because of the wide variations in altitude, temperatures, and precipitation within the drainage basin, natural vegetation is diverse. The eastern section, being relatively dry, has a

desert-type cover consisting of sage, short bunchgrass, and treeless landscapes. The stream courses support narrow bands of deciduous woodlands. Progressing westward up the eastern slopes of the Cascade Mountains, conditions change rapidly from thin to dense coniferous forests of pine, larch, and fir. Extensive alpine meadows, grasslands, and fields of low brush types grow near the summit of the basin.

2.78 Project Area. A listing of principal trees, shrubs, forbs, grasses, and aquatic plants within the project area is listed in appendix A. The dense riparian vegetation along the project reach of the Yakima River is important for wildlife habitat and for its scenic qualities.

2.79 As wildlife habitat, the riparian bottomland habitat produces plants in greater abundance than probably anywhere else in the basin. This great plant diversity provides numerous niches for the hundreds of mammals, birds, reptiles, amphibians, fish, and invertibrates which depend on this area for food and cover.

2.80 The lush, green riparian vegetation also provides a dramatic contrast with the relatively sparse and drab sagebrush vegetation of the surrounding uplands. The overstory vegetation consists primarily of black cottonwood, alder, and willow. The chief understory species include cottonwood and willow saplings, hawthorn, red-osier dogwood, rose, service berry, rumex, sumac, mullein, thistle, and rabbit-brush. Grasses include sedge, fescue, bluebunch, wheatgrass, and cheatgrass. Where sloughs or subsurface waters are present, horsetail and cattail can be found.

Wildlife

2.81 General Area. Important game animals found within the Yakima River Basin were described in section 2.28. Other animals include those listed in appendix B.

2.82 Project Area. Appendix B is a listing of principal birds, mammals, reptiles, and amphibians which use the project area. Appendix C is a description of the importance of the project area to the wildlife resource. It was written by Mr. Gaylin Woodard, Game Biologist for the WDG.

Fish

2.83 General and Project Area. The present anadromous game fish resource in the Yakima system consists of spring and fall chinook salmon, coho salmon, and steelhead trout. Approximately 3,000 spring chinook, 1,000 fall chinook, 1,000 coho salmon, and 6,000 steelhead presently enter the Yakima River system, and many of these fish would be expected to migrate past the project reach. The fall chinook, however, would not migrate past the project reach. Since 1958 the WDG has augmented summer run steelhead populations in the Yakima system by stocking, and the

Washington Department of Fisheries has augmented anadromous fish runs by occasionally stocking juvenile spring chinook and coho salmon.

2.84 Other important game fish in the project reach of the Yakima River include whitefish, largemouth bass, and rainbow trout. Rainbow trout are stocked by the WDG north of the Moxee Bridge, and bass can be found within the river and in several ponds within the flood plain. Appendix D lists all fish species which are believed to use the project reach of the Yakima River. Nongame fish, such as carp and suckers, predominate.

Endangered or Threatened Species

2.85 Project Area. The FWS has stated that the bald eagle (Haliaeetus leucocephalus), a threatened species in the state of Washington, has been observed occasionally within the project area. They have also stated that the project area may be in the range of the American peregrine falcon (Falco peregrinus anatum), an endangered species. The Corps has contacted peregrine falcon experts in the state of Washington and questioned them concerning the presence of these birds in the project area. The experts did not believe that American peregrine falcons have ever been seen in the project area.

Prehistorical and Historical Resources

2.86 General Area. The project is located in the heart of the Yakima River Valley, the homeland of the modern Yakima Indians. This large tribal group belongs to the Plateau Culture Area and is similar to other Native American groups within the central portion of Washington. Although very little is known about the prehistory of the Yakima, there is quite a lot of knowledge regarding other Plateau peoples, and much of this information is applicable to the Yakima Indians. Archeologists believe that the area was first occupied somewhere between 11,000 and 13,000 years ago and that it was continually occupied up to the time of the first Euro-American settlers in the early 1800's. The first Indian groups to settle the area probably practiced a generalized hunting and gathering subsistence pattern. This generalized pattern became more specialized as the people adapted to the changing environments and the resulting changes in the floral and faunal communities of the region during the late Pleistocene Epoch.

2.87 At the time of the first Euro-American contact, the basic pattern of subsistence was primarily unchanged from that of the preceding 3,000 years. This pattern of subsistence is known as seasonal round, wherein a group will migrate from a centralized village to harvest or collect floral or faunal foodstuffs as they appear or become ripe and then return with these foodstuffs to the centralized village where they are stored and later consumed. The Yakima Indians generally had their

winter village (central village) along a major watercourse or small streams. These houses, semisubterranean earth lodges, were abandoned in the early spring for the favored mat lodge to be used until the onset of winter. Mat lodges or other summer dwellings might be erected at any number of fishing, hunting, or gathering locations during the harvest season (April-October).

2.88 Project Area. Archeological site records at the University of Washington and at the Washington Archeological Research Center indicate that no archeological sites have been recorded within or immediately adjacent to the project area. The State Historic Preservation Officer was consulted and no properties listed in the State Register of Historic Places would be adversely affected by the proposed project. The National Register of Historic Places (through December 1975) lists no properties, registered or eligible for inclusion on the National Register, in the vicinity of the project. However, no cultural resources survey of this area (Selah to Union Gap) has ever been conducted, so undiscovered resources may exist there. The likelihood that this is the case is increased by the fact that surveys conducted along the Yakima River both upstream and downstream from this area have resulted in the identification of numerous cultural sites located in similar if not identical environmental settings. Also, the area is located along a major waterway known to have been a focus of considerable aboriginal activity.

2.89 A cultural resources investigation of selected portions of the proposed new levee alinement was conducted by the Corps of Engineers during the fall of 1975. This investigation, which covered only a small percentage of the project area, did not reveal any prehistoric or historic sites within the area of survey. Due to the project's proximity to the Yakima River, it would be expected that a more thorough cultural resources survey would reveal evidence of prehistoric sites on or near the proposed levee alinements or within the area of impact. Prior to construction, a comprehensive prehistorical and historical survey would be made of the project area. Correspondence concerning cultural resources investigation is included in appendix E.

3.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND-USE PLANS

3.01 Relationship to Existing Comprehensive Development Plans. The project area flood plain from Selah Gap to Union Gap is primarily zoned (A) agriculture, with the exception of a parcel of land zoned commercial on the right bank just downstream of the Terrace Heights Bridge and a parcel of land zoned industrial on the left bank just downstream of the Terrace Heights Bridge. The agricultural classification is designed to establish agriculture as the principal land use for this area; to discourage the scattering of commercial, industrial, and other urban-type uses into this area; and to establish minimal development standards which will assure a continuation of the open and rural character of the area. The minimum lot size is currently 2 acres. Discussions with the Principal Planner for Yakima County indicate that the proposed new levees and levee rehabilitations would be compatible with the zoning classification. For a discussion of the possible impacts of levee construction on zoning classification and future land-use changes, see paragraphs 4.31 to 4.34.

3.02 Relationship to Existing Flood-Plain Zoning Restrictions. Imposed over the principle zoning are flood-plain zoning restrictions, which were established by the state in 1935 to protect hazardous areas. This zoning imposes additional restrictions on developers. Construction of the project would offer safety and probably preclude the need for some of these restrictions, but the flood control zone designation would officially remain until the State Legislature made a boundary change. Building proposals landward of the levees would probably be granted exemptions.

3.03 Relationship to the Existing State Shoreline Management Act (SMA). For most of the Yakima River shoreline from Selah Gap to Union Gap, the local shoreline master program of the SMA designates the shoreline "conservancy," a classification which is used to maintain the existing character of the shoreline. Low intensity land uses primarily related to natural resources uses and diffuse recreational development are allowed. The rehabilitation of existing levees and the construction of new levees set back from the river channel should not be in conflict with this shoreline designation, nor should the project result in a shoreline classification change.

4.0 THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.01 Short-Term Construction Impacts. Paragraphs 4.02 to 4.10 discuss short-term impacts to air quality, noise, water quality, vegetation, wildlife, borrow sites, and local traffic. The proposed project would not be expected to cause any unusual construction problems or impacts.

4.02 Air Quality Impacts. The movement of dump trucks, bulldozers, and road graders would create the potential for localized dust problems. This problem would be substantially alleviated through periodic sprinkling of the construction area.

4.03 Noise Impacts. Project-generated noise would primarily come from three sources: construction equipment working within the borrow pits or quarries, dump trucks moving to and from the work areas, and construction equipment working within the work areas. Since rock and earth material would probably be extracted from established quarries, it is anticipated that the noise from trucks and earth movers working within the quarries and supplying material to the Corps of Engineers' project would be indistinguishable from existing noise levels. Potentially, the worst noise levels would occur along the rural roads to be used by the trucks destined for the work areas. At times during the construction period, some flood-plain residents would hear trucks passing by their homes at a rate of perhaps one every 3 to 5 minutes during the daylight hours. Since it is not known precisely which borrow source the contractor would use, these affected homes cannot be identified. Noise levels caused by the construction of left bank levee below the Moxee Bridge and the improvement of the left bank levee above the Moxee Bridge may also be annoying to some flood-plain residents. About 50 homes are within 1,000 feet of these proposed work areas. However, for most of these residents, annoying noise levels should only be experienced for 1 to 2 weeks, since the construction of particular levee segments should proceed fairly rapidly.

4.04 Water Quality Impacts. The most significant impacts to water quality would be temporary river turbidity resulting from the placement of rock riprap along 10,600 feet (2.0 miles) of the Yakima River and excavation and backfill within the riverbed. Placement of rock riprap in the river channel would occur along a 2,100-foot section of the left bank levee to be improved, a 2,200-foot section of the right bank levee to be improved, a 500-foot section of the proposed downstream left bank levee, a 2,800-foot section along the Yakima Sewage Treatment Facility levee, and a 1,900-foot and a 1,000-foot section along the I-82 bank protection. Excavation and backfill within the river would occur along the left bank levee to be improved (1,700 c.y. excavation, 700 c.y. backfill), along the right bank levee to be improved (800 c.y. excavation, 300 c.y. backfill), and along the I-82 bank protection (19,000 c.y. excavation, 0 c.y. backfill). Material moved in the river would be primarily gravel, not silt, and for this reason river turbidity would be

expected to be minor. Construction in the river would be coordinated with fishery agencies to minimize adverse impacts.

4.05 Short-Term Vegetation Impacts. Construction of the proposed project would radically alter, at least temporarily, about 66 acres of land. Most of this acreage has at present at least a sparse cover of vegetation, and about 20 acres of land presently support important wildlife habitat (trees, shrubs, and marsh vegetation). The 66 acres include alteration of 29 acres of land above the Moxee Bridge (6.5 acres affected by landward extension of levees, 16 acres affected by changes to existing landward levee slopes, and 6.5 acres affected by changes to existing riverward slopes), the elimination of 25 acres of vegetation for the construction of the left bank levee below the Moxee Bridge, and the alteration of 12 acres of land for the Yakima Sewage Treatment Plant Levee. Little loss of vegetation would occur during the construction of the I-82 bank protection and Union Gap control structures. Most of the 20 acres of important wildlife habitat is below the Moxee Bridge. The loss of vegetation would result in a loss of aesthetic values, a loss of wildlife, and an increase in erosion potential.

4.06 The loss of about 20 acres of important habitat would be partially mitigated as previously described in chapter 1 (see paragraphs 1.09, 1.13, 1.18, and 1.22). Long-term impacts to vegetation are discussed in paragraphs 4.36 through 4.40.

4.07 Short-Term Wildlife Impacts. Besides the elimination of important wildlife habitat, construction activity (chiefly the operation of earth-moving equipment) would cause disruption of project area wildlife and loss of breeding and brooding wildlife populations in immediate surroundings. For instance, birds would be harassed and nests would be abandoned. In addition, some animals would be killed outright by equipment and others within the area of disturbance would be forced onto adjoining lands where most would unsuccessfully compete for life requirements with animals already established in adjoining lands. Long-term impacts are discussed in paragraph 4.42.

4.08 Short-Term Fish Impacts. As noted in paragraph 4.04, construction activity would cause temporary river turbidity along a few reaches of the Yakima River, but since the degree of turbidity is expected to be minor, no fishkill problems would be expected. The National Marine Fisheries Service has stated that short-term impacts could be severe on the anadromous fish resource and Indian fisheries if construction occurs during the migration of anadromous fish. Construction activity, which would occur in the river, would be coordinated with the appropriate Federal and state agencies to minimize impacts on fish during migration periods.

4.09 Borrow Site Impacts. Construction of the proposed levee and rehabilitation of the existing levees would require 255,820 c.y. of earth material and 153,807 tons of rock. The sources of earth material may be

any or all of the following existing borrow sites: a city-owned borrow site near Union Gap, a commercial source near Union Gap, or a commercial source near Selah Gap. The rock source would probably be either the Horseshoe Bend Quarry about 25 miles northwest of Yakima near the Naches River, or the Yakima Firing Range Quarry about 15 miles northeast of Yakima. If (as expected) the borrow sources are established sources, there should be only minimal or insignificant environmental impacts to an already degraded area.

4.10 Local Traffic Impacts. In order for construction work to proceed evenly, trucks carrying earth material and rock must arrive at the work areas at a rate of approximately one every 3 to 5 minutes. This will appreciably increase traffic on rural roads close to the proposed levees, and the following problems would be expected: increased safety hazards to pedestrians, cyclists, and autos; wear on rural county roads; and occasional dirt dropped on roads. The roads near the work areas would be periodically patrolled, and any spilled dirt or rocks would be removed.

4.11 Short-Term Economic and Social Impacts. Paragraphs 4.12 to 4.15 discuss short-term impacts to local employment and the labor force, income, local government finances, and displacement of people.

4.12 Employment and the Labor Force. An appreciable portion of the local labor force required for project construction will be local unemployed residents. Of total project construction costs, 45 percent is estimated to be labor. The Yakima Office of the Washington State Employment Security Department has indicated that, as of August 1976, the local labor force included about 1,776 construction workers having skills required for contract construction work. Of these, approximately 1,544 were employed and 232 unemployed. In addition, there were approximately 2,000 unskilled agricultural workers in the area who are unemployed during the winter and are able and willing to perform unskilled construction work when available. Manpower needed to construct the Yakima-Union Gap levees will peak at 55 workers and average 21 workers over the 15-month construction period. Most skills required will be equipment operators filled by the local construction work force. Remaining semi-skilled and unskilled labor will also be provided by the local labor market. No other large construction projects are planned for the Yakima area which will absorb the unemployed labor pool. Based on information provided by construction people of the Corps of Engineers, Washington State Employment Security Department, local labor unions, and local construction firms, the assumption was made that 75 percent of labor will be hired from the local unemployed labor pool. The balance of the labor used for project construction was estimated to be from outside the local area or already employed in the local area.

4.13 Income. It is difficult to determine how much of the $5.17 million total investment expenditure will accrue to the Yakima County economy. It will depend on the extent to which county labor and capital resources are used for project construction and what portion of the resulting income is spent locally. Whatever this figure ultimately becomes, the monetary impact to Yakima County, Yakima, and Union Gap will be more than the original investment as the income of project workers and contractors is spent, flows through the community, and impacts many types of businesses.

4.14 Local Government Finances. The non-Federal costs associated with the left and right bank levees and other flood control measures would be paid by Yakima County, the city of Yakima, and the State of Washington in a manner not yet determined. The funds would most likely come from current revenue generated out of the local tax base of the county and communities from the selling of general obligation bonds. Prior to completion of the study, the sources of local Government finance will be better known.

4.15 Displacement of People, Businesses, and Farms. No people, businesses, or farms would be forced to relocate due to the construction of the proposed flood control structures.

4.16 Long-Term Economic and Social Impacts. Paragraphs 4.17 to 4.25 discuss long-term impacts to property values, property taxes, social and economic well-being, impacts to unprotected lands, ponding landward of the levees, and impacts associated with possible levee failure. In general, the proposed project would have both long-term economic and social benefits.

4.17 Property Values for Protected Lands. The proposed project may raise property values on protected agricultural lands. With flood protection provided to pasture on the left bank below the Moxee Bridge, this may induce farmers to begin planting row crops and thereby increase land values.

4.18 Property Taxes Impacts. Property tax revenues should rise in areas provided protection due to the probable increase in assessed value of property, residences, and businesses. This could be partially offset by reduction in tax revenues from land now in private hands converting to nontaxable levee use.

4.19 Social and Economic Well-Being Impacts for Protected Lands. Summarizing information presented in chapter 2, the completion of the project would provide substantial flood protection for the following:

	Upstream of Moxee Bridge	Downstream
Agricultural Land	425 ac.	2,080 ac.
Businesses (industrial, retail, wholesale, warehouses, and services)	27 businesses	17 businesses
Residential Units	580 units	206 units
Roads and Public Facilities	Roads, streets, I-82, and rail roads	Roads, streets, I-82, two sewage treatment plants, FAA VORTAC
Public Recreation Facilities	State park, city arboretum, fishing access	

Substantial flood protection would, of course, be of greatest benefit to those who live, work, and own a business within the project area flood plain. However, all citizens who depend upon or make frequent use of the sewage treatment plants, I-82, SR-24, the Yakima Airport, the state park, and the city arboretum would also benefit from completion of the project.

4.20 Other social well-being impacts are as follows: Completion of the proposed project would reduce the problem of areas east of the proposed levees becoming isolated when floods cover access roads. During floods, many farms situated at the end of one-lane private dirt roads have been isolated. Residents have been unable to utilize medical and police services, stores, churches, and schools during periods of flooding. The value of such improvements and services is lost when individuals cannot avail themselves of the required services. Should a 200-year flood occur, emergency aid could assist to some extent, but social well-being is neither preserved nor enhanced in a flood situation. The expense and hardship of evacuation adds discomfort and financial stress to families affected. Alleviation of the threat of flooding and associated hazards results in peace of mind and social well-being for the residents of the area.

4.21 Impacts to Prime and Unique Farmlands. The U.S. Department of Agriculture, Soil Conservation Service, has stated there would be no impacts on unique farmlands. As the alinement is now drawn, the southernmost spur of the levee would, however, cross prime lands (Toppenish silt loam and Wenas silt loam). The levee would protect several hundred acres of left bank prime farmland.

4.22 Impacts of Unprotected Lands. Proposed new levees and levee improvements would not cause significant adverse impacts to any upstream, downstream, or project area flood-plain lands. On the left bank flood plain above the Moxee Bridge, several permanent residences and mobile homes are located outside the levee alinement, but the proposed levee improvement would not increase water surface elevations for the 200-year flood and, therefore, would not cause the residences any additional flood problems. On the left bank below the bridge, the only developments outside the proposed levee alinement are a small mobile home, an office for a gravel company, and one farm unit. Project construction would increase the water surface elevation not over 2 inches for a 100-year flood and not over 3 inches for a 200-year frequency flood. This would cause no noticeable increase in damages to these structures.

4.23 Impacts of Ponding Landward of the Levees. As previously discussed in paragraph 1.30, ponding in the project area caused by local drainage is presently not a significant problem. With the exception of only one area, the completion of the proposed project should not increase the depth of any ponding which presently occurs in the project area during high streamflows. The one exception is at the southernmost end of the proposed left bank levee below the Moxee Bridge, at the angle point where the levee turns east. During a severe storm and flood on the mainstem, water could pond over about 50 acres of land, reaching a maximum depth of 5 feet along the levee. Depths could slightly exceed preproject conditions; however, velocities would be near zero as compared to high velocity under preproject conditions. The 50 acres of land are presently in pasture, and no adverse impacts from temporary and very infrequent ponding would occur in this area.

4.24 The Possibility of Levee Failure. Assuming proper levee maintenance, the project would provide substantial long-term flood protection along the Yakima River both upstream and downstream of the Moxee Bridge. The following large floods would, however, be expected to have the following effects: A flood in excess of the 200-year event would not be expected to be contained by any of the levee sections. The 200-year flood event (70,000 c.f.s.) would be contained by the upstream levees. The 200-year flood would be contained by levees downstream of the Moxee Bridge, except on the right bank by Highway I-82. The 100-year flood event (55,000 c.f.s.) would be expected to be contained by all proposed improvements. However, in the absence of flood-fighting measures, the 100-year flood would overtop and possibly wash out a section of I-82 near Union Gap. This flood fighting is part of the recommended plan.

4.25 Lack of proper maintenance or the impact of a flood greater than the design flood could result in levee failure, and subsequent local flooding might be worse than that experienced with preproject conditions. Further aggravating this problem is the chance that the presence of the levee would impart a long-term sense of security to residents in the protected area, encouraging them to improve existing structures and intensify present agricultural practices. Due to land-use controls and

restrictions, major land-use changes would not be expected; however, the Washington Department of Game has pointed out that there are no guarantees that present land-use controls and restrictions would not someday change.

4.26 Long-Term Esthetic Impacts. The completion of the proposed levees and the rehabilitation of the existing levees would cause the flood-plain lands to take on less of a natural and more of a man-influenced appearance. The existing levees upstream of the Moxee Bridge would be enlarged as previously described, and much of the riverward slope would receive additional riprap, resulting in a rocked slope from the levee toe to top. In addition, the Washington State Parks and Recreation Commission has stated that if the existing levee through Sportsman Park is rehabilitated without plantings of trees and shrubs on the landward levee slope, then the result would be severe esthetic degradation in Sportsman State Park. The Corps of Engineers will work closely with the Commission during post authorization planning to prevent degradation.

4.27 Much more of a visual impact would occur downstream of the Moxee Bridge on the left bank. The levee alinement runs along an area which is currently native riparian vegetation, improved pasture, and marsh. On the riverward side of the 2.9-mile levee, 2.0 miles of levee would be riprapped. The levee would not be highly visible in the project area, but the continuous mound of earth rising to as high as 13 feet would be seen by the local east bank community.

4.28 The levee along the sewage treatment plant would be enlarged and expanded to the south. The landward slope would be easily visible from I-82 but not the riprap. The I-82 bank protection would consist of additional rock and would result in only a very minor change in the landscape.

4.29 Long-Term Outdoor Recreation Impacts. The completion of the proposed project would have both beneficial and adverse impacts on outdoor recreation. The rehabilitated levees would offer increased flood protection to such developed recreation areas as the Yakima City Arboretum, a private campground, and Sportsman State Park. Assuming that the proposed downstream levees would be open to the public (especially the left bank levee), the project would also create access to an area which is still mostly undeveloped and which is presently closed to the public. It is possible that light use would be made of the left bank levee for short hikes and nature observation. However, project completion would also destroy riparian vegetation, reduce fish and wildlife populations, and reduce fishing and hunting success.

4.30 Completion of the project could also have an impact on future plans for outdoor recreation in the flood-plain area. For the past decade, various local groups have studied and actively sought the

establishment of a Selah Gap to Union Gap flood-plain park (often referred to as the Freeway Park). The city of Yakima has prepared a Master Plan Study of the Yakima Freeway Park. Should the Freeway Park be realized, it is likely that the proposed new levees and the rehabilitated levees would form much of the park boundary and could be used as trails linking most of the park together.

4.31 Long-Term Land-Use Plans and Land-Use Changes Impacts. Completion of the project may result in pressure to change the existing agricultural zoning on the protected lands to a higher use classification, which would allow for such developments as new single-family homes on small lots. (The current minimum lot size restriction is 2 acres.) If more intensive land development does occur, such impacts as reduction of wildlife populations and additional water pollution would probably result.

4.32 Discussions with the Principal County Planner, however, reveal the county's desire to retain the predominantly rural flavor of the flood-plain land. The planner anticipates that the agricultural classification would persist. With or without additional flood-plain protection, it would be expected that eventually a few more homes and mobile homes would locate in the flood plain, and more intensive agriculture would be practiced.

4.33 For the two parcels of land zoned commercial and industrial (see section 3.01), additional flood protection may encourage more intensive commercial and industrial development landward of the levees near the Terrace Heights Bridge area.

4.34 As the proposed levee alinements and levee improvements are now drawn, hundreds of acres of flood-plain land both upstream and downstream of the Moxee Bridge would be left inside the levees and unprotected from flooding. It is conceivable that this land would never receive flood protection. Thus, completion of the proposed project would help insure that the present wild and natural appearance of those lands would remain in an essentially low state of development (some pasture and light recreation use).

4.35 Long-Term Biological Impacts. Paragraphs 4.36 to 4.44 discuss long-term impacts to project area vegetation, fish, and wildlife.

4.36 Long-Term Vegetation Impacts. As stated in paragraph 4.05, about 66 acres would be lost to initial levee construction (20 acres of high quality wildlife habitat). The planting of grasses, forbs, shrubs, and trees would replace some of this lost vegetation, but the addition of about 5.3 acres of new rock riprap to the upstream levees and the addition of 3.6 acres of rock riprap below the Moxee Bridge would probably represent a permanent loss of vegetation. The maintenance practice of periodically removing trees and shrubs from the levee tops and slopes would represent a long-term loss of forest cover. Also, benefits to wildlife habitat resulting from periodic flooding will also be lost.

These benefits include weed seed deposition, alluvial fertilization from silt deposits, and insect food supplies.

4.37 The photos at the end of Chapter 4 show the character of the existing vegetation within the project area. The levee segments on photos 1, 2, and 3 would all be affected by the proposed left bank levee rehabilitation upstream of the Moxee Bridge. Photo 1 shows an area which would be raised and riprapped, and presently supports only a sparse cover of vegetation. Photo 2 shows part of a heavily-vegetated 1,300-foot section which would be raised and riprapped. Photo 3 shows part of a heavily-vegetated 2,000-foot section along Sportsman State Park which would be raised about 1 foot, riprapped, and then partially covered with topsoil and seeded. Photo 1 is more representative of the typical vegetation found on and adjacent to the upstream east bank levee.

4.38 Photos 4, 5, and 6 show the character of the existing vegetation along the proposed right bank levee rehabilitation upstream of the bridge. Photo 4 shows an area which would be raised and riprapped, and presently supports a sparse cover of forbs, grasses, and small shrubs. Photo 5 shows part of a heavily-vegetated 1,500-foot section just south of Freeway Lake which would be raised about 1 foot and riprapped. Photo 6 shows a heavily-forested 1,500-foot levee section which would be raised about 1 foot and riprapped. Photo 4 is more representative of the typical vegetation found on and adjacent to the upstream west bank levee.

4.39 Photos 7, 8, and 9 depict the character of the land through which the proposed downstream left bank levee would be constructed. Part of the alinement would extend through a still largely natural area consisting of cottonwood overstory with a shrub layer of primarily willow, wild rose, and sumac, as in the background of photo 7. Another part of the levee would extend through improved pasture, as pictured in photo 8, and a small part of the levee would extend through marsh, as pictured in photo 9. The construction of the levee would eliminate about 1 acre of marsh vegetation.

4.40 Photo 10 shows the small existing levee protecting the Yakima Sewage Treatment Plant. Construction of the new levee would eliminate between 20 and 40 cottonwood trees within the area.

4.41 Vegetation impacts associated with I-82 bank protection would be minor because the area is already riprapped.

4.42 Long-Term Wildlife Impacts. The following wildlife paragraphs have been extracted from the FWS's Fish and Wildlife Report (27 September 1976), from previous correspondence with the Service concerning the impacts the proposed project would have on fish and wildlife resources and from comments by the Washington State Department of Game. The loss of food, space, and cover provided by the volume of riparian habitat along the Yakima River would be felt by all wildlife in and adjacent to

the project. Pheasant and chukar would be adversely affected by the loss of the critical seasonal habitat necessary to sustain their populations during stress periods. Quail and cottontail rabbits are highly dependent on riparian vegetation for daily cover, as well as a food source throughout the year, and they too would suffer losses. Mourning doves, nongame songbirds, and raptors are particularly dependent upon the larger shrubs and trees that will be removed during construction and subsequent levee maintenance. Geese and other waterfowl utilize streamside vegetation and trees for grazing and nesting. Fur animals are entirely dependent on the close vegetation and water relationship for all their life requirements. Deer, which are commonly observed along the river bottom in the Union Gap area, require access to riparian habitat during severe winters. The absence of food and cover would make all rock-riprapped areas barriers that are virtually unusable to most wildlife. In addition to these long-term construction and maintenance impacts, should the project encourage urbanization landward of the levees, then wildlife would suffer additional losses. The Washington State Department of Game has also noted that significant losses would occur to waterfowl if the levees encourage the conversion of wet pasture at the Moxee Game Reserve to row cropping. The Fish and Wildlife Report stated that the initial loss of wildlife habitat would result in the following losses (as expressed in man's use of the resource) within the project area:

Group	Without the Project	With the Project	Hunter-days Losses
Upland Game	370 hunter-days	280 hunter-days	90
Big Game	20 hunter-days	20 hunter-days	0
Waterfowl	550 hunter-days	500 hunter-days	50
	940 hunter-days	800 hunter-days	140 hunter-days
Nonconsumptive Wildlife	2,100 man-days	1,700 man-days	400 man-days

Due to project changes made in 1978 by the Corps of Engineers, the proposed project was again reviewed by the FWS. In a letter to the Corps of Engineers dated 4 October 1978, the FWS stated that original project loss estimates are no longer valid. They recognize that during the advanced engineering and design phase of project implementation (which is the same as postauthorization planning), the FWS and state conservation agencies will be given the opportunity to work closely with the Corps of Engineers in developing more adequate habitat replacement measures and minor levee realinement alternatives which would markedly reduce project impacts to fish and wildlife.

4.43 Long-Term Fish Impacts. The removal of riparian vegetation and the addition of rock riprap, especially along the one-half-mile stretch where the Yakima Sewage Treatment Plant Levee abuts the main stem Yakima River, would remove streamside shade and fish holding and feeding waters

and thus would adversely affect fish populations within the project area. The addition of riprap at customary fishing locations could also make fisherman access more difficult. The Fish and Wildlife Report has estimated that the project would reduce the present usage of the resource within the project area from 3,000 angler-days to 2,650 angler-days, for a loss of 350 angler-days. However, the FWS letter of 4 October 1978 states that the Service no longer has confidence in these loss estimates because of late Corps project changes, changes in habitat use and value, and because of an increased demand for consumptive and non-consumptive fish and wildlife oriented recreation. The Washington Department of Fisheries has stated that levees would help prevent loss of downstream anadromous migrants (salmon) from stranding as floodflows recede.

4.44 Impacts to Endangered or Threatened Species. As stated in paragraph 2.85, the FWS has stated that the bald eagle, a threatened species, has been occasionally seen in the project area, and the American peregrine falcon, an endangered species, may also use the area. However, it seems very unlikely that the American peregrine falcon has ever actually been seen in the project area. It also seems unlikely that the proposed levee project would adversely impact the bald eagles which occasionally use the area. If Congress ultimately authorizes and funds this project, the Corps of Engineers would conduct a biological assessment for both species in accordance with the Endangered Species Act during post authorization planning. If the assessment finds that adverse impacts may occur, the consultation process would be initiated and any problems resolved before construction is initiated. Also, the southernmost end of the proposed left bank levee downstream of the Moxee Bridge would be approximately 6,000 feet from a unique 14-acre sphagnum bog which attracts a rare, silver-bordered, fritillary butterfly (Blaria selene). This distance should be great enough to insure that the project would have no adverse impacts on the butterfly. The butterfly, though rare, is not presently classified as either an "endangered" or "threatened" species under the Federal Endangered Species Act.

4.45 Long-Term Historical and Prehistorical Resources Impacts. Although a preliminary cultural investigation did not reveal the presence of significant cultural resources within the areas investigated, there is reason to believe that such sites do exist in the vicinity of the project. Thus, construction of the project may directly, through construction, or indirectly, through land-use change, result in the loss of cultural resources. A more thorough cultural resources survey would be conducted early in postauthorization planning. All items having any apparent archeological interest discovered during any construction activities would be carefully preserved. The Contractor would leave the archeological find undisturbed and would immediately report the find to the Contracting Officer. The State Office of Archeology and Historic Preservation would be contacted by the Corps, and informed of the find and the Corps' salvage program.

Photo 1

Left bank rehab., looking south, just south of Terrace Heights.

Photo 2

Left bank rehab., looking south just north of Terrace Heights Bridge. Trees and shrubs to the left and right of the levee top would be lost.

Photo 3

Left bank rehab., looking north, in vicinity of Sportsman Park. Trees to the right of the levee top would be lost.

Photo 4

Right bank rehab., looking north, midway between Terrace Heights and Moxee Bridges.

Photo 5

Right bank rehab., looking north, in an area just south of Freeway Lake. Grasses, forbs, and shrubs to the left of the levee top would be lost.

Photo 6

Right bank rehab., looking north, in an area north of the Moxee Bridge. Trees to the left of the levee top would be lost.

Photo 7

Left bank, looking south, just south of Highway 24.

Photo 8

Left bank, looking south, midway between Moxee Bridge and southern end of proposed levee.

Photo 9

Left bank, marsh area near southern end of proposed levee.

Photo 10

Right bank, Secondary Waste Treatment Facility Levee, looking south, taken from Highway 24.

5.0 ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

5.01 The proposed project would have short-term construction impacts on air quality, water quality, borrow sites, local traffic, noise, vegetation, and wildlife. The first three types of impacts would be insignificant or minimal, and the last four would be significant. Noise and local traffic impacts would result from trucks travelling at the rate of one every 3 to 5 minutes along rural roads near the proposed levee alinements. Project construction would radically alter about 66 acres of land, some of which has important stands of riparian vegetation. The loss of this vegetation would be a loss to wildlife (both game and nongame).

5.02 For the short-term and long-term, the removal of riparian vegetation and addition of rock riprap would adversely affect project area fish populations. In addition, rocked banks would hinder fisherman access.

5.03 The completion of the proposed levees and the rehabilitation of the existing levees would cause flood-plain lands to take on less of a natural and more of a man-influenced appearance. This would be an adverse aesthetic loss to some people within the community.

5.04 The project would have long-term adverse impacts on wildlife and wildlife habitat. The addition of about 5.3 acres of riprap to the upstream levees and the addition of 3.6 acres of riprap below the bridge would result in a permanent loss of vegetation. Also, the periodic removal of trees and shrubs by the local sponsor for levee maintenance would result in a long-term loss of forest cover in forested areas. Birds, small mammals, reptiles, and amphibians dependent upon a cover of trees and shrubs would suffer some permanent losses. The project would permanently eliminate some flat shorelines, with subsequent adverse impacts to waterfowl, shorebirds, and doves. Due to the previously described mitigation proposals, wildlife populations would begin to recover several years after project construction but the populations would probably never fully return to the preproject numbers.

5.05 Unidentified prehistoric and historic resources, which could exist within the project area, may be destroyed if not salvaged prior to construction.

6.0 ALTERNATIVES TO THE PROPOSED ACTION

6.01 Do Nothing. No further structural action would be taken beyond those projects already under active consideration (such as enlargement of Bumping Lake) and the maintenance of existing levees. Nonstructural actions (such as flood-plain zoning restrictions and flood proofing for new flood-plain developments) would not be implemented to control future flood damages.

6.02 Assuming this alternative was chosen, recurring floods with associated average annual damages of $465,900 would continue, with damage levels expected to increase in the future due to increased flood-plain development. Disruption of public services and potential hazard of life, health, and safety would continue unmitigated. In addition, the encroachment of conventional and mobile homes on the flood plain would lead to destruction of riparian wildlife habitat. This alternative was eliminated from further consideration in September 1972, as Yakima County and the State of Washington were in the process of implementing a program for managing land use in flood hazard areas.

6.03 Flood-Plain Management Alone. This alternative corresponds to present conditions within the project area. Average annual flood damages would be about $465,900, but the growth of damage levels would be less than the "Do Nothing" alternative. The following existing flood control structures would remain: The 8.7-mile levee system upstream of the Moxee Bridge (25- to 30-year protection), a low-lying levee which protects the Yakima spray irrigation field, I-82, and a left bank, low-lying levee south of the bridge. Present flood-plain management measures, including land-use zoning, development restrictions, and early flood warning, would continue. Since state and national flood control laws require future flood-plain development to be flood proofed up to the 100-year flood level, flood proofing would also be required for any new structures built within the flood plain. By participating in the National Flood Insurance Program, Yakima County and the cities of Yakima and Union Gap are obliged to develop and enforce flood-plain commitment, the Federal Government has made flood insurance available at a subsidized rate for existing residental and commercial structures in those communities.

6.04 Flood-plain management alone would do nothing to mitigate the present level of flood damage. Project area manufacturing, retail and service businesses, farms, outdoor recreation areas, and such public facilities as the Yakima and Union Gap Sewage Treatment Plants, the FAA VORTAC, a section of I-82, and other roads would all remain threatened by flooding. All previous social well-being impacts discussed in paragraph 4.20 would continue to add discomfort, inconvenience, and present health and safety problems to flood-plain residents.

6.05 Implementation of flood-plain management alone would not result in the destruction of wildlife habitat as the recommended plan would.

However, both alternatives would probably result in some additional development of the flood plain with consequent adverse impacts to wildlife and habitat.

6.06 The alternative was eliminated because existing flood problems are substantial and this alternative does not address present flood damages.

6.07 Flood-Plain Management with Additional Upstream Storage. Floodplain management measures discussed in paragraph 6.03 would continue, and expansion of developed areas would be subject to flood-plain zoning controls. Upstream storage projects would be constructed where feasible in addition to those projects already under active consideration (such as enlargement of Bumping Lake). The primary purpose of the new storage would be flood control.

6.08 Implementation of this plan would result in a reduction in flood damages and reduce hazard to life and safety. The new reservoirs could possibly be used for other purposes, such as water supply, generation of electricity, flat water recreation, irrigation, etc.

6.09 Adverse impacts would, of course, depend upon the exact location and size of the flood control reservoir, but the following general impacts could occur: relocation of former project area residents, loss of free-flowing river sections and recreation activities associated with free-flowing rivers, loss of wildlife and wildlife habitat, and adverse impacts to game fish.

6.10 The alternative was eliminated because, other than the proposed Bumping Lake Enlargement, there appear to be no economically justifiable flood control storage sites. In order to significantly reduce flood damage between Selah Gap and Union Gap, additional storage projects would be needed on the Teanaway River, on the Yakima River near Ellensburg, and on the Naches River below Rattlesnake Creek. Although specific projects have not been evaluated in detail, a review of previous studies in a 1956 Corps of Engineers' report and the 1972 Columbia-North Pacific Comprehensive Framework Study indicate development of remaining major storage sites is not economically feasible on the basis of flood control alone.

6.11 Flood-Plain Management with Channel Modification. Floodplain management measures discussed in paragraph 6.03 would be continued, and expansion of developed areas would be subject to floodplain zoning controls. The main Yakima River Channel would be deepened, widened, or both from Moxee Bridge downstream to Ahtanum Creek (a distance of 4.5 miles) to improve its flood-carrying capacity. Lowering of footings or complete reconstruction of the Moxee and I-82 Bridges could be required, as well as heavy riprapping of channel sides and bottom. In addition, improvement of the levee upstream would be required.

6.12 Adoption of this alternative would reduce flood damages between Selah and Union Gaps; however, flooding and flood damage would probably be aggravated downstream of Union Gap. The following other adverse impacts would occur: loss of aesthetic values along the Moxee Bridge to Union Gap reach of the Yakima River, loss of project area wildlife and wildlife habitat, and adverse impacts to fish along the project reach and for several miles downstream of Union Gap. In addition, implementation of this plan would result in large maintenance costs due to required annual dredging of the channel.

6.13 The alternative was eliminated because it is not economically feasible, probably creates downstream flood problems, and has serious adverse environmental impacts.

6.14 Purchase of Development Rights. Rights of floodway owners to develop their land to higher use would be purchased to limit growth in flood damage potential. This would, in effect, involve acquisition of a flowage easement as a means of preventing further obstructions to the passage of flood waters. Flood proofing would be required of new developments in the flood plain outside of the floodway. Flood insurance would be used to partially indemnify for recurring flood damages to dwellings. No new levees or other structural measures would be undertaken beyond those projects already under active consideration.

6.15 The impacts of this plan would be essentially the same as flood-plain management impacts (paragraphs 6.04 to 6.06). The alternative would aid in the reduction of future, increased level of flood damages, but the existing level of flood damage would continue. Because the existing level of flood damage is substantial, this alternative was eliminated.

6.16 Purchase of Floodway. About 850 acres of land lying within the floodway would be purchased in fee title and held in public open-space use. Management measures discussed in paragraph 6.03 would continue for those lands lying outside the floodway. Five to ten permanent residents of this area would be displaced, with buildings and other improvements removed. No new levees or other structural measures would be untertaken beyond those projects already under consideration.

6.17 Through flood-plain management, the plan would guide future development within the flood plain and aid in preventing an increase in future flood damages. To a small extent the plan would also reduce the present level of flood damage through the purchase and removal of a few homes within the 850-acre floodway. The retention of the 850-acre floodway in public open space could become an enjoyable natural park area, and at a later date, could be included within the proposed Selah Gap to Union Gap Freeway Park if that idea becomes a reality.

6.18 This alternative was eliminated because the cost of purchasing the 850-acre floodway and the few homes would be much greater than the

expected flood damage reduction benefits. Also, it would be expected that the adverse social impacts, such as local residents forced to sell their land or, in some cases, sell their land and relocate, would not be acceptable to the local sponsor or community.

7.0 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 Assuming proper long-term levee maintenance and repairs, the project would provide short-term and long-term flood protection for private residences, businesses, agricultural land, and public facilities. Furthermore, there appears to be little likelihood that some future project, such as a large flood control reservoir, would ever be completed which would eliminate the need for this flood protection.

7.02 There is a long-term possibility that the security of improved and expanded levees may encourage urbanization of this still mostly rural area. Permanent losses to fish, wildlife, recreation, and water quality would result from increased development. However, based on discussions with the County Planner, it seems more likely that the rural areas to be protected by the project would, in the long-term, remain rural. Residential land use in the Yakima-Union Gap area is projected to concentrate within the currently zoned residential areas, resulting in a higher density residential use.

8.0 ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.1 The irreversible and irretrievable commitment of resources would be to use land for the expansion and improvement of existing levees and the creation of new levees. This land would be devoted primarily to flood protection, but should the local community develop a Yakima River Floodway Park, the levees could also be used for park trails. The placement of rock riprap and periodic removal of trees and shrubs from the levee proper would lower the carrying capacity of the area for wildlife resources. The removal of streamside vegetation and addition of rock riprap would adversely affect project area fish populations and fisherman access. Any prehistorical and historical resources existing in the levee right-of-way or in places where project-induced development occurs, and which is not recovered by salvage operations prior to construction, could be irretrievably lost. Even if extensive salvage operations are carried out on such sites, loss could occur.

8.02 Construction materials and Federal and local sponsor financing would be irreversibly and irretrievably committed to this project, should it be authorized and funded. These materials and monies would not be available for some other project. Likewise, human labor and skills would be committed to this project for the duration of the construction period.

9.0 COORDINATION AND COMMENT AND RESPONSE

9.01 Public and Agency Participation. The initial public meeting was held on 17 February 1972 in Yakima, Washington, to explain the study background and afford local interests an opportunity to express their views on flood problems and related water resource development needs. In March 1972, the first of four draft brochures was distributed to known interested parties, including all persons who attended the February public meeting. Information on the study and flood problems and a description of conceptual alternative solutions were presented for each of seven subreaches of the Yakima River Basin. A workshop was held in April 1972 to obtain additional public input. Draft No. 2 of the brochure was distributed in advance of the second public meeting held on 24 October 1972. In December 1972, a second workshop was held at the Terrace Heights Grange Hall to specifically discuss flood problems in the vicinity of Yakima and Union Gap.

9.02 Brochure draft No. 3 was distributed prior to the third public meeting conducted on 31 January 1974 in Yakima. Results of preliminary engineering, economic, and environmental studies of alternative flood damage reduction measures for the Yakima-Union Gap area were presented in the brochure and discussed at the meeting. A decision was reached during the meeting that detailed studies should be performed of the alternative which involved flood-plain management and levee construction. A number of informal meetings and briefings of local groups were held in addition to the foregoing, as well as onsite inspections of the project area with representatives of state and Federal fish and wildlife and recreation agencies. County and city officials were kept fully informed of study progress. Final public meeting was held on 19 January 1977 in Yakima, Washington, to present the results of the detailed studies reflected in this report. Prior to the meeting, brochure draft No. 4 was distributed to all known interested parties containing the District's tentatively recommended plan.

9.03 Government Agency and Public Response to Draft Environmental Impact Statement. The draft EIS was distributed to interested agencies and citizens in January 1977. All comments received which are relevant to the draft statement or the project are summarized below, and copies of all letters received are shown in appendix F. In addition to these comments, the Board of Engineers for Rivers and Harbors and the Office of the Chief of Engineers reviewed a preliminary draft of the revised draft EIS in January through March 1978 and made the following recommendations: (1) change the level of flood protection for levees downstream of the Moxee Bridge from 100-year protection to 200-year protection, and (2) armor most of the left bank levee below the Moxee Bridge.

9.04 U.S. Environmental Protection Agency.

Comment: The Environmental Protection Agency has rated this draft

environmental statement LO-1, LO (Lack of Objectives) 1 (adequate Information). The rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal action under section 209 of the Clean Air Act.

Response: Noted.

9.05 U.S. Department of the Interior - Fish and Wildlife Service.

Comment: General Comments. These documents (the draft EIS and draft feasibility report), in general, satisfactorily address project impacts on fish and wildlife resources.

Response: Noted.

Comment: Borrow Sources. Insert the following sentence: Borrow and spoil areas would be carefully selected to minimize problems of habitat restoration.

Response: As stated in paragraph 1.29, we believe we can make use of existing, long-term borrow sites, and as such, we would not need habitat restoration.

Comment: Project Maintenance. We suggest that the text identify areas receiving habitat enhancement so that routine maintenance would not disrupt them.

Response: Paragraph 1.32 has been changed to include this.

Comment: Project Maintenance. We believe that you should consider removing the sentence which calls for the local interests to remove trees and large shrubs from a portion of the floodway between Moxee Bridge and Selah Gap in order to pass design flood. Our representatives have discussed with Corps of Engineers' personnel the matter of vegetation removal in the floodway. We were assured at that time by project engineers that the levee would pass design floods without need for removal of trees and large shrubs from the floodway. If this situation has recently changed, it should be more adequately addressed in the text.

Response: We regret the confusion this section has caused. However, it does appear that some floodway maintenance upstream of the Moxee Bridge will still be necessary even if the project is constructed. Paragraph 1.32 has been revised to discuss this in more detail.

Comment: Interrelationships and Compatibility with Existing or Proposed Corps of Engineers or Other Agency Projects. The Bureau of Reclamation is working with fish and wildlife service personnel in evaluating problems and solutions to fisheries resources involving Roza Wasteway. It appears that any solution would be affected by the proposed levee, and

we suggest this matter could be acknowledged and addressed in this section.

Response: Paragraph 1.39 has been expanded to include this.

Comment: Project Area Outdoor Recreation. Remove the phrase ". . . less desirable nongame fish . . ." and replace with ". . . other nongame fish . . . ."

Response: Paragraph 2.31 (2) has been changed to include this.

Comment: General Area Water Quality. We have understood that the proposed Bumping Lake Reformulation Project could, by increasing low flows, benefit fisheries in the Yakima River watershed. So, we suggest the following rewording: If the proposed Bumping Lake Reformulation Project is realized, low-flow augmentation would aid fisheries resources in the Yakima River system.

Response: Paragraph 2.75 has been revised to include this.

Comment: Endangered or Threatened Species. We suggest the following rewording of the first sentence from ". . . the only species . . ." to ". . . the only known species . . . ."

Response: Paragraph 2.85 has been revised to include this.

Comment: Short-Term Vegetation Impacts. Remove the word "insignificant."

Response. In Paragraph 4.05, "insignificant" has been replaced with "little."

Comment: Short-Term Wildlife Impacts. We suggest rewording the first sentence from ". . . would cause temporary loss of . . ." to ". . . would cause disruption . . . ."

Response: Paragraph 4.07 has been revised to include this.

Comment: Short-Term Fish Impacts. We ask consideration of the following rewording: Timing of construction activity on the riverward side will be coordinated with appropriate Federal and state agencies to minimize impacts on fisheries during migration periods.

Response: Paragraph 4.08 has been revised to include this.

Comment: Long-Term Vegetation Impacts. We recommend revising the first sentence from ". . . (17 acres important as wildlife habitat)" to ". . . (17 acres of high quality wildlife habitat)."

Response: Paragraph 4.36 has been revised to include this. The 17-acre figure has been rounded up to 20 acres.

Comment: Long-Term Vegetation Impacts. Replace "insignificant" with "minor."

Response: Paragraph 4.41 has been changed to include this.

Comment: Long-Term Fish Impacts. It would apparently be more accurate to revise the last sentence to read: The U.S. Fish and Wildlife Service has estimated that the proposal would result in an initial loss of 350 angler-days of fishing within the project area; however, revegetation and other mitigation measures may significantly reduce this impact.

Response: For the authorization report, the Corps of Engineers will not be recommending mitigation measures which could significantly reduce the loss of 350 angler-days. At the present time we do not know of any such measures which could be used for this project. Therefore, we have revised paragraph 4.43, and no mention is made of lessening this initial loss.

Comment: Impacts to Endangered or Threatened Species. The first sentence could be revised to say ". . . is the only officially designated endangered species known to utilize the project site." We also suggest a brief discussion of project proximity to the unique 14-acre sphagnum bog owned by Nature Conservancy, which attracts a rare silver-bordered fritillary butterfly (Blaria selene).

Response: Paragraph 4.44 has been revised to include both concerns.

Comment: Effects Which Cannot be Avoided. We suggest changing the third sentence from ". . . would suffer small but permanent losses" to "would suffer some permanent losses."

Response: Paragraph 5.04 has been changed to include this.

Comment: Appendix C. Common names of animals should not be capitalized (unless a proper name) nor underlined, only scientific names.

Response: Appendix C has been revised to include this.

Comment: Appendix C. The common name for sparrow hawk is American kestrel.

Response: Appendix C has been revised to include this.

Comment: Appendix C. Neither the northern bald eagle nor osprey is presently classified as an endangered species under Federal listing in Washington.

Response: Appendix C has been changed to include this.

9.06 U.S. Department of the Interior - National Park Service.

Comment: We are pleased to learn that there will be comprehensive survey of the project area for cultural resources prior to any ground-disturbing activities. Resources which are discovered should, of course, be evaluated for eligibility for the "National Register of Historic Places," and if eligible, they should be nominated.

Response: Noted.

9.07 U.S. Department of the Interior - Bureau of Outdoor Recreation (now Herigage Conservation and Recreation Service).

Comment: We have reviewed the draft environmental statement for flood damage reduction at Yakima-Union Gap, Yakima River Basin, Washington. We believe it adequately describes project impacts on outdoor recreation and the related environment.

Response: Noted.

9.08 U.S. Department of the Interior - Bureau of Reclamation (now Water and Power Resources Service).

Comment: Written Comments Requested. If the separate interim agencies are to be listed in your distribution list, then several others should be added, including the Bureau of Reclamation.

Response: This section has been changed to include this.

Comment: Proposed Flood Damage Reduction Measures - Flood Control Storage. The sentence stating that the Bumping Lake Enlargement project appears to be the only new feasible storage project in the Yakima River Basin should be deleted since preliminary evaluations of other storage sites within the basin show favorable results.

Response: This section has been revised.

Comment: Flood-Plain Management with Additional Upstream Storage. Delete sentence indicating no additional multipurpose reservoirs appear feasible.

Response: Sections covering storage reservoirs have been revised.

9.09 U.S. Department of Interior - Bureau of Mines.

Comment: Aspects of geology, mineral, and borrow sites are adequately covered in the environmental statement. The project should not adversely affect mineral development.

Response: Noted.

9.10 U.S. Department of Agriculture - Soil Conservation Service.

Comment: We feel the report adequately addresses all situations, with the exception of the effect of the proposed action on prime and unique farmlands. (The letter provided information on prime and unique farmlands within the project area.)

Response: Information supplied by the Soil Conservation Service has been included in paragraphs 2.18 and 4.21.

9.11 U.S. Department of Commerce - National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Comment: Although we anticipate no direct impact on anadromous fish spawning areas with the proposed project, more attention should be given to the timing of any instream work, since many of the anadromous species currently found in the Yakima system migrate through the project area. All instream work should be done during the lowest flow periods in the Yakima River system. Instream work during migration periods will inhibit migration of anadromous fish and have an adverse impact on the Indian fishery which occurs immediately below the project area on Wapato and Sunnyside Irrigation Diversion Dams.

Response: Paragraph 4.08 has been revised to include this concern.

Comment: Outdoor Recreation - General Area. In this paragraph, coho salmon should also be added to the list of anadromous fish found in the Yakima Basin.

Response: Paragraph 2.28 has been changed to include this.

Comment: Proposed Flood Damage Reduction Measures - Flood Control Storage. This paragraph should also mention that 324,000 acre-feet of water will be stored in enlarged Bumping Lake for fish enhancement flows in the Yakima River system.

Response: Paragraph 2.70 has been revised to include the fact that increased storage would provide enhancement flows for fish.

Comment: Water Quality. Another very significant problem encountered by anadromous fish in the Yakima system is their inability to migrate due to poor passage conditions at the existing diversion dams and the practices of diverting too much water for irrigation and power in the Yakima system, particularly below Sunnyside and Prosser Dams. Also, the Bumping Lake Enlargement Project does not have dilution of pollution as a project purpose. Much of the flows proposed for the Yakima system from Bumping Lake Enlargement are for spawning, rearing, and migration of fish.

Response: Paragraph 2.75 has been revised; dilution of pollution has been removed.

Comment: Fish. It should be mentioned that the 1,000 fall chinook which currently enter the Yakima River system spawn primarily below the Chandler Powerhouse in the Yakima River and would not migrate past the project area.

Response: Paragraph 2.83 has been changed to include this.

Comment: Short-Term Fish Impacts. It should be mentioned here that short-term impacts can be severe on the anadromous fish resources and Indian fisheries if construction occurs during the migration of anadromous fish.

Response: Paragraph 4.08 has been changed to include this.

9.12 Advisory Council on Historic Preservation.

Comment: The Advisory Council has determined that the draft environmental statement demonstrates compliance with Section 106 of the National Historic Preservation Act of 1966 prior to its amendment on September 28, 1976, but that it does not demonstrate compliance with Section 106, as amended (90 Stat. 1320). However, it appears that the Corps of Engineers recognizes its responsibilities pursuant to Section 106, as amended, and will carry them out in the future.

Response: Noted.

Comment: The Corps of Engineers is reminded that should future surveys identify cultural properties eligible for inclusion in the National Register of Historic Places which will be affected by the undertaking, it must afford the council an opportunity to comment pursuant to the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), prior to taking any further action with respect to the undertaking which will affect the cultural properties.

Response: Noted.

9.13 Washington State Department of Ecology.

Comment: We feel that maintenance of the levees is an important aspect of this proposal. We would like to have some assurance that a regular program of inspection and maintenance would be carried out.

Response: An operations and maintenance manual will be prepared following completion of the project for use by local interests. This will be an extension of the existing program being carried out by Yakima County for the 1948 project.

Comment: Only brief mention is made of the possibility of recreational use of this facility. The direct benefits of this publicly financed project could be expanded to more individuals by incorporating recreational facilities in the project.

Response: The incorporation of recreational facilities in the levee project was explored in detail; however, a necessary element is a local sponsor willing to share 50 percent of the recreational cost. To date, the local sponsors have expressed no interest in cost-sharing for recreational facilities.

Comment: In addition to the comments by this Department, we have gathered comments from other concerned state agencies. The Washington State Department of Fisheries has stated that levees will prevent loss of downstream anadromous migrants from stranding as floodflows recede.

Response: Paragraph 4.43 has been revised to include this.

Comment: The Department of Fisheries would like to review construction plans and procedures to determine that there will be no detriment to the fishery resource.

Response: We would coordinate construction plans and procedures with the Department of Fisheries throughout post-authorization planning and construction.

Comment: The proposed project is within Yakima Sportsman State Park. The Parks and Recreation Commission staff is concerned about the dike on the east bank of the Yakima River. The aesthetic quality of the park may be adversely affected by loss of vegetation. They feel a jointly developed landscape plan would be important prior to construction. The detailed comments from parks and recreation are attached.

Response: Some minor brush and tree removal will be required. However, the substantial growth of tall trees and brush lying between the toe of the levee and the developed park area should adequately screen the view of the levees. During preconstruction planning, a jointly developed landscape plan will be made.

Comment: The Department of Natural Resources states that the report does not mention where the levee material will be obtained. Our River Management Policy Plan does not favor removal of material from the streambed for such purposes.

Response: Paragraph 1.29 mentions the likely borrow sources.

9.14 Washington State Department of Transportation.

Comment: We have no objections to the basic content of the document

and have no comments on the project from the Moxee Bridge north.

Response: Noted.

Comment: South of the Moxee Bridge, the river channel location is in a constant state of change. It is very likely in a few years the main force of the river may be directed against a section of I-82 that is not being riprapped under this project. The existing training dike near the northern Spring Creek culvert may, under the 100-year flood condition, actually tend to force the water along I-82 and increase the erosion potential along the highway. The draft EIS does not address itself to this problem.

Response: During large floods, water will flow between I-82 and the remaining portion of dike located near the upper Spring Creek culvert and will continue flowing downstream parallel to the highway. However, the velocities of the overbank flow should be low enough to preclude significant damage to the highway embankment. Hydraulic design is covered in the feasibility report.

Comment: We feel the riprap section Type X shown on plate 6 is too thin. Normally our standards would require 2 feet or even 3 feet of depth, with an additional 1 foot of filter material. It may be that the nature of the I-82 embankment is such that the filter blanket may be omitted, but it should still be considered.

Response: A review was made of the riprap design and the conclusion reached that the Type X riprap section will satisfactorily protect I-82. During post-authorization studies, design will be reviewed again in light of conditions existing at that time.

9.15 Washington State Parks and Recreation Commission.

Comment: It is our understanding that the dike through the Yakima Sportsman State Park will be raised 2 to 3 feet vertically, which will cause a 10- to 15-foot horizontal increase measured at the toe of the dike and that the width increase will occur on the inboard or park side of the dike.

Response: A field check by Corps of Engineers' personnel in February 1977 and review of levee design profiles revealed that, on average, lift of only about 0.7 feet will be required in the park area to bring the levee top to grade. Maximum lift will only be 1.5 feet. The average horizontal increase then will only be about 4 feet.

Comment: We request that the width increase be on the outboard or river side of the dike. We would definitely be opposed to removing the existing trees and shrubs on the park side of the levee. That vegetation adds a substantial aesthetic quality to the park.

Response: A width increase on the river side of the dike would be much more expensive than an increase on the landward side. Also, an increase on the river side would tend to constrict the channel, and construction within the river would have temporary impacts on water quality.

Comment: We request that all work shall be done from the top of the dike, with no equipment operating on or across nondike lands.

Response: All construction will be done from top of levee or from 10-foot construction easement adjacent to levee toe.

Comment: We request that a land survey be carried out by the Corps of Engineers to mark the dike easement boundaries prior to construction.

Response: This will be done.

Comment: If the width increase must be on the landward side of the dike, we request that a landscape plan agreeable to State Parks and the Corps of Engineers be jointly prepared prior to construction. The landscape plan should consider, at a minimum, the following items:

(1) Drainage system with inlets and lawn.

(2) Stream water source and development.

(3) Variable levee slopes in order to break up the monotonous appearance and steepness.

(4) Planting of ornamental trees to improve tree quality.

(5) Improve shrub planting to improve quality and wildlife habitat.

(6) Assurance that the soil quality will support the landscape plantings as well as the erosion control grasses.

Response: A jointly prepared landscape plan for the levee in the park will be developed during preconstruction planning.

Comment: State Parks also have several questions that can't be answered from Corps of Engineers' documents presently in hand. One question concerns a culvert under the levee with a headgate on the river side which supplies water to a stream which flows through the park. This is an established stream with high recreation and aesthetic value and is essential to the park. Will this structure be maintained or eliminated?

Response: The existing culvert will be retained.

Comment: At the base of the existing levee fill, there is a drainage ditch which normally has water in it. If this ditch is to be relocated, the lawn area will be lost. It appears a tile drain system with surface inlets could be installed in place of the ditch.

Response: The tile drain will be considered. Design details will be worked out at a later date. If possible, no lawn area will be lost.

Comment: A large rock pile exists adjacent to the dike. It would be useful to parks if it were removed. Can it be used in the new levee construction?

Response: This is a design detail that must be developed later. The rock pile will be used for levee construction if it is suitable material.

Comment: I am confident that this levee can be built to provide needed flood protection and can also protect and preserve the amenities of the public recreation area.

Response: Noted.

Note: We believe our reponses to this letter of 11 February 1977 also addresses the concerns expressed in the State Parks' letter of 4 March 1977. Both letters are in appendix F.

9.16 Yakima County Clean Air Authority.

Comment: We agree with the conclusion that the only foreseeable air quality problems which might arise from construction of the levees are related to the construction period and can easily be abated.

Response: Noted.

Comment: In the interest of accuracy, we believe the reference to a gravel pit operation near Granger has no relevance to the project area air quality. This particular source is not considered a major source, and we note that the location is southeast rather than southwest of Yakima.

Response: Paragraph 2.52 has been revised to eliminate reference to the Granger gravel pit.

Comment: Air Quality - Project Area. The list of sources should be expanded to include an asphalt batch plant located in the flood plain on property adjacent to the gravel-crushing operation mentioned in the draft EIS.

Response: Paragraph 2.53 has been revised to include this.

9.17 Associated Students, University of Washington.

Comment: Several times the U.S. Fish and Wildlife Service is noted as contributing recommendations under consideration. What are these recommendations? How would they affect the environment or the outcome of the project? We support the interactions involved, but feel the results should be included for adequate public review.

Response: Paragraphs 1.09, 1.13, and 1.22 have been revised, and all mention of "recommendations under consideration" have been deleted. Some of the landscaping ideas presented in section 1 were recommendations by the Fish and Wildlife Service.

Comment: What is the impact of the excavation needed for the left bank improvement?

Response: Excavation impacts would include adverse short-term impacts to water quality and both short-term and long-term adverse impacts to vegetation, wildlife, fish, and aesthetics. The impacts of all the levee sections are discussed collectively throughout section 4.

Comment: Project Description. Why are the backfill quantities less than the excavation quantities?

Response: This is because buried riprap is placed in the excavated sections, and the remaining excavation area is filled with earth.

Comment: Appendix F of the Feasibility Report should have been included in the draft EIS. We understand that this is a revised version, but to omit the benefit-cost analysis seems inappropriate. It is impossible to accurately assess the economic outlay of the project with the information provided. What are the project costs based on? How were the figures arrived at?

Response: We disagree. It is more appropriate to append the detailed discussion of the benefit-cost analysis to the feasibility report rather than the environmental impact statement. Anyone wishing to obtain either appendix F or the entire Yakima-Union Gap Flood Damage Reduction Study Interim Report (the feasibility report) may request such from the Seattle District.

Comment: How long will construction last?

Response: Paragraph 1.06 states that project construction would take 15 months.

Comment: On what do you base your statement, "alleviation of local unemployment would constitute a benefit to the local area and national economies?"

Response: Statement is based on common assumption of benefits from increase in employment.

Comment: What economic impact will occur when construction is completed? Will there be any permanent jobs created? If so, we hope local people will be used to fill these spots.

Response: There will be economic benefits because of increased flood protection. Long-term economic impacts are covered by paragraphs 4.17 to 4.25. No permanent jobs will be created by the levee itself.

Comment: Table 1. What are the project costs based on?

Response: Basis for project costs is covered in more detail in appendix F of main feasibility report.

Comment: Population Projections. On what do you base your statement, "should the project be authorized and completed, the area would probably retain its agricultural zoning with only a small increase in the number of homes and mobile homes?"

Response: From discussions with the Principal County Planner (see paragraph 4.32).

Comment: Have 100-year and 200-year flood determinations been established subsequent to Bureau of Reclamation storage facilities?

Response: Yes.

Comment: Since levees will interrupt the natural reservoir action of a flood plain, flooding downstream can be expected to increase. How large would damages downstream be from this phenomenon, and if they were not included in the benefit-cost analysis, why?

Response: As stated in paragraph 4.22, the new levees and levee improvements would not be expected to increase impacts to any upstream or downstream lands.

Comment: Floods and Flood Damage. What is "significant damage?" How did you arrive at these figures?

Response: "Significant damage" refers to the flood level where damage is measurable. The discharges that cause measurable damage were based on data from past floods and hydraulic calculations.

Comment: Proposed Flood Damage Reduction Measures - Flood Control Storage. What would be the consequences if the Bumping Lake proposal is not activated?

Response: Yakima levee project is designed for the present condition without Bumping Lake Enlargement. Failure to enlarge Bumping Lake would have no effect on levee project.

Comment: Section 101(b)2 of the National Environmental Policy Act points out the need for culturally pleasing as well as productive surroundings. This is certainly a difficult task to bear; however, it appears nothing has been done to further the possibility of important and valuable archeological findings since April 8, 1974. Has funding been sought since then? If not, why?

Response: As stated in paragraph 2.89, a cultural resources investigation of selected portions of the proposed new levee alinement was conducted by the Corps of Engineers during the fall of 1975. This investigation did not reveal any prehistoric or historic sites within the area of survey.

Comment: If any prehistoric or historic sites are found on the project site, how would it affect the project? Would excavation be allowed? The investigation in Appendix E indicates a strong possibility that cultural artifacts do exist at the site.

Response: As indicated within the EIS, a cultural resources survey would be undertaken after project authorization by Congress. The survey would assess the total number of sites to be affected, their temporal and functional character, and their importance to prehistory and history of the Pacific Northwest. If cultural resource sites which meet the criteria for eligibility on the National Register of Historic Places are found in the direct impact area, the levee would either be realined to prevent their destruction or they would be excavated by professional archeologists to preserve their historic or prehistoric information. Salvage of these significant sites would occur prior to construction. However, in the event that cultural sites are found during construction, a cultural resource specialist would be contacted immediately, and a salvage program would be undertaken.

Comment: Relationship to the Existing Shoreline Management Act. The levees, which will be within 200 feet of O.H.W., do not provide public access to the river and alter the existing character of the area. Why is the levee not in conflict with conservancy designation where activities and uses of a nonperson nature which do not substantially degrade the existing character of an area" (Department of Ecology guidelines) are favored?

Response: Shouldn't the quote from Department of Ecology guidelines read "nonpermanent" nature instead of "nonperson" nature? Where the levees abut the river, they would provide public access to the river. In general, the levees would provide access to an area which is not now available to the public. As stated in our paragraph 3.03, we believe the rehabilitation of the existing levees and the construction of new levees

generally set back from the river channel should not be in conflict with the conservancy shoreline designation.

Comment: Alternatives - The "Do Nothing" Alternative. How was the figure $465,900 arrived at?

Response: Detailed economic analysis can be found in appendix F of the main report.

Comment: How "substantial" are existing flood problems?

Response: Paragraphs 2.58 to 2.61 present information on historic floods within the general and project area.

Comment: We support the Army Corps of Engineers' decision not to enlarge the reservoir system.

Response: It does not appear that more reservoirs within the Yakima drainage system could effectively control flooding near the city of Yakima.

Comment: Rare and Endangered Species. Will the habitat of the "rare butterfly" be altered? We feel this deserves more attention than it has received. We support the consultation with the Department of Game but do not see any time spent to mitigate a potential problem. It the area referred to the Moxee Bog? Will the hydrology affect the area?

Response: Paragraph 4.44 has been revised to include a brief discussion of the 14-acre sphagnum bog (known as the Moxee Bog) which is the habitat of a rare butterfly. We would not expect that project construction would adversely impact this bog.

9.18 Robert C. Card.

Comment: I would like to commend the Corps of Engineers for preparing what appears to be a thoughtful and objective EIS. The format used greatly facilitated my review, which included the entire statement in detail. I approached the review as an environmental engineer and a citizen of the community concerned for its social and economic welfare.

Response: Noted.

Comment: There was no mention in the statement about possible downstream impacts of the project either with the normal flows or the project design floodflows of the Yakima River. The potential impacts of this type of project are increased aggradation or degradation of the downstream river bed and increases in the magnitude of floodflows experienced by the lower Yakima Valley. While, in this case, these impacts may be small, I still think that the potentially affected population deserves to hear the Corps of Engineers' position on this subject.

Response: Paragraph 4.22 states that the project would cause no significant adverse impacts to any upstream or downstream flood-plain lands.

Comment: Proposed Flood Damage Reduction Measures - Levees and Channels. Several other possible levee projects in the drainage basin are mentioned. However, there are no statements in the EIS describing the broad potential impacts of the whole system and the Yakima-Union project's contribution to these impacts. For example, the proposed project's impact on anadromous fish may be small as the river exists today but large if the whole levee system is built. Comments in the final EIS addressing these issues would help avoid piecemeal environmental degradation due to a lack of understanding of the overall program.

Response: As stated in paragraph 2.72, it is impossible to state whether or not the construction of any of these levees will ever be authorized and funded. We agree that the construction of many more levee segments may create serious environmental impacts, such as adverse impacts to anadromous fish.

Comment: There was no rationale given to the selection of the 100-year and 200-year return period floods as the design values. This selection has a major impact on the size of the project. Therefore, a mention of why these values, as opposed to larger or smaller ones were chosen, would be informative.

Response: Reason for selecting 100- and 200-year level of protection is discussed under "Plan Selection" in the feasibility report. Level of protection was originally chosen to maximize net benefits. However, because serious danger exists from overtopping, the degree of protection for the levees downstream of the Moxee bridge has been increased to the highest level that is economically feasible - 200-year flood protection.

Comment: Short-Term Fish Impacts. This section did not mention the potential interruption of anadromous fish runs during construction due to disturbances in the river. This impacts could be minimized by careful project scheduling coordinated with the Washington State Fish and Game Department.

Response: Paragraph 4.08 has been revised to include this.

Comment: Impacts to Endangered or Threatened Species. This section is not specific enough in describing the impact on the peregrine falcon community. At a minimum, the bird's nesting site(s) and routine travel patterns (if any) should be identified. If this is done, then ornithologists could more objectively describe the impacts on the project's short-term or long-term effects on the bird's behavior.

Response: Conversations with the Fish and Wildlife Service have revealed that there are no falcon nesting sites near the project area, and the bird is not commonly seen within the area. There is no reason to believe this project would have either significant short- or long-term effects on the bird's behavior.

Comment: Long-Term Economic and Social Impacts. This section did not mention social costs associated with the project. The river has a potential for becoming a focal point of day-to-day community recreational activity. It is particularly valuable in this respect due to its proximity to low-income neighborhoods. Many of these people do not have the resources to travel to find recreation, so anything that hinders their access to the river should be considered in that light. Both good and harmful effects in this regard were alluded to elsewhere in the statement. However, a statement in this paragraph summarizing the project's impact on the public's future access to, and enjoyment of, the river would be valuable to the local sponsor and other concerned citizens.

Response: We believe this subject is more appropriate under our "Long-Term Outdoor Recreation Impacts" paragraph (4.29). This paragraph states that we assume the levees would be open to the public and would create access to an area which is presently closed to the public. The levees could be used for short hikes or nature observation.

Comment: Impacts on Unprotected Land. This section did not describe either the additional loss to land owners due to changes in channelization or changes in flood characteristics (e.g. sediment transport) due to unprotected land across the river from Union Gap.

Response: The levees would cause no additional loss to unprotected land.

Comment: Also, there may be a cost associated with poorer access to the land inside the levees and a reduction in property values. These costs, if they exist, should be included in the benefit-cost analysis.

Response: We anticipate no additional cost or loss of property value to unprotected land.

Comment: The possible changes in flood characteristics may also have long-term impacts on the biotic community.

Response: The levee is not expected to significantly change flood characteristics.

Comment: Borrow Site Impacts. This section describes the impacts of expanding borrow pits as "minimal or insignificant." The excavation of 208,700 cubic yards of earth material will leave a 13- acre, 10-foot-deep hole. If the site is near a city, as stated, it is difficult to see how this comprises a minimal impact. Most people experiencing the noise and

dust from gravel excavating and processing operation would describe it as highly negative.

Response: At least three borrow sources may be used, chosen from existing borrow sites or sites that will have minimum adverse impact.

Comment: Much of the proposed levee protecting the Yakima Wastewater Treatment Plant involves excavation and/or backfill in the river. Was the less environmentally damaging and perhaps less costly alternative of a more localized levee around the plant itself examined? I think that an argument for or against this proposal should be presented in the final statement.

Response: The entire spray irrigation field needs to be protected; thus a more localized levee around the plant itself is not a viable alternative.

Comment: Project Area Services. I wish to note here that the Keith and Keith Funeral Chapel (see paragraph 2.26) is a recent structure that was approved by the County with full knowledge of its position on the flood plain. Including damage reduction for this facility as a benefit has the effect of allowing the owner and county to cover up unwise flood-plain management. Using this type of practice, any Federal flood control project can eventually be justified from a benefit-cost perspective. If the current benefit-cost ratio is less than one, all that the county has to do is allow building in the flood plain until the benefit of protecting the new construction exceeds the cost of the flood control project.

Response: Noted.

Comment: Employment and the Labor Force. The statement in paragraph 4.12 about the 2,000 unemployed agricultural workers is misleading. Many other local, union-protected, construction workers are typically out of work during the winter. Therefore, if there is levee construction during the winter, it is highly unlikely that any significant number of these agricultural workers will be employed on the project.

Response: Most of the project work force will be union workers. Agricultural workers provide an additional source to draw on, if necessary.

Comment: Table 1, Project Costs. The costs of operation and maintenance listed in the table do not conform to historical data. In the past, Yakima County has spent several thousand dollars annually on levee maintenance. This money was spent primarily on brush clearing through the county's student summer employment program. I suggest that the Corps of Engineers obtain historical data from the county and revise its cost figures accordingly.

Response: The listed cost is in addition to current cost.

Comment: Project Economics. The benefit-cost analysis is weak in that the criteria for estimating costs is not explained, and environmental costs as recognized in the statement were not quantified and included. This section of the statement is probably one of the most important and debatable, but it is one of the sections least reinforced by presentations of data and methodology. Having some experience in cost estimating, I know that the criteria and assumptions used are often quite subjective. Therefore, I think that at least a cursory summary of your procedure would be appropriately included in the final statement.

Response: We believe that it is more appropriate to append the detailed discussions of the benefit-cost analysis to the feasibility report rather than the EIS. Anyone wishing to obtain either appendix F or the entire Yakima-Union Gap Flood Damage Reduction Study Interim Report (the feasibility report) may request such from the Seattle District. As soon as it is prepared, we will send you the final report in hopes that it will answer your questions on our benefit-cost analysis. Also, table 1 of the Revised Draft EIS now includes an estimate of fish and wildlife losses.

Comment: Paragraph 2.02, line 5 should read ". . . Between 1970 and . . . ."

Response: Correction in text has been made.

Comment: The 24-inch-diameter line as shown on plate 5, when compared with plate 3, does not correspond to the functional description given in paragraph 1.19. As shown, the inlet is not above the 100-year flood level.

Response: Correction in text has been made.

9.19 Comments and Responses on Revised Draft Statement: In December 1978 the revised draft environmental impact statement was sent to Yakima County, the State of Washington and Federal agencies at the Washington, D.C. level. All comments received which are relevant to the revised draft EIS Are shown below, and copies of all letters received are shown in appendix G.

9.20 U.. Environmental Protection Agency.

Comment: We feel that the project changes covered in the revised statement will not greatly influence the environmental impacts of the project.

Response: Noted.

Comment: The effects of increased cost-sharing recommended under the President's new water resources policy are not addressed in the revised statement.

Response: Section 1.38 has been added to include this.

Comment: We support the Corps of Engineers plan to work closely with the U.S. Fish and Wildlife Service and the state conservation agencies during the post-authorization planning.

Response: Noted.

Comment: The Environmental Protection Agency has rated this draft environmental statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). The rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under section 309 of the Clean Air Act.

Response: Noted.

9.21 U.S. Department of the Interior.

Comment: Our field review indicated that the modification (recommended by the Board of Engineers of Rivers and Harbors) would amount to a significant increase in previously identified fish and wildlife losses and that a reanalysis of fish and wildlife aspects would be required. By a letter dated October 4, 1978, to the District Engineer, our Fish and Wildlife Service recommended, among other things, that we be given the opportunity during the post-authorization phase (advanced engineering and design) to reassess fish/wildlife losses and to develop a new and more comprehensive habitat restoration plan. We understand that, if the project is authorized, the Corps will make every opportunity available to accomplish our recommendations during the post-authorization phase.

Response: The Fish and Wildlife Service will be given the opportunity during the post-authorization phase to reassess fish and wildlife losses and to develop a new and more comprehensive habitat restoration plan.

Comment: It should be recognized, depending on final levee details developed in the design phase, that the $117,000 habitat restoration cost, identified in paragraph 18 of the Board's Report, may be too low.

Response: Noted.

Comment: It is important to note that setback features of the levees are highly important and the Fish and Wildlife Service will insist on these features to protect wildlife values.

Response: Noted.

Comment: The revised draft statement does not note that the State Historic Preservation Officer (SHPO) has been consulted regarding cultural resources; however, a letter from the SHPO is included in Appendix E.

Response: The final EIS has been changed (Section 2.88) to state that the SHPO was consulted regarding cultural resources.

Comment: We recommend that if artifactual material is encountered during construction, the State Office of Archaeology and Historic Preservation should be contacted for consideration of an archaeological salvage program.

Response: The final EIS has been changed (Section 4.45) to state that all items having any apparent archaeological interest discovered during any construction activities shall be carefully preserved. The contractor shall leave the archeological find undisturbed and shall immediately report the finding to the contracting officer. The State Office of Archaeology and Historic Preservation would be contacted by the Corps, and informed of the find and the Corps' salvage program.

Comment: Local officials have recently expressed interest in discussing the possibility of cost sharing in the development of a system of trails along the proposed project levees. We believe the revised draft environmental impact statement should be expanded to reflect this new possibility for use of project resources.

Response: During plan formulation stages of the feasibility report local interests were not prepared to enter into agreements with the Corps for any recreation features. Recreation (including trails) will be reconsidered during the post-authorization phase.

Comment: The reasons for the Fish and Wildlife Service no longer having confidence in previous estimates of angler days are due to late Corps project changes, change in habitat use and value, and to an increased demand for consumptive and non-consumptive fish and wildlife oriented recreation.

Response: The reasons for the Fish and Wildlife Service no longer having confidence in previous estimates of angler days have been included in the final EIS (Sectin 4.43).

Comment: The bald eagle has been given official threatened status in the State of Wasington since publication of the Corps' feasibility report and revised draft EIS. Some birds have been observed occasionally within the project area.

Response: The final environmental impact statement has been changed (Section 2.85) to include this information.

Comment: Because the bald eagle and the peregrine falcon use the project site, consultation under Section 7 of the Endangered Species Act should be initiated immediately.

Response: At this point in the processing of this feasibility report, we do not believe it would be appropriate to expend time and funds on formal consultation. If Congress authorizes this project and appropriates funds, the Corps of Engineers will conduct a biological assessment in accordance with the Endangered Species Act during the pre-construction planning phase. If the assessment finds that adverse impacts may occur, the consultation process will be initiated and any problems resolved before construction is initiated.

9.22 U.S. Department of Agriculture.

Comment: Recommendations by the Board of Engineers for Rivers and Harbors, including higher level of protection of a portion of the flood plain, would raise first project cost to $5,168,000 and result in a benefit ratio of 1.6. Changes in cost sharing provisions to conform to requirements under current policy would raise the non-Federal contribution to the first costs of project installation to 25 percent.

Response: The final environmental impact statement will reflect the project modifications recommended by the Board of Engineers for Rivers and Harbors and will note the results of application of the President's proposed cost-sharing policy to the project (See Section 1.38).

Comment: It would appear appropriate that Table 4 on page 20 of the draft EIS include the many acres of meandering river and associated wildlife lands (photo on page 27 of interim report).

Response: There are several hundred acres of meandering river and associated wildlife lands (islands and gravel bars) in between the right and left banks. This information has been added to Table 4 as a footnote.

Comment: We appreciate your including Soil Conservation Service's comments to a previous draft and hope these comments are helpful.

Response: Noted. They were helpful.

9.23 U.S. Department of Commerce.

Comment: The Department of Commerce has reviewed your proposed report on the Yakima-Union Gap, Washington together with the interim report concerning flood damage reduction in the Yakima River basin. We have no substantive comments to make on these documents.

Response: Noted.

9.24 U.S. Department of Transportation, U.S. Coast Guard.

Comment: On behalf of the U.S. Department of Transportation the concerned operating administrations and staff of the U.S. Coast Guard have reviewed the Revised Draft Environmental Impact Statement for Yakima-Union Gap Interim Report, Flood Damage Reduction. We have neither comments nor objections to offer regarding this proposal.

Response: Noted.

9.25 U.S. Department of Health, Education and Welfare.

No comments.

9.26 U.S. Department of Housing and Urban Development.

Comment: We have no constructive comments to offer.

Response: Noted.

9.27 Washington State Department of Ecology.

Comment: The State of Washington strongly supports the proposed project and looks forward to working with the Corps of Engineers during the post-authorization phase.

Response: Noted.

Comment: We do wish to express our great concerns over the application of the President's proposed cost-sharing policy at this advanced stage of project planning.

Response: Noted.

Comment: State agencies have some additional information and concerns which are outlined below for your information and consideration.

Response: Noted. (The comments of the State Department of Transportation, Parks and Recreation Commission, Department of Fisheries, Department of Game, and Office of Archaeology and Historic Preservation follow accompanied by Corps of Engineers responses to each comment).

9.28 Washington State Department of Transportation.

Comment: We have reviewed the subject document and are in support of the proposed project because it will preserve the structural integrity of the Interstate Highway roadway.

Response: Noted.

Comment: The Department, in our letter dated February 16, 1977, expressed some concern regarding the depth of rip rap to be placed on the roadway slopes. The Department cannot recommend approval of construction plans until our hydraulics section can review design computations.

Response: Construction plans will be prepared during postauthorization planning (i.e., following authorization by Congress). Design details concerning I-82 will be fully coordinated with the State Department of Transportation during post-authorization studies.

Comment: The Department is planning to improve SR 82 by construction of a connection to SR 97 in the vicinity of Union Gap. This proposed improvement will fall within the limits of the subject proposal. The proposed highway project is not shown on any of the maps or plans in the document. Attached for the Corps information are plans of the planned highway improvement.

Response: The proposed highway project will be shown and considered in any future post-authorization study documents for the project.

Comment: Any references to the State Highway Department should be changed to the Washington State Department of Transportation.

Response: The Final EIS has been changed.

9.29 Washington State Parks and Recreation Commission.

Comment: I have reviewed the above noted documents and find that they do not contain a detailed evaluation of the application of Engineer Manual EM 1110-2-301, "LANDSCAPE PLANTING AT FLOODWALLS, LEVEES AND EMBANKMENT DAMS.

Response: The manual was used during planning of the project. To reduce the size of our report and EIS, we did not include a detailed evaluation of the use of this manual.

Comment: I have reviewed the above noted documents and find that no reasonable means to adequately landscape the dike within Yakima Sportsman State Park is available. Only plantings of various grasses appear to be possible given the parameters spelled out in the Interim Report and Draft Environmental Impact Statement. Therefore, any mutually prepared landscape plan prepared by Parks and the Corps during the "post-authorization planning" stage (detailed planning) cannot include schemes utilizing groupings of trees and shrubs if the Interim Report and Revised Draft Environmental Impact Statement are not revised.

If there is to be no allowance for tree and shrub planting on the inboard face of the dike within Yakima Sportsman State Park, then please make it clear in the Interim Report and Environmental Statements that any "joint

landscape plan" prepared by Corps and Parks in the future will be considered within extremely limited parameters that were established unilaterally by the Corps without the concurrence of Parks and that the narrow parameters preclude the possibility of trees and shrub planting.

Response: If the levees are built as described in the Revised Draft EIS (that is, if the levees are not overbuilt), some plantings of trees and shrubs would be possible landward of the levees, but no plantings would be possible on the levees themselves. However, during post-authorization planning, overbuilt levees, or sections of overbuilt levees, will be considered. Overbuilt levees would make possible plantings of trees and shrubs on the levees themselves. If overbuilt levees are found to be economically feasible, if the local sponsor is willing to incur the higher costs associated with the levees, and if they are desired by the public and concerned agencies, it is reasonable to assume that overbuilt levees would be recommended at least for sections of the State Park. The Final EIS (Section 1.09) has been changed to state that overbuilt levees will be considered in post-authorization planning.

Comment: Further, please understand that it is the judgment of the professional planning staff of state parks, the owner and public recreation manager of the land, that the failure to plant trees and shrubs on the inboard dike face will result in severe esthetic degradation within the Yakima Sportsman State Park.

Response: This comment has been added to Section 4.26 "Long-Term Esthetic Impacts" in the EIS. We will work closely with the State Parks and Recreation Commission to explore all acceptable measures to prevent esthetic degradation.

9.30 Washington State Depart ent of Fisheries.

Comment: We have reviewed the draft EIS for the Yakima-Union Gap Flood Damage Reduction Study and find that the project will have no apparent significant detrimental impacts on the salmon resource.

Response: Noted.

Comment: Any work which will actually be performed in the river will, of course, require a Hydraulic Permit.

Response: Noted.

9.31 Washington State Department of Game.

Comment: pp 7-1.32. Removal of burrowing animals is not discussed beyond this section. In most instances these would be furbearers such as muskrats. How will these be taken, and by whom? Will losses of these animals be mitigated?

Response: Maintenance of the levees would be the responsibility of the sponsor, Yakima County. If burrowing animals threaten the stability of the levees, the animals should be removed by the sponsor. If the levees are maintained properly, the necessity to remove burrowing animals should be a rare occurrence and not require mitigation. There presently does not appear to be a problem with burrowing animals in the existing levees.

Comment: pp 10 - Table 1. We wondered how the figure of $4,200 a year in unmitigated fish and wildlife costs was derived. How many animals are involved? We would like to point out that fish and wildlife increase dramatically in value as they become more scarce.

Response: The $4,200 annual cost of unmitigated fish and wildlife impacts was derived as follows:

The U.S. Fish and Wildilfe Service's estimate of annual hunter-day losses (140), angler-day losses (350), and losses to nonconsumptive wildlife recreation (400) were multiplied by day use values obtained from Principles and Standards ($9 per day, $6 per day, and $2 per day, respectively). Thus, 140 x 9 + 350 x 6 + 400 x 2 = $4,160, which rounds up to $4,200 per year.

We recognize there are some concerns with this approach: (1) The Project has changed somewhat since the man-day losses were estimated by the Fish and Wildlife Service and need to be updated, (2) the per day costs taken from Principles and Standards dates back to 1973, and need to be based on the recently published revised Principles and Standards, and (3) the $4,200 estimate does not take into account the future mitigating impact of Corps-planted trees, shrubs, forbs, and grasses in the project area. During post-authorization planning the physical and monetary impacts of the recommended plan will be reanalyzed.

Comment: pp 16-2.29. A fourth area important to hunters, which would be impacted by the proposal, is Moxee Game Reserve. It holds duck populations which contribute about 12,000 waterfowl to the Yakima County total harvest of between 60,000 to 100,000 waterfowl yearly. The approximately 12,000 waterfowl contributed to this total from Moxee Reserve indicate about 10,000 man/days of hunting, worth about $261,000 economically, based on direct spending.

Response: This comment has been added to the final EIS (Section 2.29).

Comment: pp 30-2.79. This riparian bottomland habitat may be described as unique in Yakima County.

Response: The project site riparian bottomland is very important for wildlife in Yakima County but it does not seem unique to us. Similar habitat can be found along other sections of the Yakima River in Yakima County.

Comment: pp 33-3.03. You state rehabilitation of existing levees, and construction of new levees set back from the river channel, should not be in conflict with the county's designation as "conservancy" in its shoreline master program, which includes most of the Yakima River shoreline from Selah Gap to Union Gap. We feel this would depend greatly on the location of the levees, proposed alternatives, and development encouraged by security generated by the existence of new levees.

Response: Our discussions with state and local officials have indicated that the proposed levee alinements are compatible with the shoreline "conservancy" category. The impact of the proposed project on all land use plans would be reviewed during post-authorization planning.

Comment: pp 37-4.16. A discussion of long-term economic and social impacts should address economic impacts to recreation. This can be calculated to a good degree of accuracy from man-days impacts.

Response: Section 4.29 in the EIS discusses long-term recreation impacts. Man-day impact figures will be updated during our post-authorization planning.

Comment: pp 39-40-4.25. There are no guarantees that land use controls and restrictions will not change. Present controls do not restrict intensification of agriculture or construction of buildings or other structures related to agriculture. Gravel mining permits are also available.

Response: This comment has been added to Section 4.25 in the final EIS.

Comment: pp 41-4.31. This paragraph seems to sidestep the fact that the reason present levees are being raised, and new ones constructed, is to provide security from flood damage so more intense land use can be developed.

Response: Raising the existing levees and building new ones will protect the existing level of development. Future flood plain development with the project is not expected to differ from development without the project. Continuation of local zoning regulations which prohibit residential use of agricultural lands are expected to continue to affect new development. Residential land use in the Yakima-Union Gap area is projected to concentrate within the currently zoned residential areas. Flood control laws that require new developments to be flood proofed up to 100-year level do not appear to be a significant deterrent to new development in the project area. Therefore, the removal of this restriction with a project is not expected to induce development.

Comment: pp 41-4.31. Sections 4.17 through 4.25 discuss long-term economic and social benefits, but do not address the social and economic

costs of these actions in terms of losses of wildlife oriented outdoor recreation.

Response: Losses of wildlife oriented outdoor recreation are discussed in Section 4.29, Long-Term Outdoor Recreation Impacts.

Comment: pp 41-4.34. There are no guarantees that these hundreds of acres of flood-plain land will remain unprotected from periodic flooding, and therefore in a low state of development compatible with wildlife. We cannot assess impacts to wildlife on this basis.

Response: We agree that there are no guarantees that the floodplain land riverward of the levees would remain in a low state of development. The paragraph does not suggest that there are such guarantees. However, it is logical to assume that if the levees are built, structures would not be permitted to be constructed on the "wrong side" of the levees.

Comment: pp 41-4.36. Natural vegetation behind the dike will also be lost due to more intensive land use, both residential and agricultural. Benefits to wildlife habitat resulting from periodic flooding will also be lost. These benefits include weed seed deposition, aluvial fertilization from silt deposits, insect food supplies, and protection for natural vegetation and space from development.

Response: We have included most of these statements (Section 4.36) in the final EIS. However, we *do not* believe the project would result in a major land use change. With or without the proposed project, we believe that a few more homes and mobile homes would locate in the flood plain, and more intensive agriculture would be practiced.

Comment: pp 42-43-4.42. Again, this section does not address wildlife losses behind the dikes, losses from encroachment on Moxee Reserve, or losses of burrowing animals.

Response: These possible impacts have been included in Section 4.42 in the final EIS, except for losses to burrowing animals which we believe are unlikely.

Comment: pp 48-5.04. Adverse Environmental Effects which cannot be avoided should have included impact on waterfowl, shorebirds, doves and others from loss of flat shorelines. Mitigation proposals for diking will not offset losses discussed in 5.02.

Response: The impact on waterfowl, shorebirds, doves, and other birds has been included in Section 5.04 in the final EIS. We recognize that collectively these measures do not fully mitigate the losses.

Comment: pp 53-7.0. The productivity of this proposal assumes protection of "private residences, businesses, agricultural lands

and public facilities." Project benefits are based on these features. Fish, wildlife, recreation and water quality costs were not measured against these benefits because of present zoning restrictions, but the benefits cannot accrue without assessing these environmental costs of development, which result from the security of improved and expanded levees.

Response: We have added a paragraph in Chapter 7.0 stating that urbanization of the floodplain may adversely impact fish, wildlife, recreation, and water quality. However, based on discussions with the County Planner, it seems likely that the rural areas protected by the proposed project would, in the long-term, remain rural. Residential land use in the Yakima-Union Gap area is projected to concentrate within the currently zoned residential areas resulting in a higher density residential use.

Comment: The possibility that the utility of Moxee Reserve would be lost if it were converted from wet pasture to row cropping was not addressed, nor was the cost of waterfowl depredation. This depredation could occur if row cropping or other more intensive agriculture replaced wet pasture in all or part of Moxee Reserve or other areas on the affected flood plain.

Response: The final EIS now discusses the possibility that the utility of the Moxee Reserve would be lost if it were converted from wet pasture to row cropping (Section 4.42).

9.32 Office of Archaeology and Historic Preservation.

Comment: A staff review of items 2.85-2.89 and 4.45 regarding cultural resources has been completed. We concur with the proposal to conduct a comprehensive prehistoric and historic resources survey of the project area. The potential for the presence of cultural resources in the area has been quite adequately recognized and addressed.

Response: Noted.

9.33 Yakima County, Washington, Board of County Commissioners.

Comment: The Board of Yakima County Commissioners wishes to advise you that we fully support the Yakima-Union Gap Levee Project.

Response: Noted.

Comment: Yakima County is willing to participate in the project and provide all necessary items of local sponsorship as required by congressional legislation. We understand that the President's cost-sharing proposal is under consideration but would require congressional enactment before any modifications would be made to our previously agreed upon

sponsorship. It must be noted that such enactment would have the effect of making our further sponsorship impossible.

Response: Noted.

APPENDIX A

PRINCIPAL NATIVE AQUATIC AND TERRESTRIAL VEGETATION

The following trees, shrubs, forbs, grasses, and aquatic plants are found within the project area. The list was developed with the aid of the Yakima offices of the Soil Conservation Agency and the Washington Department of Game. The list is not all inclusive; numerous other plant species probably occur along this reach of the Yakima River.

The following symbols are used to describe the relative abundance of these plants within the project area:

C - common within project area

U - uncommon within project area

R - rare, probably found in only one small section of the project area.

SPECIES (Common Name)	SCIENTIFIC NAME	ABUNDANCE
Trees		
Aspen	Populus tremuloides	U
Mountain alder	Alnus tenuifolia	?
Cottonwood	Populus trichocarpa	C
Shrubs		
Red osier dogwood	Cornus stolonifera	C
Willows	Salix spp.	C
Elderberry	Sambucus glauca	C
Serviceberry	Amelanchier alnifolia	C
Wild rose	Rosa	C
Hawthorn	Crataegus douglasii	C
White clematis	Clematis ligusticifolia	C
Oregon grape	Berberis aquifolium	C
Poison oak	Rhus diversiloba	?
Snowberry	Symphoricarpos albus	C
Greasewood	Sarcobatus vermiculatus	U
Big sagebrush	Artemisia tridentata	U or R
Rabbitbrush	Chysothamus viscififlorus	U or R
Chokecherry	Prunus virginiana	U
Western sumac	Rhus glabra	C
Grasses		
Sedge	Carex spp.	C
Redtop grass	Agrostis alba	C
Rye grass	Elymus sp.	C
Kentucky blue grass	Poa pratensia	C
Quack grass	Agropyron repens	C

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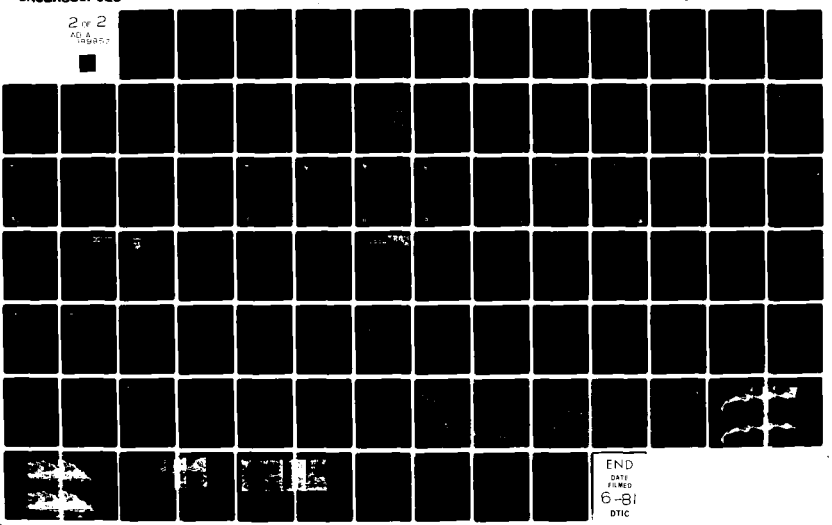

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Timothy grass	Phleum pratensis	C
Orchard grass	Dactylis glomerata	U
Barley	Hordeum spp.	C
Crested wheatgrass	Agropyron desertorum	C

Forbs

Western yarrow	Achillea millefolium	C
Stinging nettle	Urtica lyallii	C
Yellow sweet clover	Melilotus alba	C
Alfalfa	Medicago sativa	U
Common clovers	Trifolium spp.	C
Columbine	Aquilegia formosa	C
Small flowering buttercup	Ranunculus testiculatus	C
Water hemlock	Cicuta occidentalis	C
Pussytoes	Antennaria rosea	C
Mullein	Verbascum tharpus	C
Dogbane	Apocynum androsaemifolium	C
Common thistle	Cirsium lavceolatum	C
Mustard	Brassia compesteris	C
Willow weed	Epiloglum spp.	C
Pepper grass	Lepidium perfoliatum	C
Teasle	Dipsacus sylvestris	C
English plantain	Plantago lanceolata	C
Common groundsel	Senecio vulgaris	U
Goldenrod	Solidago elongata	C
Dandelion	Taraxucum officinale	C
Meadow rue	Thalictrum occidentale	C
Cow parsnip	Heracleum lanatum	C
Monkey flower	Mimulus langsdorfii	C
Rocky Mountain iris	Iris missouriensis	C

Aquatic plants

Yellow pond lily	Nymphaea ploysepala	C
Smartweed	Polygonum sp.	C
Cattail	Typha latifolia	C
Duck weed	Lemna minor	C
Bullrushes	Scripus spp.	C
Common horsetail	Equisetum arrense	C

APPENDIX B

WILDLIFE INVENTORY

The following birds, mammals, reptiles, and amphibians use the project area habitat at least part of the year. The list was provided by the U.S. Fish and Wildlife Service.

Seasonal occurrence and abundance are coded as follows:

S = March - May
S = June - August
F = September - November
W = December - February

* = Nests in area

A = Abundant
C = Common
U = Uncommon
O = Occasional
R = Rare

Bird	S	S	F	W
Western Grebe	O			
Eared grebe	O			
Pied-billed grebe	O	O	O	O
Great blue heron	C	C	C	C
Black-crowned night heron			O	O
American bittern*	U	U	U	U
Whistling swan			O	O
Canada goose	C			O
White-fronted goose	U		O	
Snow goose			U	
Mallard*	A	C	A	A
Gadwall*			O	O
Pintail*	C		C	C
Green-winged teal*	C		C	C
Blue-wnged teal*	C	O		
Cinnamon teal*	C	C		
American widgeon	C		C	C
Shoveler*	C		C	O
Wood duck*	C	C	O	U
Redhead	U		U	
Ring-necked duck	O		O	U
Lesser scaup	O		O	U
Bufflehead	O		O	O
Ruddy duck*	O		O	O
Hooded merganser	U		U	
Common merganser	O		O	
Turkey vulture	O	O	O	
Sharp-shinned hawk	O		O	
Cooper's hawk	O	O	O	O
Red-tailed hawk*	C	C	C	C
Swainson's hawk	C	O	C	O
Rough-legged hawk	C	O	C	O
Golden eagle	U	U	U	U

Bird	S	S	F	W
Bald eagle	U	U	U	U
Marsh hawk*	C	C	C	C
Prairie falcon	O	U	O	
Peregrine falcon	R	R	R	R
Pigeon hawk	O	O	O	
Sparrow hawk*	C	C	C	C
California quail*	A	A	A	A
Chukar	O	O	O	O
Ring-necked pheasant*	A	A	A	A
Virginia rail*	C	C	C	C
Sora*	U	U	U	U
American coot*	O	O	O	U
Killdeer*	C	C	C	U
Common snipe	C	C	C	
Long-billed curlew	O		O	
Greater yellow legs	O		O	
Lesser yellow legs	C		C	
Least sandpiper	C		C	
Long-billed dowitcher	O		O	
Western sandpiper	O	O	O	
Wilson's phalarope*	C	C	O	
Ring-billed gull	O	C	C	
Black tern	O		O	
Rock dove*	C	C	C	C
Mourning dove*	C	A	A	U
Barn owl*	O	O	O	O
Screech owl*	C	C	C	O
Great horned owl*	C	C	C	C
Burrowing owl*	C	C	C	C
Short-eared owl	O	O	C	C
Saw-whet owl		U		
Poor-will	U	U		
Common night hawk	C	C	C	
Rufous hummingbird*	O	O	O	
Calliope hummingbird	O			
Belted kingfisher	O	O	O	
Red-shafted flicker*	C	C	C	C
Lewis' woodpecker	O	O	O	
Yellow-bellied sapsucker	O		O	
Hairy woodpecker	O	O	O	
Downy woodpecker	O	O	O	

Bird	S	S	F	W
Eastern kingbird*	O	O	O	
Western kingbird*	C	C	O	
Say's phoebe*	O	O	O	
Western wood pewee	O	O	O	
Horned lark	U	O	O	C
Violet-green swallow	O		O	
Tree swallow*	A	C	C	
Bank swallow*	C	C	U	
Rough-winged swallow	O		O	
Barn swallow*	C	C	U	
Steller's jay			O	O
Black-billed magpie*	C	C	C	C
Common raven	C	O	U	C
Common crow*	C	U	U	O
Black-capped chickadee	O	O	O	
Red-breasted nuthatch	O		O	
Pigmy nuthatch	O		O	
Brown creeper	O		O	
House wren*	O	O	O	
Winter wren	O		O	
Bewick's wren*	O	O	O	
Long-billed marsh wren*	C	C	C	U
Robbin*	C	C	C	O
Varied thrush	C		C	
Hermit thrush	O		O	
Townsend's solitaire	O		O	
Golden-crowned kinglet	C	O	C	
Ruby-crowned kinglet	C	O	C	
Water pipit	O		O	
Cedar waxwing	U		U	
Loggerhead shrike*	C	C	C	C
Starling*	C	C	C	C
Warbling vireo			O	
Yellow warbler	O			
Myrtle warbler	U		U	
Audubon's warbler	A	O	A	R
Townsend's warbler	O		O	
MacGillivray's warbler	O		O	

Bird	S	S	F	W
Yellowthroat	O	O		
Yellow-breasted chat	O	O		
Wilson's warbler	C		C	
House sparrow*	A	A	A	A
Western meadowlark*	A	A	A	C
Yellow-headed blackbird*	C	C	O	
Red-winged blackbird*	A	A	A	O
Bullock's oriole*	C	C	U	
Brewer's blackbird*	C	C	C	C
Brown-headed cowbird	O	O	O	O
Western tanager	O			
Black-headed grosbeak	O			
Evening grosbeak	U		U	R
House finch*	C	C	C	O
Pine siskin	O			
American goldfinch	C	O	C	
Rufous-sided towhee	O	O	O	O
Savannah sparrow*	C	C	C	R
Vesper sparrow*	C	C	C	R
Sage sparrow*	C	C	C	
Oregon junco	O		C	C
Harris' sparrow			R	R
White-crowned sparrow	C	O	C	U
Golden-crowned sparrow	O		O	
Fox sparrow*	C	C	C	O
Song sparrow	C	C	C	O

The following mammals, amphibians, and reptiles are permanent residents of the project area.

Mammals

Common Name	Scientific Name
Vagrant shrew	Sorex vagrans
Desert cottontail	Sylvilagus auduboni
Yellow pine chipmunk	Eutamias amoenus
Yellow-bellied marmot	Marmota flaviventris
Columbia ground squirrel	Citellus columbianus
Northern pocket gopher	Thomomys talpoides
Deer mouse	Peromyscus maniculatus
Long-tailed meadow mouse	Microtus longicaudus
Bushy-tailed wood rat	Neotoma cinerea
Porcupine	Erethizon dorsatum
Beaver	Castor canadensis
Muskrat	Ondatra sibethicus
Mink	Mustela vison
Striped skunk	Mephitis mephitis
Coyote	Canis latrans
Red fox	Vulpes fulva
Raccoon	Procyon lotor
River otter	Lutra canadensis
Short-tailed weasel	Mustela errminea
Long-tailed weasel	Mustela frenata
Badger	Taxidea taxus
Bobcat	Lynx rufus
Mule deer	Odocoileus hemiounus
Shrew	Sorex spp.
Little brown myotis	Myotis lucifugus
Big brown bat	Eptesicus fuscus
White-tailed hare	Lepus townsendii
Western harvest mouse	Reithrodontomys megalotis
Nutria	Myocaster coypus bonariensis
Least chipmunk	Eutasmias minimus
Mole	Scapanus spp.
Common rat	Rattus norvegicus

Amphibians and Reptiles

Common Name	Scientific Name
Long-toed salamander	Ambystoma macrodactylum
Tiger salamander	Ambystoma tigrinum
Western spadefoot	Scaphiopus hammondi
Western toad	Bufo boreas
Pacific tree frog	Hyla regilla
Spotted frog	Rana pretiosa
Painted turtle	Chrysemys picta
Western skink	Eumeces skiltonianus
Northern alligator lizard	Gerrhonotus coeruleus
Racer	Coluber constrictor
Gopher snake	Pituophis catenifer
Common garter snake	Thamnophis sirtalis
Western garter snake	Thamnophis elegans
Western rattlesnake	Crotalus viridis
Western fence lizard	Sceloporus occidentalis
Swift	Sceloporus graciosus gracilis
Pigmy horned lizard	Phyrnosoma orbiculare douglassi
Rubber boa	Charina bottae
Tailed frog	Ascaphus truei
Bull frog	Rana catesbeiana
Rough-skinned newt	Taricha granulosa granulosa

APPENDIX C
IMPORTANCE OF THIS AREA TO WILDLIFE

By Gaylin Woodard, Washington Deparment of Game

Importance of This Area to Wildlife

The deep, rich soil found along the Yakima River bottom between the Moxee Bridge and Union Gap and other bottomland watercourses produces shrubs, grasses, seeds, and insects in greater abundance and nutrition than anywhere else. These alluvial lands are life-producing for young and life-sustaining for adult birds. The range of upland birds is keyed to a water supply, but the watercourse provides something more than drinking water, for here are produced the large cottonwoods that provide nesting habitat for great blue heron rookeries and hollows for wood ducks, and here, also, are produced the willows, dogwood, serviceberry, clematis, hawthorn, and currant utilized by countless species of wildlife for food and cover. As the extent of bottomland gets smaller, it assumes a greater relative importance. The popular concept is that of continuous upland bird range, but in fact there are many islands or voids within the range that do not support birds. However, there is rarely an undisturbed streambank area in Washington that does not sustain upland bird life. Any disturbance in that area that would affect the marshes and swamps or alter the flows of the ditches and channels would have a resultant proportional effect on the wildlife and the food chain that supports it. In any key ecological area, the relationship between nature and the land that supports it lies in a very delicate balance. Young mallard ducklings are very dependent upon mosquito larvae for their food source during their first few weeks. Therefore, alterations that affect mosquito propagation directly affect the local mallard population. Also adjacent to the reserve is a small patch of vegetation which attracts a certain rare butterfly. This area has been established as a nature site for perpetual observation by outdoor enthusiasts. Should the relationship between that insect and its environment be altered, however slightly, the value of that area may be lost forever.

The natural fertility of the alluvial flood plain of the Yakima River provides the essential base of algae, mosses, lichens, grasses, herbs, shrubs, and trees upon which over 180 species of birds, mammals, reptiles, and amphibians are highly dependent.

Waterfowl, Upland and Migratory

The riparian habitat along this stretch of the river is heavily utilized by many species of birds as a nesting, brooding, or wintering area. This habitat provides important cover and food in addition to the availability of water. Mallard, wood duck, and the greater Canadian goose hatch and rear their young in this area. Other waterfowl using the area are bluewing, greenwing, and cinnamon teal, gadwall, pintail, widgeon, shoveler, coot, mergansers, and whistling swan. The pied-billed grebe and great blue heron are frequent and common users of the shorelines in the area. In fact, a large heron rookery is located in the cottonwood trees growing in the bottom along the side channels. As many as 40 herons have been observed at one time at the rookery.

The area also supports a very high population of Chinese pheasant, valley quail, and the migratory mourning dove and Wilson snipe. In addition to the above birds, sora rails, phalarope, avocet, curlew, kingfishers, and yellow-headed blackbirds have been observed in the area. Redtail, marsh, coopers, and American kestrel include the area within their territory for both hunting and nesting. Chukar inhabit the lower, rocky slopes above the valley but depend upon the brushy watercourse for insects and water source in summer and productive cover and food during extreme winters. The dependency of wildlife on river edge-riparian habitat has been well documented in Washington (Wendell Oliver, Wells Dam Project Studies).

The 933-acre Moxee Reserve is situated along the river bottom in Union Gap. This reserve, established in 1952, holds up to 40,000 ducks and is effective in holding populations that provide flights of ducks into the Moxee, Wenas, and Ahtanum areas during hunting seasons.

There are, of course, many nongame species of birds (more than 135 species identified) dependent upon the habitat along the river for their existence in that area, all of which are gaining increasing importance to those interested in conserving our wildlife resource.

Waterfowl upon a variety of aquatic vegetation, such as the fronds, stems and roots of smartweed, pond weed, duck weed, and bulrushes, and animal matter such as insects, mollusks, crustaceans, and small fish. Pheasants feed on cereal grains, weed seeds, and grasses, while quail, which prefer the thick brushy areas along streambanks, are especially fond of wild rose hips. Chukar prefer grasses and insects, while snipe are worm- and insect-eaters. Herons wade the shallows along the river and its side channels looking for small fish and other aquatic organisms.

Furbearers

Most of the major species of furbearers of the state are found in the area between the Moxee Bridge and Union Gap along the Yakima River and its side channels. These include beaver, muskrat, mink, raccoon, nutria, and otter. Food includes leaves and bark of willow and poplar, roots and stems of pond lily, pond weeds, cattail, and fish and crustaceans.

Big Game

Riparian habitat is a rich source of food and cover for deer which are commonly observed along the river bottom in the Union Gap area. They eat a large variety of grasses, herbs, shrubs, and deciduous trees, including aspen, willow, red osier dogwood, and serviceberry. Again, there are many smaller mammals that find streambank habitat essential for food, cover, or water. High populations of coyote, cottontail, rabbits, weasel, and skunk exist in the area along with lesser populations of fox, bobcat, porcupine, chipmunk, and ground squirrels.

Reptiles and Amphibians

Western painted turtles are quite common in the area. Others associated with wet areas are northern alligator lizard, western skink, rubber boa, ringneck snake, sharptail snake, garter snake, long-toed salamander, Pacific tree frog, tailed frog, and northwestern toad.

APPENDIX D

FISH INVENTORY

The following list of fish was provided by the U.S. Fish and Wildlife Service. Little is known about their relative abundance within the project reach, but nongame fish such as carp and suckers are believed to predominate.

Common Name	Scientific Name
Western brook lamprey	Lampetra richardsoni
Pacific lamprey	Entosphenus tridentatus
White sturgeon	Acipenser transmontanus
Coho salmon	Oncorhynchus kisutch
Chinook salmon	Oncorhynchus tshawytscha
Mountain whitefish	Prosopium williamsoni
Cutthroat trout	Salmo clarki
Rainbow and steelhead trout	Salmo gairdneri
Brown trout	Salmo trutta
Brook trout	Salvelinus fontinalis
Dolly Varden	Salvelinus malma
Tui chub	Gila bicolor
Chiselmouth	Acrocheilus alutaceus
Carp	Cyprinus carpio
Peamouth	Mylocheilus caurinus
Northern squawfish	Ptychocheilus oregonensis
Longnose dace	Rhinichthys cataractae
Leopard dace	Rhinichthys falcatus
Speckled dace	Rhinichthys osculus
Redside shiner	*Richardsonius balteatus*
Bridgelip sucker	Catostomus columbianus
Largescale sucker	Catostomus macrocheilus
Mountain sucker	Catostomus platyrhynchus
Black bullhead	Ictalurus melas
Sand roller	Percopsis transmontana
Pumpkinseed	Lepomis gibbosus
Bluegill	Lepomis macrochirus
Smallmouth bass	Micropterus dolomieui
Largemouth bass	Micropterus salmoides
Black crappie	Pomoxis nigromaculatus
Yellow perch	Perca flavescens
Prickly sculpin	Cottus asper
Mottled sculpin	Cottus bairdi
Piute sculpin	Cottus beldingi
Torrent sculpin	Cottus rhotheus
Shorthead sculpin	Cottus confusus

APPENDIX E

CORRESPONDENCE WITH SOURCES OF CULTURAL RESOURCES EXPERTISE

Cooke/mb/7025
13 Feb 1974

NPSEN-PL-ER

19 FEB 1974

Mr. Frank Green
Washington State Historical Society
315 North Stadium Way
Tacoma, Washington 98403

Dear Mr. Green:

We are preparing an environmental impact statement on a proposed setback levee system for the Yakima River between the Moxee Bridge in Yakima (Highway 24) and Union Gap. The current proposed levee alinement is depicted as a solid red line on the inclosed map. This alinement is tentative and subject to some slight change. Based on readily available information which you may wish to furnish at no cost to the United States Government, I would appreciate receiving information on the effect, if any, this project would have on any known or potential historical, archeological, and paleontological resources.

If you have any further questions, please contract Mr. Paul Cooke of my staff who will be preparing this environmental statement. Mr. Cooke can be reached at (206) 442-7025. This same request has been sent to individuals listed on Inclosure 2.

Sincerely yours,

DICE/s/

THRU:
SELLEVOLD

STEINBORN

2 Incl
As stated

Steven F. Dice
Chief, Environmental Resources Section

ED PL FILES

cc: w/incl
ERS RP File
Basin Plng, Urabeck

SAME COMMUNICATION SENT TO:

Mr. Frank Green
Washington State Historical Society
315 North Stadium Way
Tacoma, Washington 98403

Mr. Albert Culverwell
Eastern Washington State
Historical Society
2316 West 1st Avenue
Spokane, Washington 99204

Richard D. Daugherty, Director
Washington Archeological Research Center
Washington State University
Pullman, Washington 99163

Robert C. Dunnell, Chairman
Anthropology Department
University of Washington
Seattle, Washington 98195

Mr. Roy W. Reaves, III
Denver Service Center
National Park Service
7200 West Alameda
Denver, Colorado 80226

Charles H. Odegaard, Historic Preservation Officer
Washington State Parks and
Recreation Commission
Post Office Box 1128
Olympia, Washington 98504

Yakima Valley Historical Society
2105 Tieton Drive
Yakima, Washington 98902

Incl 2

United States Department of the Interior

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
655 Parfet Street
P.O. BOX 25287
Denver, Colorado 80225

IN REPLY REFER TO:

April 5, 1974

Steven F. Dice
Chief, Environmental Resources Section
Department of the Army
Seattle District, Corps of Engineers
1519 Alaskan Way South
Seattle, Washington 98134

Dear Mr. Dice:

I have reviewed the proposal on the levee system for the Yakima River between the Moxee Bridge and Union Gap which you sent to me February 19, 1974.

I have no direct knowledge of the cultural resources within this area. As I have indicated previously, in my memorandum of December 12, 1973, the nature of my comment is to advise you under Section 3f of Executive Order 11593 regarding this proposal. In constructing the levee you need to be concerned with the nature of the impact which you will have on and the significance of buildings, districts, sites and objects with the following provenience(s):

1. borrow areas for levee construction material.
2. sites with river bottom provenience if dredging or other disturbance is to occur.
3. areas disturbed in construction of levee itself.

The area in this project which would seem to potentially be most sensitive is the area adjacent to Union Gap, particularly at the confluences of Spring and Wide Hollow Creeks. At these locations there would seem to be a high potential of finding both historical and archeological remains.

If I can be of further assistance please let me know.

Sincerely,

Roy W. Reaves, III
Archeologist, Executive Order
Consultant (Denver)

CONSERVE AMERICA'S ENERGY

RWR:ef

E-3

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UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Anthropology

March 25, 1974

Dr. Steven F. Dice, Chief
Environmental Resources Section
Department of the Army
Seattle District, Corps of Engineers
1519 Alaskan Way South
Seattle, Washington 98134

Dear Dr. Dice:

We have had an opportunity to examine our records with respect to your inquiry about the archaeological materials that might be affected in the proposed setback levee system for the Yakima River between the Nasse Bridge and Union Gap. The site survey records available here do not indicate the presence of any archaeological materials in the project area but at the same time they reveal that no systematic survey of the area has been done. Consequently the absence of known material does not indicate the absence of the significant archaeological resources in the project area.

To the contrary nearby areas suggest that important material may well be located in the project area. There is, for example, a group of sites north of Yakima (YK 16, 17, and 18) on an alluvial fan at the confluence of the Yakima and Wenas Rivers. Nearby in Selah canyon two additional sites are known (YK 47 and 48). These are petroglyphs and carins in contrast the occupations sites nearer the rivers. In similar fashion a large cluster of ten or more sites is reported for the Simcoe-Fort Simcoe area to the southwest. All of this indicates a fairly high density of archaeological material on or near the rivers of the area and strongly suggests that the absence of reported material from the project area is simply an artifact of no one having looked there systematically.

I hope this information is of value. I trust that better and more up-to-date information will be forthcoming from Washington State. If I can be of further assistance in this matter, I will be pleased to cooperate.

Sincerely yours,

Robert C. Dunnell
Chairman

RCD:kr

E-4

THE WASHINGTON STATE HISTORICAL SOCIETY

315 No. Stadium Way
Tacoma,
Washington
98403

February 22, 1974

Mr. Paul Cooke
Department of the Army
Seattle District, Corps of Engineers
1519 Alaskan Way South
Seattle, Washington 98134

Dear Mr. Cooke:

The following might have some bearing on the proposed setback levee system for the Yakima River as mentioned in your letter of 19 Feb.

There is a monument one mile east of the Union Gap Bridge on the old Moxee Highway commemorating the first settlers and the first school. The Thorp family cabin was located 100 feet west of the memorial. It was erected by the Yakima Valley Historical Society which might have some better idea of exactly what impact your project would have. They are located at 2105 Tieton Dr., Yakima 98902.

The Narcissa Whitman Chapter of the DAR placed a monument near Union Gap to mark the site of a battle between Government forces and Indians Nov. 9, 1856.

Neither of these is under consideration by the State Advisory Council for Historic Preservation for submission to the National Register of Historic Sites. For that reason I suspect the local society mentioned above would be the one to consult about them or other potential historical resources in that area.

Sincerely,

Frank L. Green

Frank L. Green
Librarian

WASHINGTON STATE
ADVISORY COUNCIL ON HISTORIC PRESERVATION
P. O. BOX 1128, OLYMPIA, WASHINGTON 98504

March 6, 1974

Mr. Steven F. Dice, Chief
Environmental Resources Section
Seattle District, Corps of Engineers
1519 Alaskan Way South
Seattle, Washington 98134

Dear Mr. Dice:

Your letter to Mr. Charles H. Odegaard, the State Historic Preservation Officer, has been referred to me for reply.

Our records indicate that no properties listed in either the State or National Registers of Historic Places will be adversely affected by the proposed setback levee system for the Yakima River between the Moxee Bridge in Yakima (State Route #24) and Union Gap.

However, our survey is continuing, and you should be aware that there might be unrecorded historic properties within the project boundaries. Thank you for the opportunity to comment, and feel free to contact me at (206) 753-4117 if you desire any further information.

Sincerely,

Glen Lindeman

Glen Lindeman
Historic Preservation
Specialist

bd

E-6

WASHINGTON ARCHAEOLOGICAL RESEARCH CENTER
WASHINGTON STATE UNIVERSITY PULLMAN, WASHINGTON 99163

DIRECTOR
RICHARD D. DAUGHERTY, PH.D.

ASSISTANT DIRECTOR
HARVEY S. RICE

PHONE 509-335-6681
SCAN 426-6681

March 19, 1974

Steven F. Dice
Chief, Environmental Resources Section
Seattle District, Corps of Engineers
1519 Alaskan Way South
Seattle, WA 98134

Dear Dr. Dice:

In reference to your letter of February 19 regarding a levee system for the Yakima River between the Moxee Bridge in Yakima and Union Gap, we have no archaeological data for this area. No archaeological reconnaissance has been made of this portion of the Yakima River to date.

The potential for archaeological resources appears to be quite high since Indian encampments are most frequently found adjacent to watercourses in the Columbia Plateau.

I recommend that an archaeological reconniassance of two days duration be accomplished and the results of the reconnaissance be included in the environmental impact statement for this project. This will insure the consideration of any archaeological resources that may be within the project area in project planning and construction.

Sincerely,

Harvey S. Rice

Harvey S. Rice
Assistant Director

HSR:glr

Cooke/rs/7025
3 Apr 74

NPSER-PL-ER

3 APR 1974

Charles F. Bohannon, Regional Archeologist
Pacific N.W. Regional Office
National Park Service
1424 4th Avenue
Seattle, Washington 98101

Dear Mr. Bohannon.

Recent information received from Mr. Harvey S. Rice of the Washington Archaeological Research Center (Inclosure 1) and Mr. Robert C. Dunnell of the University of Washington Department of Anthropology (Inclosure 2) indicates the potential for archeological resources along the Yakima River between the Moxee Bridge and Union Gap. Mr. Rice recommends that an archeological reconnaissance of two days duration be accomplished.

We request that you analyze this recommendation and, if appropriate, perform such a survey for use in the preparation of our environmental impact statement for our flood damage reduction study in this area. We would appreciate receiving the results of this survey by 31 May 1974.

Our 13 February 1974 multiple-addressee letter to several archeological and historical agencies and societies included maps of the study area detailing proposed levee alinements. We have inclosed this information for your use (Inclosure 3). Please call Mr. Paul Cooke of my staff at (206) 442-7025 if you have any questions.

Sincerely yours,

DICE/s/

THRU SELLEVOLD

STEINBORN

STEVEN F. DICE
Chief, Environmental Resources Section

ED-PL File

3 Incl
As stated

Copy furnished. w/incl
Mr. Roy A. Reaves, III
Denver Service Center
National Park Service
Denver, Colorado 80226

E-8

cc: BP Sec (Urabeck) (w/incl)
Cooke (w/incl)
ERS RP File (w/incl)

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific Northwest Region
Fourth and Pike Building
Seattle, Washington 98101

IN REPLY REFER TO:

H2219
(PNR)PSA

April 8, 1974

Mr. Steven F. Dice
Chief, Environmental Resources
Section
Corps of Engineers
1519 Alaskan Way South
Seattle, Washington 98134

Dear Mr. Dice:

We have reviewed your letter of April 3 concerning an archeological survey of the Yakima River and Tributaries Study. Such a reconnaissance would seem to be necessary, but the National Park Service will be unable to fund such a study since our fiscal year 1974 funds are already committed to other projects.

Sincerely yours,

Charles F. Bohannon
Regional Archeologist

APPENDIX F

LETTERS RECEIVED ON

DRAFT STATEMENT

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: 10FA - M/S 623

FEB 18 1977

Colonel John A. Poteat
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

We have reviewed the draft environmental statement on the Yakima-Union Gap flood damage reduction project. The project will cause short-term increases in turbidity and sediment during construction, and replacement of vegetation with rip rap may cause increased summer stream temperatures. However, adequate control of turbidity and temperature should be possible if the Corps takes proper precautions during the construction phase and institutes an appropriate revegetation program.

The Environmental Protection Agency has rated this draft environmental statement LO-1, LO (Lack of Objections) 1 (Adequate Information). The rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under section 309 of the Clean Air Act.

Thank you for the opportunity to review this draft environmental statement.

Sincerely,

Alexandra B. Smith

Alexandra B. Smith
Director
Office of Federal Affairs

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1500 N.E. IRVING STREET
P.O. BOX 3737
PORTLAND, OREGON 97208

Reference: EC

Colonel John A. Poteat
District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

FEB 23 1977

Dear Colonel Poteat:

As requested by the Director of the Department of the Interior's Office of Environmental Project Review, we are pleased to provide you with our technical comments on your draft environmental statement and draft feasibility report for Flood Damage Reduction, Yakima-Union Gap, Yakima County, Washington. We understand that these documents are intended to form a basis for future Congressional action and that Departmental comments by Interior will be requested by the Chief of Engineers at a later date. Consequently, the following comments are on items within areas of jurisdiction or expertise of the U. S. Fish and Wildlife Service and do not represent the position of the Department of the Interior on the contemplated project.

Draft Environmental Statement

General Comments

These documents in general satisfactorily address project impacts on fish and wildlife resources.

Specific Comments

Page 9, paragraph 1.28, Barrow Sources. Insert the following sentence: Borrow and spoil areas would be carefully selected to minimize problems of habitat restoration.

Page 10, paragraph 1.30, Project Maintenance. Maintenance measures would include periodic removal of trees, shrubs, and concurrently, wildlife use of this environment. We suggest that the text also identify areas receiving habitat enhancement so that routine maintenance would not disrupt them. Also, we believe that you should consider removal of the following sentence: "As called for in the Operations and Maintenance Manual for the existing Corps levee project, local interests would still be required to remove trees and large shrubs from a portion of the floodway between Moxee Bridge and Selah

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F 2

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Gap in order to pass design flood." Our representatives have discussed with Corps personnel the matter of vegetation removal in the floodway. We were assured at that time by project engineers that the levee would pass design floods without need for removal of trees and large shrubs from the floodway. If this situation has recently changed, it should be more adequately addressed in the text.

Page 12, par. 1.36, Interrelationships and Compatibility with Existing or Proposed Corps or Other Agency Projects. The Bureau of Reclamation is working with Fish and Wildlife Service personnel in evaluating problems and solutions to fisheries resources involving Roza Wasteway. It appears that any solution would be affected by the proposed levee, and we suggest this matter could be acknowledged and addressed in this section.

Page 25, par. 2.30, item (2). Remove the phrase "...less desirable nongame fish..." and replace with "...other nongame fish..."

Page 44, par. 2.72, General Area. We have understood that the proposed Bumping Lake Reformulation Project could, by increasing low flows, benefit fisheries in the Yakima River watershed. So, we suggest the following rewording: If the proposed Bumping Lake Reformulation Project is realized, low flow augmentation would aid fisheries resources in the Yakima River system.

Page 47, par. 2.82, Project Area. We suggest the following rewording of the first sentence from "...the only species..." to "...the only known species..."

Page 54, par. 4.05, sentence 4, Short-Term Vegetation Impacts. Remove the word "insignificant."

Page 54, par. 4.07, Short-Term Wildlife Impacts. We suggest rewording the first sentence from "...would cause temporary loss of..." to "...would cause disruptional..."

Page 55, par. 4.08, Short-Term Fish Impacts. We ask consideration of the following rewording: Timing of construction activity on the riverward side will be coordinated with appropriate Federal and State agencies to minimize impacts on fisheries during migration periods.

Page 63, par. 4.34, Long-Term Vegetation Impacts. We recommend revising the first sentence from "...(17 acres important as wildlife habitat)" to "...(17 acres of high quality wildlife habitat)."

Page 65, par. 4.39. Replace "insignificant" with "minor."

Page 66, par. 4.41, Long-Term Fish Impacts. It would apparently be more accurate to revise the last sentence to read: The U. S. Fish and Wildlife Service has estimated that the proposal would result in an initial loss of 350 angler days of fishing within the project area; however, revegetation and other mitigation measures may significantly reduce this impact.

Page 66, par. 4.42, Impacts to Endangered or Threatened Species. The first sentence could be revised to say "...is the only officially designated endangered species known to utilize the project site." We also suggest a brief discussion of project proximity to the unique 14-acre sphagnum bog owned by Nature Conservancy, which attracts a rare silver bordered fritillary butterfly (Blaria selene).

Page 72, par. 5.04. We suggest changing the third sentence from "...would suffer small but permanent losses" to "would suffer some permanent losses."

Appendix C, page C-2. Common names of animals should not be capitalized (unless a proper name) nor underlined, only scientific names.

The common name for sparrow hawk is American kestrel.

Appendix C, page C-4. Neither the northern bald eagle nor osprey are presently classified as endangered species under Federal listing in Washington.

Specific Comments, Draft Feasibility Report

We recommend revising the described environmental impacts as follows:

> There will be some adverse impacts on the natural environment. Most new levees would be set back from the main river channel and, therefor, would eliminate only some riparian vegetation. Native plants would be used after levee construction to help reestablish wildlife habitat. Only a few acres of pasture would be lost to levee construction.

Page 14, Natural Resources. We suggest substituting Canada geese for snow geese, since they are more common to the area. Black brant are seabirds and do not occur here. We suggest substituting the nomenclature coho salmon for silver salmon.

Page 26. Reference is made to the Bumping Lake Reformulation Project and how this procedure would meet irrigation water requirements. This statement seems only partly correct. Primary purpose of Bumping Lake Reformulation

Project is to provide instream flow enhancement. Secondary functions include recreation, irrigation, and flood control. We suggest revising this paragraph to reflect the primary project purpose.

Page 54, Effects of the Plan on Environment. Revise second sentence from "...(Highway 24), should have minor measurable..." to "...(Highway 24), should have some measurable..."

Page 57, Construction. Insert the following: Timing of construction activity on the riverward side will be coordinated with appropriate Federal and State agencies to minimize project impact on fisheries resources during migration periods.

Page 59, Operation and Maintenance. Areas receiving revegetation for wildlife mitigation should be clearly indicated so routine maintenance activities do not accidentally damage these sites.

Page 76, Environmental Considerations. Revise first sentence to say: The recommended plan (environmental quality plan) could have both short-term and long-term effects on fish and wildlife populations.

B-1, Natural Resources. We suggest including a paragraph on wildlife resources.

C-8, Item 16. See our comments for page 26. They are appropriate for this section as well and should be revised to reflect the primary purpose of Bumping Lake Reformulation Project.

E-20, Revegetation. Include the phrase "wildlife enhancement and beautification measures" where the term beautification now occurs.

E-22, Construction. Please refer to our comments for page 57, construction.

If we can be of further assistance, please contact us.

Sincerely yours,

J. W. Teeter

James W. Teeter
Assistant Regional Director
Environment

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific Northwest Region
Fourth and Pike Building
Seattle, Washington 98101

IN REPLY REFER TO:

L7619
(PNR)PCC

February 16, 1977

Colonel John A. Poteat
District Engineer
U.S. Army Engineer District, Seattle
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

We have reviewed the draft environmental statement and draft feasibility report for Flood Damage Reduction, Yakima-Union Gap, Yakima County, Washington.

We are pleased to learn that there will be a comprehensive survey of the project area for cultural resources prior to any ground-disturbing activities. Resources which are discovered should, of course, be evaluated for eligibility for the "National Register of Historic Places," and if eligible, they should be nominated.

The preceeding represents the views of this agency only and not necessarily those of the Department of the Interior.

Sincerely yours,

James S. Rouse

James S. Rouse
Acting Associate Regional Director,
Planning and Resource Preservation

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
NORTHWEST REGION
915 SECOND AVENUE, RM. 990
SEATTLE, WASHINGTON 98174

IN REPLY REFER TO:
D6427-CNP
E 3027
ER-77/37

FEB 1977

Colonel John A. Poteat
District Engineer
Seattle, District,
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

We have reviewed the draft environmental statement for flood damage reduction at Yakima-Union Gap, Yakima River Basin, Washington. We believe it adequately describes project impacts on outdoor recreation and the related environment.

Sincerely yours,

Maurice H. Lundy
Regional Director

United States Department of the Interior

BUREAU OF RECLAMATION
PACIFIC NORTHWEST REGION
FEDERAL BUILDING & U.S. COURTHOUSE
BOX 043-550 WEST FORT STREET
BOISE, IDAHO 83724

IN REPLY REFER TO: 160

120.1

MAR 1 1977

District Engineer
Seattle District, Corps of
Engineers
Department of the Army
P. O. Box C-3755
Seattle, Washington 98124

Dear Sir:

We have reviewed the draft environmental statement and feasibility report on "Flood Damage Reduction, Yakima-Union Gap, Yakima County, Washington - ER 77/37), and have the following comments on the draft environmental statement for your consideration:

Page iii -- If the separate Interior agencies are to be listed in your distribution list, then several others should be added, including the Bureau of Reclamation.

Page 42, 2d paragraph, last sentence -- This sentence should be deleted since preliminary evaluations of other storage sites within the Yakima River Basin show favorable results.

Page 76, 1st paragraph, last sentence -- This sentence should be deleted since preliminary evalations of storage sites within the Yakima Indian Reservation show favorable results.

Please let us know if we can provide further assistance.

Sincerely,

H. R. Stiles

Assistant Regional Director

cc: Commissioner, Attn: 150
Director, Office of Environmental Project Review, USDI, WDC

United States Department of the Interior

BUREAU OF MINES

EAST 315 MONTGOMERY AVENUE
SPOKANE, WASHINGTON 99207

Western Field Operation Center
January 21, 1977

Colonel John A. Poteat
District Engineer
U.S. Army's Engineers District
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

The Draft Environmental Statement and the Draft Feasibility Report for Flood Damage Reduction, Yakima-Union Gap, Washington (ER-77/37), has been referred to this office by the Department of Interior's Office of Environmental Project Review for comments relevant to the report's mineral data.

Aspects of geology, minerals, and borrow sites are adequately covered in the environmental statement. The project should not adversely affect mineral development.

Mineral production statistics in the section covering minerals in Appendix I of the technical report (page B-2) should be updated. The first two sentences should read: "Total value of mineral production in the county in 1974 was $3.5 million, or 2 percent of the state's total production. Major minerals produced in order of value were sand and gravel, crushed basalt, lime, and dimension granite and basalt."

Sincerely yours,

R. N. Appling, Jr., Chief
Western Field Operation Center

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Room 360 U.S. Courthouse, Spokane, Washington 99201

January 25, 1977

Sidney Knutson, Ass't. Chief
Engineering Division
Department of the Army
Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

Thank you for the opportunity to review your draft environmental impact statement for the Columbia River and Tributaries Study Interim Report, Yakima-Union Gap Flood Damage Reduction, Yakima River Basin, Washington.

We have no comments on the report and feel it adequately addresses all situations with the exception of the effect of the proposed action on prime and unique farmlands. Following is the information requested on prime and unique lands within the project area.

No unique lands have been designated within the area affected by project action.

Prime lands within the project area are:

Map Symbol	Mapping Unit Name	Capability Subclass
181	Esquatzel silt loam, 0 to 2 percent slope	I
621	Toppenish silt loam, 0 to 2 percent slope	IIw
451	Wenas silt loam, 0 to 2 percent slope	IIw
561	Yakima silt loam, 0 to 2 percent slope	IIs

It appears that only the lower spur of the levey will cross prime lands. If an alternative site for this spur can feasibly be utilized, it would preserve this prime agricultural land.

Enclosed is a copy of a soil survey field sheet of the area proposed for project action. This is a preliminary survey sheet and is subject to correlation changes. If further information is needed, please feel free to contact Chuck Lenfesty, Soil Scientist, Soil Conservation Service, 2015 South First Street, Yakima, Washington 98903.

Sincerely,

L. Boyd A. Shaver acting

Galen S. Bridge
State Conservationist

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

February 23, 1977

Colonel John A. Poteat
Seattle District, Corps of Engineers
Department of the Army
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This is in reference to your draft environmental impact statement entitled "The Columbia River and Tributaries Study Interim Report, Yakima-Union Gap Flood Damage Reduction, Yakima River Basin, Washington." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures Memo from: Mr. Fred Cleaver
Chief, FNW5
NOAA

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P. O. Box 4332, Portland, Oregon 97208

FEB 7 1977

January 27, 1977

To : Director, Office of Ecology and Environmental Conservation, FE

Thru : Robert L. Schueler FEB 04 1977
Acting Assistant Director for Scientific and Technical Services, F5

From : Fred Cleaver
Fred Cleaver, Chief, FNW5

Subject: Comments on Draft Environmental Statement--The Columbia River and Tributaries Study Interim Report, Yakima-Union Gap Flood Damage Reduction, Yakima River Basin, Washington (CE) DES #7701.13

The Draft Environmental Statement for The Columbia River and Tributaries Study Interim Report Yakima-Union Gap Flood Damage Reduction, Yakima River Basin, Washington that accompanied your memorandum of January 14, 1977, has been received by the National Marine Fisheries Service for review and comment. The statement has been reviewed and the following comments are offered for your consideration.

General Comments

Although we anticipate no direct impact on anadromous fish spawning areas with the proposed project, more attention should be given to the timing of any instream work since many of the anadromous species currently found in the Yakima system migrate through the project area. All instream work should be done during the lowest flow periods in the Yakima River system. Instream work during migration periods will inhibit migration of anadromous fish, and have an adverse impact on the Indian fishery which occurs immediately below the project area on Wapato and Sunnyside Irrigation Diversion Dams.

Specific Comments

2.0 ENVIRONMENTAL SETTING WITHOUT THE PROJECT

Outdoor Recreation

2.26 General Area

Page 23, paragraph 2. In this paragraph coho salmon should also be added to the list of anadromous fish found in the Yakima basin.

Proposed Flood Damage Reduction Measures - Flood Control Storage

2.67 General Area

Page 42, paragraph 2. This paragraph should also mention that 324,000 acre-feet of water will be stored in Enlarged Bumping Lake for fish enhancement flows in the Yakima River system.

Water Quality

2.72 General Area

Page 44, paragraph 1. Another very significant problem encountered by anadromous fish in the Yakima system is their inability to migrate due to poor passage conditions at the existing diversion dams and the practices of diverting too much water for irrigation and power in the Yakima system, particularly below Sunnyside and Prosser Dams. Also, the Bumping Lake Enlargement Project does not have dilution of pollution as a project purpose. Much of the flows proposed for the Yakima system from Bumping Lake Enlargement are for spawning, rearing, and migration of fish.

Fish

2.80 General and Project Area

Page 46, paragraph 2. It should be mentioned that the 1,000 fall chinook which currently enter the Yakima River system spawn primarily below the Chandler Powerhouse in the Yakima River and would not migrate past the project area.

4.0 THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.08 Short-Term Fish Impacts

Page 55, paragraph 2. It should be mentioned here that short-term impacts can be severe on the anadromous fish resource and Indian fisheries if construction occurs during the migration of anadromous fish.

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

March 18, 1977

Colonel John A. Poteat
District Engineer
Corps of Engineers, Seattle District
Department of the Army
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This is in response to your request of January 5, 1977 for comments on the draft environmental statement (DES) for the Yakima-Union Gap Flood Damage Reduction Program, Yakima River Basin, Washington. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that this DES demonstrates compliance with Section 106 of the National Historic Preservation Act of 1966 prior to its amendment on September 28, 1976, but that it does not demonstrate compliance with Section 106, as amended, (90 Stat. 1320). However, it appears that the Corps of Engineers recognizes its responsibilities pursuant to Section 106, as amended, and will carry them out in the future.

The Corps is reminded that should future surveys identify cultural properties eligible for inclusion in the National Register of Historic Places which will be affected by the undertaking, it must afford the Council an opportunity to comment pursuant to the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), prior to taking any further action with respect to the undertaking which will affect the cultural properties.

Should you have any questions or require additional assistance in this matter, please contact Brit Allan Storey of the Council's Denver staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

Louis S. Wall
Assistant Director, Office
of Review and Compliance

F-14

February 22, 1977

Colonel John A. Poteat, District Engineer
U.S. Army Engineer District, Seattle
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

Your draft environmental impact statement and your feasibility report for Yakima-Union Gap Flood Damage Reduction proposal have been reviewed in the Department of Ecology. We would like to offer the following comments:

(1) We feel that maintenance of the levees is an important aspect of this proposal. We would like to have some assurance, that a regular program of inspection and maintenance would be carried on.

(2) Only brief mention is made of the possibility of recreational use of this facility. The direct benefits of this publicly financed project could be expanded to more individuals by incorporating recreational facilities in the project.

(3) Appendix 2 of the Interim Report contains a letter from Yakima County dated November 30, 1976, stating that the County will "adjust all claims pertaining to water rights". This is somewhat confusing, as the authority to deal with water rights does not lie with the City or County, but rather with the Department of Ecology.

In addition to the comments by this Department, we have gathered comments from other concerned state agencies. We have attached copies of the full text of the comments. Summarized they are:

Department of Fisheries: Reviewing the public brochure, alternate 4 appears to be the most feasible alternative.

Levees will prevent loss of downstream anadromous migrants from stranding as flood flows recede.

The Department of Fisheries would like to review construction plans and procedures to determine that there will be no detriment to the fishery resource.

Parks and Recreation Commission: The proposed project is within Yakima Sportsman State Park. The Commission staff is concerned about the dike on the east bank of the Yakima River. The aesthetic quality of the park may be adversely affected by loss of vegetation. They feel a jointly developed landscape plan would be important prior to construction. The detailed comments from Parks and Recreation are attached.

Department of Natural Resources: Regards Alternative 4 as having minimal impact on state-owned shore and bed.

"The report does not mention where the levy material will be obtained. Our River Management Policy Plan does not favor removal of material from the stream bed for such purposes."

We appreciate the effort expended by the Corps of Engineers to involve all interested persons and agencies in the planning and development of this project.

Thank you for the opportunity to review these documents.

Sincerely yours,

Fred D. Hahn
Assistant Director
Office of External Affairs

FDH:bjw

Attachments

WASHINGTON STATE
HIGHWAY COMMISSION
ARTMENT OF HIGHWAYS
Office of District Engineer
2809 N. Main St., Union Gap
P.O. Box 52
Yakima, Washington 98907

DIXY LEE RAY - GOVERNOR

February 16, 1977

U.S. Army Corps of Engineers
Seattle District
P. O. Box C-3755
Seattle, Washington 98124

Attn: Mr. Dan Meredith
Study Manager

Yakima - Union Gap Flood
Damage Reduction, Yakima
River Basin, Washington
Draft Environmental Statement

Dear Sir:

We have reviewed the Draft Environmental Statement for the subject project and wish to offer the following comments:

We have no objections to the basic content of the document, and have no comments on the project from the Moxee Bridge north.

South of the Moxee Bridge the river channel location is in a constant state of change. It is very likely in a few years the main force of the river may be directed against a section of I-82 that is not being riprapped under this project. The existing training dike near the northern Spring Creek culvert may under the 100 year flood condition actually tend to force the water along I-82 and increase the erosion potential along the highway. The Draft EIS does not address itself to this problem.

We feel the riprap section Type X shown on Plate 6 is too thin. Normally our standards would require 2 feet or even 3 feet of depth with an additional one foot of filter material. It may be that the nature of the I-82 embankment is such that the filter blanket may be omitted, but it should still be considered.

It should be emphasized that we are not objecting to the proposed project. However, we are genuinely concerned that adverse impacts to the highway be kept to a minimum.

Very truly yours,

ROBERT C. SCHUSTER, P.E.
District Engineer

BY: W. I. HORDAN, P.E.
District Location Engineer

RCS
WIH
RMM
LHR/bjd

WASHINGTON STATE
PARKS & RECREATION COMMISSION
LOCATION: THURSTON AIRDUSTRIAL CENTER PHONE 753-5755
P. O. BOX 1128 OLYMPIA, WASHINGTON 98504

February 11, 1977

IN REPLY REFER TO:
Yakima-Union Gap
Flood Damage
Reduction Study -
Brochure
Public Draft 4-C
January 1977
(E-762)

Ms. Rosemary Walrod
Environmental Review and Evaluation
Washington State Department of Ecology
St. Martins College Campus
Lacey, Washington 98504

Dear Ms. Walrod:

The Washington State Parks and Recreation Commission is in receipt of the Corps of Engineers' Draft Environmental Impact Statement of this project and offers the following comments:

1. The dike project is within Yakima Sportsman State Park. State Parks is concerned about the dike on the east bank of the Yakima River (referred to as the left bank in the Corps' documents).

2. It is our understanding that the dike will be raised two to three feet vertically which will cause a 10 to 15 foot horizontal increase measured at the toe of the dike and that the width increase will occur on the inboard or park side of the dike.

3. We request the following:

   a. That the width increase be on the outboard or river side of the dike. We would definitely be opposed to removing the existing trees and shrubs on the park side of the levee. That vegetation adds a substantial aesthetic quality to the park.

   b. That all work shall be done from the top of the dike, with no equipment operating on or across non-dike lands.

   c. That a land survey be carried out by the Corps of Engineers to mark the dike easement boundaries prior to construction.

4. If, for valid reasons, the width increase must be on the inboard or park side of the dike we request the following:

   a. A landscape plan agreeable to State Parks and the Corps of Engineers be jointly prepared prior to construction. The

landscape plan should consider, at a minimum, the following items:

(1) Drainage system with inlets and lawn
(2) Stream water source and development
(3) Variable levee slopes in order to break up the monotonous appearance and steepness
(4) Planting of ornamental trees to improve tree quality
(5) Improve shrub planting to improve quality and wildlife habitat
(6) Assurance that the soil quality will support the landscape plantings as well as the erosion control grasses

State Parks also has several questions that can't be answered from Corps' documents presently in hand. They are:

1. There is a culvert under the levee with a headgate on the river side which supplies water to a stream which flows through the park. This is an established stream with high recreation and aesthetic value and is essential to the park. Will this structure be maintained or eliminated?

2. At the base of the existing levee fill, there is a drainage ditch which normally has water in it. If this ditch is to be relocated, lawn area will be lost. It appears a tile drain system with surface inlets could be installed in place of the ditch.

3. A large rock pile exists adjacent to the dike. It would be useful to Parks if it were removed. Can it be used in the new levee construction?

I am confident that this levee can be built to provide needed flood protection and can also protect and preserve the amenities of the public recreation area.

We look forward to discussing these details with you in the future.

Sincerely,

David W. Heiser, Chief
Environmental Coordination

cs

cc: U. S. Army Corps of Engineers
Yakima County
Mike Mills, Office of Program Planning and Fiscal Management

WASHINGTON STATE
PARKS & RECREATION COMMISSION

LOCATION: THURSTON AIRDUSTRIAL CENTER PHONE 753-5755

P. O. BOX 1128 OLYMPIA, WASHINGTON 98504

March 4, 1977

IN REPLY REFER TO:

35-992-0720
35-2650-1820

Draft EIS - The Columbia River & Tributaries Study - Interim Report - Yakima-Union Gap Flood Damage Reduction - Yakima Basin, Wash. (Yakima Sportsman State Park)

(E-777)

TO: Mike Mills, Office of Program Planning & Fiscal Management

FROM: David W. Heiser, Chief, Environmental Coordination

RE: YAKIMA-UNION GAP FLOOD REDUCTION - DRAFT EIS

On February 11, 1977 I sent you a memo on this project reflecting upon certain data which we believed to be correct. Since that time, Mr. Frank Urabeck of the Corps of Engineers has advised Mr. Bill Bush, Chief, Long Range Planning and Research of State Parks, of the original error in the data that Mr. Urabeck had earlier provided to my office.

The original observation by me was:

"It is our understanding that the dike will be raised 2 to 3 feet vertically which will cause a 10 to 15 foot horizontal increase measured at the toe of the dike and that the width increase will occur on the inboard or park side of the dike."

The present plan as described by Mr. Urabeck is to place .7 - 1.5 feet of fill vertically with a 3 - 5 foot (3.5 foot average) horizontal increase measured at the toe of the dike and that the width increase will occur on the park side of the dike.

Apparently, to place the material on the river side of the dike would cost a very substantial sum in excess of the proposed action and cause other adverse effects also.

It is also our present understanding from Mr. Urabeck's verbal communication that the Corps desires to remove all trees and herbaceous vegetation on the park side of the levee, regardless whether there would be raising of the levee in that location or not. This is because the Corps believes the root structure causes damage to the dike integrity. The Corps would topsoil and plant to grass only. The Washington State Parks and Recreation Commission still feels that this will cause adverse effects on the aesthetics and general character of the park.

It would seem appropriate that the "adjustments" to the physical dimensions which have been supplied orally by Mr. Urabeck should be documented in the final EIS.

All other questions and concerns raised in my February 11, 1977 memo remain for discussion.

vc

cc: Walter Peck, Yakima County Public Works Department
Mark Sessinghaus, U. S. Army Corps of Engineers, Seattle District
Frank Urabeck, U. S. Army Corps of Engineers, Seattle District
Rosemary Walrod, Washington State Department of Ecology
Jan Tveten, Assistant Director, Resources Development, State Parks
Dennis Lundblad, Washington State Department of Ecology

YAKIMA COUNTY
CLEAN AIR AUTHORITY
COUNTY COURTHOUSE YAKIMA, WASHINGTON 98901

January 10, 1977

Colonel John A. Poteat, District Engineer
U.S. Army Engineer District, Seattle
P.O. Box C-3755
Seattle, Washington 98124

Dear Sir:

We acknowledge receipt of Draft EIS re: Yakima Union Gap Flood Damage Reduction.

We agree with conclusions contained in Section 4.02 related to air quality.

In the interest of accuracy, we believe the reference to a gravel pit operation near Granger (2.49) has no relevance to the project area air quality. This particular source is not considered a major source and we note that the location is southeast rather than southwest of Yakima.

In paragraph 2.50 the list of sources should be expanded to include an asphalt batch plant located in the flood plain on property adjacent to the gravel crushing operation mentioned in the draft EIS.

Again, we agree with the conclusion that the only foreseeable air quality problems which might arise from construction of the levees are related to the construction period and can easily be abated.

Sincerely,

R.L. Crossland,
Director

RLC:sd

ASSOCIATED STUDENTS UNIVERSITY OF WASHINGTON

MEMORIAL UNION BUILDING, SEATTLE, WASHINGTON 98195

March 4, 1977

Colonel John A. Poteat, District Engineer
U.S. Army Engineer District, Seattle
P.O. Box C-3 755
Seattle, WA 98124

Dear Colonel Poteat:

Thank you for the opportunity to comment on the Columbia River and Tributary Study Interim Report D.E.I.S. for the Yakima River Basin, Wash.. We hope the following comments will be of some use to you when writing the final E.I.S..

1.08 - Several times the U.S. Fish and Wildlife Service is noted as contributing recommendations under consideration. What are these recommendations? How would they affect the environment, or the outcome of the project? We support the interactions involved, but feel the results should be included for adequate public review.

1.09 - What is the impact of this excavation?
1.13 In each case, less material is returned than is removed.
1.25

1.34 - Appendix F should have been included in the D.E.I.S.. We understand that this is a revised version, but to omit the benefit cost analysis seems inappropriate. It is impossible to accurately assess the economic outlay of the project with the information provided. What are the project costs based on? How were the figures arrived at?

1.35 - How long will construction last? On what do you base your statement, "alleviation of local unemployment would constitute a benefit to the local area and national economics"? What economic impact will occur when construction is completed? Will there be any permanent jobs created? If so, we hope local people will be used to fill these spots.

P. 13 Table 1 - What are the project costs based on?

2.06 - On what do you base your statement, "should the project be authorized and completed, the area would probably retain its agricultural zoning with only a small increase in the number of homes and mobile homes"?

2.51 - Have 100 and 200 year flood determinations been established subsequent to Bureau of Reclamation storage facilities?

2.55 - Since levees will interrupt the natural reservoir action of a flood plain, flooding downstream can be expected to increase. How large would damages downstream be from this phenomenon, and it they were not included in the benefit/cost analysis, why?

2.58 - What is "significant damage"? How did you arrive at these figures?

2.67 - What would be the consequences if the Bumping Lake proposal is not activated?

2.86 - Section 101 (b) 2 of the National Environmental Policy Act points out the need for culturally pleasing, as well as productive surroundings. This is certainly a difficult task to bear, however it appears nothing has been done to further the possibility of important & valuable archaelogical findings since April 8, 1974. Has funding been sought since then? If not, why? If any pre-historic or historic sites are found on the project site, how would it affect the project? Would excavation be allowed? The investigations in Appendix E indicate a strong possibility that cultural artifacts do exist at the site.

3.03 - The levees will be within 200 feet of O.H.W., do not provide public access to the river, and alter the existing character of the area. Why is the levee not in conflict with conservancy designation when "activities and uses of a non-person nature which do not substantially degrade the existing character of an area" (Dept. of Ecology guidelines) are favored?

6.02 - How was the figure $465,900 arrived at?

6.07 - How "substantial" are existing flood problems?

6.08
6.12 - We support the Army Corps of Engineers decision not to enlarge the reservoir system.

P. C-2 - Will the habitat of the "rare butterfly" be altered? We feel this deserves more attention than it has received. We support the consultation with the Dept. of Game, but do not see any time spent to mitigate a potential problem. Is the area referred to the Moxee Bog? Will the hydrology affect the area?

We hope these comments will be of some use, and appreciate the opportunity to comment on the Columbia River & Tributaries Study D.E.I.S.. If you have any questions or comments please contact me at the ASUW Environmental Affairs Commission, 543-8700 or 543-8634.

Sincerely,

Jean Seyfried

Jean Seyfried, Co-ordinator
Darcey Fugman
Anne Mac Donald
Lynn Marek-Schooley
Impact Assessment Program
ASUW EAC

cc Chris Pearson, ASUW President

JS/bg

Robert Card
520 Crothers Memorial Hall
Stanford, CA. 94305

22 February 1977

Robert G. Card
Route 4 Box 153
Yakima, Wa. 98908

Col. John A. Poteat, District Engineer
U.S. Army Engineer District, Seattle
P.O. Box C-3755
Seattle, Wa. 98124

Dear Col. Poteat:

Thank you for giving me the opportunity to comment on the draft environmental impact statement for the Yakima-Union Gap Flood Damage Reduction Study.

I would like to commend the Corps for preparing what appears to be a thoughtful and objective EIS. The format used greatly facilitated my review which included the entire statement in detail. I approached the review as an environmental engineer and a citizen of the community, concerned for its social and economic welfare. For your convenience I have numbered each specific review comment. I hope that you will find the following comments useful in preparing the final EIS.

1. There was no mention in the statement about possible downstream impacts of the project either with the normal flows or the project design flood flows of the Yakima River. The potential impacts of this type of project are increased aggredation or degredation of the downstream river bed and increases in the magnitude of flood flows experienced by the lower Yakima Valley. While, in this case, these impacts may be small, I still think that the potentially affected population deserves to hear the Corps' position on this subject.

2. In paragraph 2.07 several other possible levee projects in the drainage basin are mentioned. However, there are no statements in the EIS describing the broad potential impacts of the whole system and the Yakima-Union Gap project's contribution to these impacts. For example, the proposed project's impact on anadromous fish may be small as the river exists today but large if the whole levee system is built. Comments in the final EIS addressing these issues would help avoid piecemeal environmental degredation due to a lack of understanding of the overall program.

3. There was no rationale given to the selection of the 100 and 200 year return period floods as the design values. This selection has a major impact on the size of the project. Therefore, a mention of why these values, as opposed to larger or smaller ones were chosen would be informative.

4. Paragraph 4.08 did not mention the potential interruption of anadromous fish runs during construction due to disturbances in the river. These impacts could be minimized by careful project scheduling coordinated with the Washington State Fish and Game Department.

5. Paragraph 4.42 is not specific enough in describing the impact on the peregrine falcon community. At a minimum, the bird's nesting site(s) and routine travel patterns (if any) should be identified. If this is done then ornithologists could more objectively describe the impacts of the project's short and long-term effects on the bird's behavior.

6. Paragraph 4.16 did not mention social costs associated with the project. The river has a potential for becoming a focal point of day to day community recreational activity. It is particularly valuable in this respect due to its proximity to low income neighborhoods. Many of these people do not have the resources to travel to find recreation so anything that hinders their access to the river should be considered in that light. Both good and harmful effects in this regard were alluded to elsewhere in the statement. However, a statement in this paragraph summarizing the project's impact on the public's future access to, and enjoyment of the river would be valuable to the local sponsor and other concerned citizens.

7. Paragraph 4.21 did not describe either the additional loss to land owners due to changes in channelization or changes in flood characteristics (eg. sediment transport) due to the levee construction. I refer specifically to the unprotected land across the river from Union Gap. Also there may be a cost associated with poorer access to the land inside the levees and a reduction in property values. These costs, if they exist, should be included in the benefit cost analysis. The possible changes in flood characteristics may also have long-term impacts on the biotic community.

8. Paragraph 4.09 describes the impacts of expanding borrow pits as "minimal or insignificant". The excavation of 208,700 cubic yards of earth material will leave a 13 acre, 10 foot deep hole. If the site is near a city, as stated, it is difficult to see how this comprises a minimal impact. Most people experiencing the noise and dust from a gravel excavating and processing operation would describe it as highly negative.

9. Much of the proposed levee protecting the Yakima wastewater treatment plant involves excavation and/or backfill in the river. Was the less environmentally damaging and perhaps less costly alternative of a more localized levee around the plant itself examined? I think that an argument for or against this proposal should be presented in the final statement.

10. I wish to note here that the Keith & Keith funeral chapel (paragraph 2.25) is a recent structure that was approved by the County with full knowledge of its position on the flood plain. Including damage reduction for this facility as a benefit has

the effect of allowing the owner and county to cover up unwise flood plain management. Using this type of practice any federal flood control project can eventually be justified from a benefit-cost perspective. If the current benefit cost-ratio is less than one all that the county has to do is allow building in the flood plain until the benefit of protecting the new construction exceeds the cost of the flood control project.

11. The statement in paragraph 4.12 about the 2000 unemployed agricultural workers is misleading. Many other local, union protected, construction workers are typically out of work during the winter. Therefore, if there is levee construction during the winter it is highly unlikely that any significant number of these agricultural workers will be employed on the project.

12. The costs of operation and maintenance listed in the table on page 13 do not conform to historical data. In the past, Yakima County has spent several thousand dollars annually on levee maintenance. This money was spent primarily on brush clearing through the county's student summer employment program. I suggest that the Corps obtain historical data from the county and revise its cost figures accordingly.

13. The benefit-cost analysis (page 13-14) is weak in that the criteria for estimating costs is not explained and environmental costs as recognized in the statement were not quantified and included. This section of the statement is probably one of the most important and debatable but it is one of the sections least reinforced by presentations of data and methodology. Having some experience in cost estimating, I know that the criteria and assumptions used are often quite subjective. Therefore, I think that at least a cursory summary of your procedure would be appropriately included in the final statement.

14. I noted two other details which I mention here in case they were missed in your review.

1. Paragraph 2.02, line 5 should read "... Between 1970 and..."
2. The 24 inch-diameter pressure lineas shown on plate 5 when compared with plate 3 does not correspond to the functional description given in paragraph 1.19. As shown the inlet is not above the 100 year flood level.

Thank you for your consideration and cooperation.

Sincerely

Robert Card

Robert Card

APPENDIX G

LETTERS RECEIVED ON

REVISED DRAFT STATEMENT

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 443

MAR 6 1[illegible]

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Morris:

We have reviewed the revised draft environmental statement on the Yakima-Union Gap Flood Damage Reduction project.

We feel that the project changes covered in the revised statement will not greatly influence the environmental impacts of the project. These project changes include longer and higher levees downstream of Moxee bridge to accommodate a 200-year flood, and more riprapping of existing levees. Revegetation and landscaping will now be considered a normal design aspect, instead of project mitigation. The effects of increased cost-sharing recommended under the President's new water resources policy are not addressed in the revised statement.

We support the Corps of Engineers plan to work closely with the U.S. Fish and Wildlife Service and the state conservation agencies during the post-authorization planning. We hope that this coordination and input will reduce both the short-term impacts of increased turbidity during construction, and the long-term impacts of vegetation removal and replacement.

The Environmental Protection Agency has rated this draft environmental statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). The rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under section 309 of the Clean Air Act.

Thank you for the opportunity to review this draft environmental statement.

Sincerely,

Alexandra B. Smith

Alexandra B. Smith, Chief
Environmental Evaluation Branch

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

MAR 20 1979

PEP ER 79/36

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Morris:

We have reviewed the proposed report of the Chief of Engineers and the revised draft environmental statement for Yakima-Union Gap, Flood Damage Reduction, Yakima County, Washington as requested in your letter dated December 28, 1978. Several comments and suggestions are offered for your consideration.

Chief of Engineers' Report

It appears that the project may have recreation potential that will not be realized through this proposal. The project is located within the Yakima River Greenway, for which a master plan is now available. The extent of consideration given to recreation as a project purpose is not apparent from the subject document. Notwithstanding the past consideration which may have occurred, it now appears that recreation agencies within the project area are interested in discussing the recreation possibilities of the project.

The urban location of the flood control proposal gives it a special emphasis for multiple use. The National Urban Policy, announced by the President on April 3, 1978, includes a strong commitment to focus existing Federal programs into the urban areas of the Nation. The President proposes to use "...agencies traditionally not involved in urban policy, such as the Defense Department,...to make their actions more supportive of urban areas."

Given the new national e[illegible] and the changing conditions in the project area, we re[illegible]d that local recreation agencies be contacted to re-examine the addition of recreation as a project purpose.

Revised Draft Environmental Statement

Project Description

In August of 1978 we were advised by the Seattle District staff that the Board of Engineers had recommended the project be approved but with modifications. These modifications included increasing the levee height along the entire length of the right and left bank levees downstream of Moxee Bridge and increasing the amount of riprap along these two levees. Our field review indicated that the modifications would amount to a significant increase in previously identified fish and wildlife losses and that a reanalysis of fish and wildlife aspects would be required.

By a letter dated October 4, 1978, to the District Engineer, our Fish and Wildlife Service recommended, among other things, that we be given the opportunity during the post authorization phase (advanced engineering and design) to reassess fish/wildlife losses and to develop a new and more comprehensive habitat restoration plan. We understand that, if the project is authorized, the Corps will make every opportunity available to accomplish our recommendations during the post authorization phase.

With respect to a mitigation plan, we believe that a good plan developed by fish and wildlife agencies, if implemented, would serve to realize some of the goals alluded to in paragraph 11 of the Board of Engineers' Report, which is to minimize or eliminate any long-term impact to fish and wildlife.

It should be recognized, depending on final levee details developed in the design phase, that the $117,000 habitat restoration cost, identified in paragraph 18 of the Board's Report, may be too low.

It is important to note that setback features of the levees are highly important and the Fish and Wildlife Service will insist on these features to protect wildlife values.

Archeological, Historical, and Unique Scenic Resources, Pages 31, 32

The revised draft statement does not note that the State Historic Preservation Officer (SHPO) has been consulted regarding cultural

resources; however, a letter from the SHPO is included in Appendix E. It is indicated in the statement that a preliminary cultural resources investigation was conducted and that prior to construction, a comprehensive prehistoric and historic survey would be made of the project area. The statement further indicates that the National Register of Historic Places has been consulted and there are no sites on the register within the project area. We recommend that if artifactual material is encountered during construction, the State Office of Archeology and Historic Preservation should be contacted for consideration of an archeological salvage program.

Recreational Resources

Page 40, paragraph 4.30, states "Should the Freeway Park be realized, it is likely that the proposed new levees and the rehabilitated levees would form much of the park boundary and could be used as trails linking most of the park together." Local officials have recently expressed interest in discussing the possibility of cost sharing in the development of a system of trails along the proposed project levees. We believe the revised draft environmental impact statement should be expanded to reflect this new possibility for use of project resources.

Long-Term Fish Impacts (page 43)

It is stated that the Fish and Wildlife Service no longer has confidence in estimates of losses for angler days. It should also be pointed out that the reason for this is due to changes in the project, as recommended by the Corps at a late date, to changes in habitat use and value, and to an increased demand for consumptive and nonconsumptive fish and wildlife oriented recreation.

Page 58, last sentence

The bald eagle has been given official threatened status in the State of Washington since publication of the Corps' feasibility report and revised draft EIS. Some birds have been observed occasionally within the project area. The peregrine falcon is known to use the project site. Because of this, consultation under Section 7 of the Endangered Species Act should be iniated immediately.

We hope these comments will be of assistance to you.

Sincerely,

Larry E. Meierotto
Assistant SECRETARY

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

APR 30 1979

Lieutenant General J. W. Morris
Chief of Engineers
Office of the Chief of Engineers
Army Corps of Engineers
U.S. Department of the Army
Washington, D.C. 20314

Dear General Morris:

This is in reply to Colonel Thorwald R. Peterson's letter of December 28, 1978. We have reviewed the proposed report on Yakima-Union Gap, Washington, together with other pertinent reports and the revised draft environmental impact statement (EIS). These reports propose local flood protection consisting of improvement of existing levees, construction of new levees, installation of flood control structures, and flood plain management to provide flood protection for approximately 3,300 acres.

Based on 1976 prices, first costs of the proposed improvements are estimated at $3,970,000, of which $76,000 would be non-Federal. The benefit to cost ratio, computed at 6 3/8 percent, is 1.9. Recommendations by the Board of Engineers for Rivers and Harbors, including higher level of protection of a portion of the flood plain, would raise first project cost to $5,168,000 and result in a benefit ratio of 1.6. Changes in cost sharing provisions to conform to requirements under current policy would raise the non-Federal contribution to the first costs of project installation to 25 percent. The revised benefit to cost estimates are given in table 1 of the EIS and should also be displayed in the main report and appendix F.

It is suggested page 33 of the main report state explicitly that benefits were calculated using alternative 2, "flood plain management alone," as the "without project" future, rather than alternative 1 "do nothing."

The first paragraph on page 34 should be clarified. As written, it appears that reduction in flood insurance premium payments were considered a national benefit rather than a reduction of transfer payment to distribute flood losses. Also, on page F-15, flood damages are described as including losses in sales or revenue and loss of wages. Such evaluations can easily be double counted since loss of gross revenue from sales includes the wage component. In some situations these losses are partially recovered through increased production after the flood in order to meet backlogged demand. As written, it is not clear if these items were allowed for in the calculations.

The level B study, referred to on page 18, is now complete. Also, a USDA cooperative river basin study regarding sediment erosion from irrigated croplands is scheduled for completion in mid-1979.

It would appear appropriate that table 4 on page 20 of the draft EIS include the many acres of meandering river and associated wildlife lands (photo on page 27 of interim report).

We appreciate your including Soil Conservation Service's comments to a previous draft and hope these comments are helpful.

Sincerely,

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Policy
Washington, D.C. 20230

March 26, 1979

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Morris:

The Department of Commerce has reviewed your proposed report on the Yakima-Union Gap, Washington together with the interim report concerning flood damage reduction in the Yakima River Basin.

We have no substantive comments to make on these documents.

Thank you very much for the opportunity given to us to make this review.

Sincerely,

James W. Curlin
Deputy Assistant Secretary
for Policy

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WEP-7/73)
WASHINGTON, D.C. 20590
PHONE: 202-426-3300

• 16476/7.b 549

14 FEB 1979

Colonel John A. Poteat
District Engineer
U. S. Army Engineer District, Seattle
P.O. Box C-3755
Seattle, Washington, 98124

Dear Colonel Poteat:

On behalf of the U. S. Department of Transportation the concerned operating administrations and staff of the U. S. Coast Guard have reviewed the Revised Draft Environmental Impact Statement for Yakima-Union Gap Interim Report, Flood Damage Reduction. We have neither comments no objections to offer regarding this proposal.

The opportunity to review the Revised Draft Environmental Impact Statement for Yakima-Union Gap Interim Report, Flood Damage Reduction is greatly appreciated.

Sincerely,

Dan C. W. Dumbo
Chief, Environmental Impact Br
By Direction of the Commandant

January 2, 1980

Office of Community Planning and Development

10C

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Morris:

Re: Chief of Engineers Report on Yakima-Union Gap, Washington and Related Reports

We have reviewed the proposed report of the Chief of Engineers on Yakima-Union Gap, Washington, other pertinent reports and a revised draft environmental impact statement submitted with your letter of December 28, 1978.

We have no constructive comments to offer.

Thank you for the opportunity to comment.

Sincerely,

Robert C. Scalia
Director
Regional Office of CPD

10C/RGilliland:lg 1/2/80

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753 2800

March 23, 1979

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Morris:

Thank you for the opportunity to review the proposed report of the Chief of Engineers and other pertinent reports for the Yakima-Union Gap Flood Damage Reduction Project. The State of Washington strongly supports the proposed project and looks forward to working with the Corps of Engineers during the post-authorization phase. We do wish to express our great concerns over the application of the President's proposed cost sharing policy at this advanced stage of project planning. State agencies have some additional information and concerns which are outlined below for your information and consideration.

1. The Department of Transportation is planning improvements to SR 82 which will fall within the proposed Corps project area. Since you may not be aware of these plans, we have enclosed the improvement plans for your information.

2. The Parks and Recreation Commission is concerned that failure to plant trees and shrubs on the inboard dike face will result in severe aesthetic degradation within Yakima Sportsmans State Park. This concern has been raised several times during the planning stage of this project, but no agreement between the Corps and the Parks Commission has yet been reached. The Seattle District Office of the Corps of Engineers has indicated it will coordinate the formulation of an acceptable landscape restoration plan with the Commission during post-authorization planning. We hope that an agreement will be reached at that time.

3. The Department of Fisheries has indicated that any work done in the river will require a hydraulic permit.

4. The Department of Game has indicated it has comments and will forward them directly to your office as soon as they are completed.

The comment letters received from the state agencies are enclosed for your information. If you have any questions, please contact the appropriate state agency or Barbara Jansen of our Environmental Review Section, at (206) 753-6892.

Yours truly,

Wilbur G. Hallauer
Director

WGH:as

Enclosures

cc: Gordon Sandison, Director
Department of Fisheries
Jan Tveten, Assistant Director
Parks and Recreation Commission
Sheila Stump, Office of Archaeology
and Historic Preservation
Wm. P. Albohn, Department of Transportation
Barbara Jansen, Department of Ecology
Seattle District Corps of Engineers

STATE OF WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF TRANSPORTATION
Highway Administration Building, Olympia, Washington 98504 206/753-6005

FEB 8 [illegible] 79

February 7, 1979

Ms. Barbara Jansen, Environmental Review Section
Department of Ecology
St. Martins College
Olympia, Washington 98504

Department of Ecology
Yakima-Union Gap Flood Damage Reduction
Revised Draft Environmental Impact Statement

Dear Ms. Jansen:

We have reviewed the subject document and are in support of the proposed project because it will preserve the structural integrity of the Interstate Highway roadway. We do have the following additional comments concerning the document:

In the Interim Report on the project on page 53 and 54 under the subject "Cost Apportionment", it indicates the Department is responsible for maintenance, operation and replacement costs of $500 annually. It should be clarified in the document this money represents normal and routine maintenance of slopes along SR 82 to be accomplished by the Department's maintenance forces. Costs over and above those considered routine must be obtained from other sources.

The Department, in our letter dated February 16, 1977, expressed some concern regarding the depth of rip rap to be placed on the roadway slopes. The Department cannot recommend approval of construction plans until our hydraulics section can review design computations.

The Department is planning to improve SR 82 by construction of a connection to SR 97 in the vicinity of Union Gap. This proposed improvement will fall within the limits of the subject proposal. The proposed highway project is not shown on any of the maps or plans in the document. Attached for the corps information are plans of the planned highway improvement.

Any references to the State Highway Department should be changed to the Washington State Department of Transportation.

Sincerely,

ROBERT S. NIELSEN
Assistant Secretary
Public Transportation and Planning

By: WM. P. ALBOHN
Environmental Planner

RSN:yw
WPA:WBH
cc: R. C. Schuster

G-13

STATE OF WASHINGTON
Dixy Lee Ray
Governor

WASHINGTON STATE PARKS AND RECREATION COMMISSIC..
7150 Cleanwater Lane, Olympia, Washington 98504
206/753-5755

January 22, 1979

TO: Ms. Barbra Jansen
State of Washington
Department of Ecology
Environmental Review Section
Olympia, Washington 98504

FROM: Jan Tveten, Assistant Director
Washington State Parks and Recreation Commission

SUBJECT: Yakima - Union Gap, Interim Report. Columbia River and Tributaries Study, Flood Damage Reduction, Yakima River Basin, Washington AND Revised Draft Environmental Impact Statement Prepared by the U.S. Army Engineer District, Seattle, Washington, 1978.

I have reviewed the above noted documents and find that they do not contain a detailed evaluation of the application of Engineer Manual EM 1110-2-301, LANDSCAPE PLANTING AT FLOODWALLS, LEVEES AND EMBANKMENT DAMS. Further, it appears that no plantings of shrubs or trees shall be permitted on the inboard face of the dike.

On January 12, 1978, Mr. David Heiser of State Parks requested in a letter to the Chairman of the Board of Engineers for Rivers and Harbors, the following:

> *In addition, we request that the Corps include in the interim report and environmental impact statement, a detailed evaluation of the application of Engineer Manual N. ETL 1110-2-301* [Now EM 1110-2-301] *by the Corps of Engineers (Engineering and Design LANDSCAPE PLATING AT FLOODWALLS, LEVEES AND EMBANKMENT DAMS) including a justification for not providing landscaping plantings* ([other than grass]) *within Yakima Sportsman State Park if the Corps insists on not providing landscape plantings (other than grass) within this recreation area.*

On March 30, 1978, Mr. Dwain F. Hogan of the Corps of Engineers stated in a letter to Mr. Heiser of Parks the following:

As a part of future coordination and post-authorization planning ("detailed planning") we will consider a variety of landscape restoration measures, including a scheme utilizing groupings of trees and shrubs.

I have reviewed the above noted documents and find that no reasonable means to adequately landscape the dike within Yakima Sportsman State Park is available. Only plantings of various grasses appear to be possible given the parameters spelled out in the Interim Report and Draft Environmental Impact Statement. Therefore, any mutually prepared landscape plan prepared by Parks and the Corps during the "post-authorization planning" stage (detailed planning") cannot include schemes utilizing groupings of trees and shrubs if the Interim Report and Revised Draft Environmental Impact Statement are not revised.

If there is to be no allowance for tree and shrub planting on the inboard face of the dike within Yakima Sportsman State Park, then please make it clear in the Interim Report and Environmental Statements that any "joint landscape plan" prepared by Corps and Parks in the future will be considered within extremely limited parameters that were established unilaterally by the Corps without the concurrence of Parks and that the narrow parameters preclude the possibility of trees and shrub planting. Further, please understand that it is the judgment of the professional planning staff of state parks, the owner and public recreation manager of the land, that the failure to plant trees and shrubs on the inboard dike face will result in severe esthetic degradation within Yakima Sportman State Park.

Incidentally, to bring you up-to-date on the status of the proposed easement for the dike, I have enclosed a copy of the last communication regarding that easement. Parks has not yet heard back from Yakima County Public Works.

jjj

Enclosure

cc: Dwain F. Hogan P.E.
Chief, Planning Branch
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Resident Member
Board of Engineers for Rivers and Harbors
Kingman Building
Fort Belvoir, VA 22060

Colonel John A. Poteat
District Engineer
Seattle District
Corps of Engineers
4735 E. Marginal Way S.
Seattle, WA 98134

Division Engineer
U. S. Army Engineer Division, North Pacific
P. O. Box 2870
Portland, OR 97208

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504 206/753-6600

February 13, 1979

Barbara Jansen
Department of Ecology
Olympia, Washington 98504

Dear Barbara:

We have reviewed the draft EIS for the Yakima-Union Gap Flood Damage Reduction Study and find that the project will have no apparent significant detrimental impacts on the salmon resource.

Any work which will actually be performed in the river will, of course, require a Hydraulic Permit.

Sincerely,

William R. Sandison

Gordon Sandison
Director

kn

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way/Olympia, Washington 98504 206/753-5700

March 30, 1979

Colonel John A. Poteat
District Engineer
U. S. Army Engineer District, Seattle
Post Office Box C-3755
Seattle, Washington 98124

RE: Yakima-Union Gap Flood Damage Reduction Revised Draft EIS

Dear Colonel Poteat:

Your document has been reviewed by our staff as requested; our comments follow. Please forgive our late response.

A great deal of preparation is apparent in sections of this EIS dealing with impacts on fish and wildlife. However, several points appear to have been neglected, which we will address below.

pp 7-1.32: Removal of burrowing animals is not discussed beyond this section. In most instances these would be furbearers such as muskrats. How will these be taken, and by whom? Will losses of these animals be mitigated?

pp 10 - Table 1: We wondered how the figure of $4,200 a year in Unmitigated Fish and Wildlife Costs was derived. How many animals are involved? We would like to point out that fish and wildlife increase dramatically in value as they become more scarce.

pp 16-2.29: A fourth area important to hunters, which would be impacted by the proposal, is Moxee Game Reserve. It holds duck populations which contribute about 12,000 waterfowl to the Yakima County total harvest of between 60,000 to 100,000 waterfowl yearly. The approximately 12,000 waterfowl contributed to this total from Moxee Reserve indicate about 10,000 man/days of hunting, worth about $261,000 economically, based on direct spending.

pp 30-2.79: This riparian bottomland habitat may be described as unique in Yakima County.

pp 33-3.03: You state rehabilitation of existing levees, and construction of new levees set back from the river channel, should not be in conflict with the county's designation as "conservancy" in its shoreline master program, which includes most of the Yakima River shoreline from Selah Gap to Union Gap. We feel this would depend greatly on the location of the levees, proposed alternatives, and development encouraged by security generated by the existance of new levees.

pp 37-4.16: A discussion of long-term economic and social impacts should address economic impacts to recreation. This can be calculated to a good degree of accuracy from man-days impacts.

pp 39-40-4.25: There are no guarantees that land use controls and restrictions will not change. Present controls do not restrict intensification of agriculture or construction of buildings or other structures related to agriculture. Gravel mining permits are also available.

pp 41-4.31: This paragraph seems to sidestep the fact that the reason present levees are being raised, and new ones constructed, is to provide security from flood damage so more intense land use can be developed. Sections 4.17 through 4.25 discuss long-term economic and social benefits, but do not address the social and economic costs of these actions in terms of losses of wildlife oriented outdoor recreation.

pp 41-434: There are no guarantees that these hundreds of acres of flood-plain land will remain unprotected from periodic flooding, and therefore in a low state of development compatible with wildlife. We cannot assess impacts to wildlife on this basis.

pp 41-4.36: Natural vegetation behind the dike will also be lost due to more intensive land use, both residential and agricultural. Benefits to wildlife habitat resulting from periodic flooding will also be lost. These benefits include weed seed deposition, aluvial fertilization from silt deposits, insect food supplies, and protection for natural vegetation and space from development.

pp 42-43-4.42: Again, this section does not address wildlife losses behind the dikes, losses from encroachment on Moxee Reserve, or losses of burrowing animals.

March 30, 1979

pp 48-5.04: Adverse Environmental Effects which cannot be avoided should have included impact on waterfowl, shorebirds, doves and others from loss of flat shorelines. Mitigation proposals for diking will not offset losses discussed in 5.02.

pp 53-7.0: The productivity of this proposal assumes protection of "private residences, businesses, agricultural lands and public facilities". Project benefits are based on these features. Fish, wildlife, recreation and water quality costs were not measured against these benefits because of present zoning restrictions, but the benefits cannot accrue without assessing these environmental costs of development, which result from the security of improved and expanded levees.

The possibility that the utility of Moxee Reserve would be lost if it were converted from wet pasture to row cropping was not addressed, nor was the cost of waterfowl depredation. This depredation could occur if row cropping or other more intensive agriculture replaced wet pasture in all or part of Moxee Reserve or other areas on the affected flood plain.

Thank you for the opportunity to review your document. We hope our comments are helpful.

Sincerely,

THE DEPARTMENT OF GAME

Douglass A. Pineo

Douglass A. Pineo, Applied Ecologist
Habitat Management Division

DP:mjf

STATE OF WASHINGTON

Dixy Lee Ray
Governor

OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 West Twenty First Avenue, Olympia, Washington 98504 206/753 4011

March 6, 1979

Ms. Barbara Jansen
Environmental Review
Department of Ecology

Dear Ms. Jansen:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for the Corps of Engineer's Yakima-Union Gap Flood Damage Reduction Project.

A staff review of items 2.85 - 2.89 and 4.45 regarding cultural resources has been completed. We concur with the proposal to conduct a comprehensive prehistoric and historic resources survey of the project area. The potentila for the presence of cultural resources in the area has been quite adequately recognized and addressed.

Thank you for your consideration of our cultural heritage.

Sincerely,

JEANNE M. WELCH, Deputy State
Historic Preservation Officer

Sheila A. Stump, Archaeologist

sm

yakima county, washington

BOARD of COUNTY COMMISSIONERS

District One	District Two	District Three
LES CONRAD	GRAHAM TOLLEFSON Chairman	CHARLES J KLARICH

March 23, 1979

J. W. Morris
Lieutenant General, USA
Department of Army
Corp of Engineers
Washington, D. C. 20314

Dear General Morris:

The Board of Yakima County Commissioners wishes to advise you that we fully support the Yakima-Union Gap Levee Project. We have reviewed the proposed report of the Chief of Engineers, the other pertinent reports and the revised draft environmental impact statement transmitted by Colonel Peterson's undated letter and reviewed by us on January 16, 1979.

Our desire is that the report be forwarded to Congress for their consideration as soon as possible. Yakima County is willing to participate in the project and provide all necessary items of local sponsorship as required by congressional legislation. We understand that the President's cost-sharing proposal is under consideration but would require congressional enactment before any modifications would be made to our previously agreed upon sponsorship. It must be noted that such enactment would have the effect of making our further sponsorship impossible.

This is an important project to Yakima County and has been several years in development. Considerable time and effort have been expended, and we hope that the report will be transmitted to the Congress promptly.

Sincerely,

Graham Tollefson
Graham Tollefson, Chairman

Charles J. Klarich
Charles J. Klarich, Member

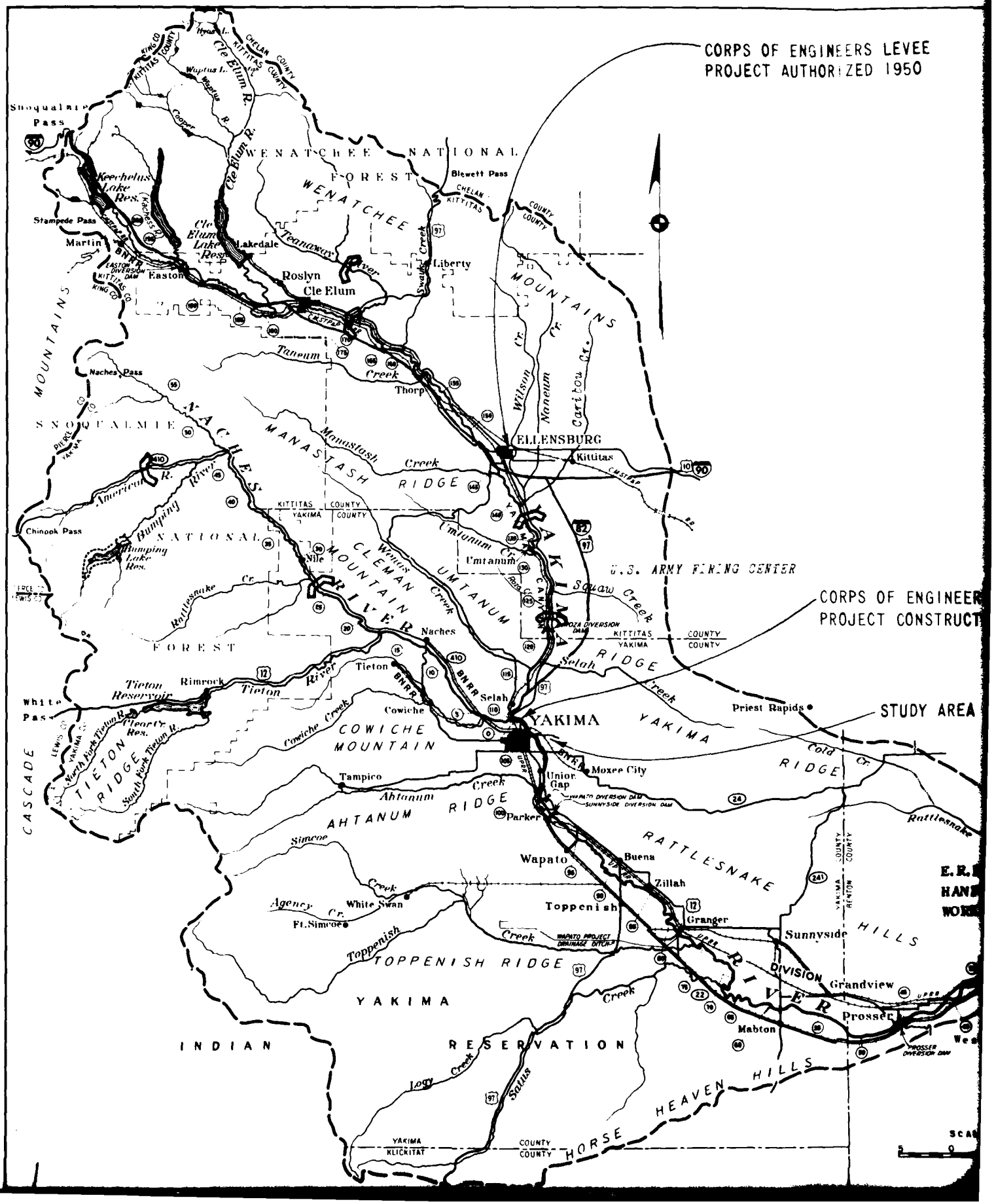
Les Conrad
Les Conrad, Member

GT/it
cc: Mike McCormick
Governor Dixie Lee Ray

G-21

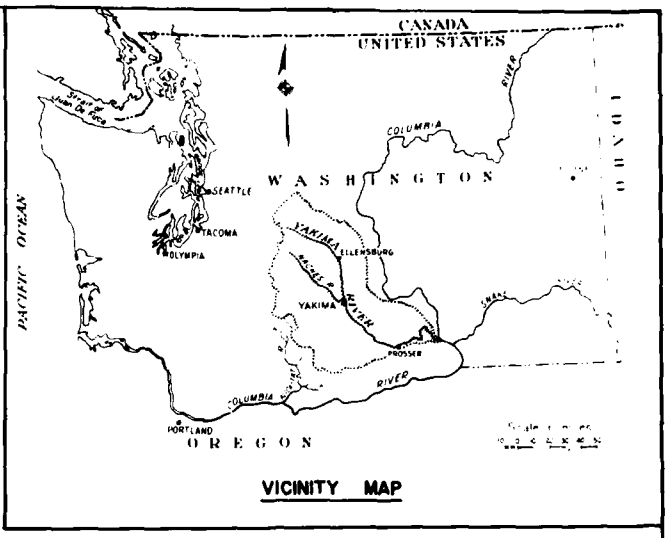
ROOM 416 COURTHOUSE
TELEPHONE (509) 575-4111
TOLL FREE 1-800 572 7354
YAKIMA, WASHINGTON 98901

CORPS OF ENGINEERS



U. S. ARMY

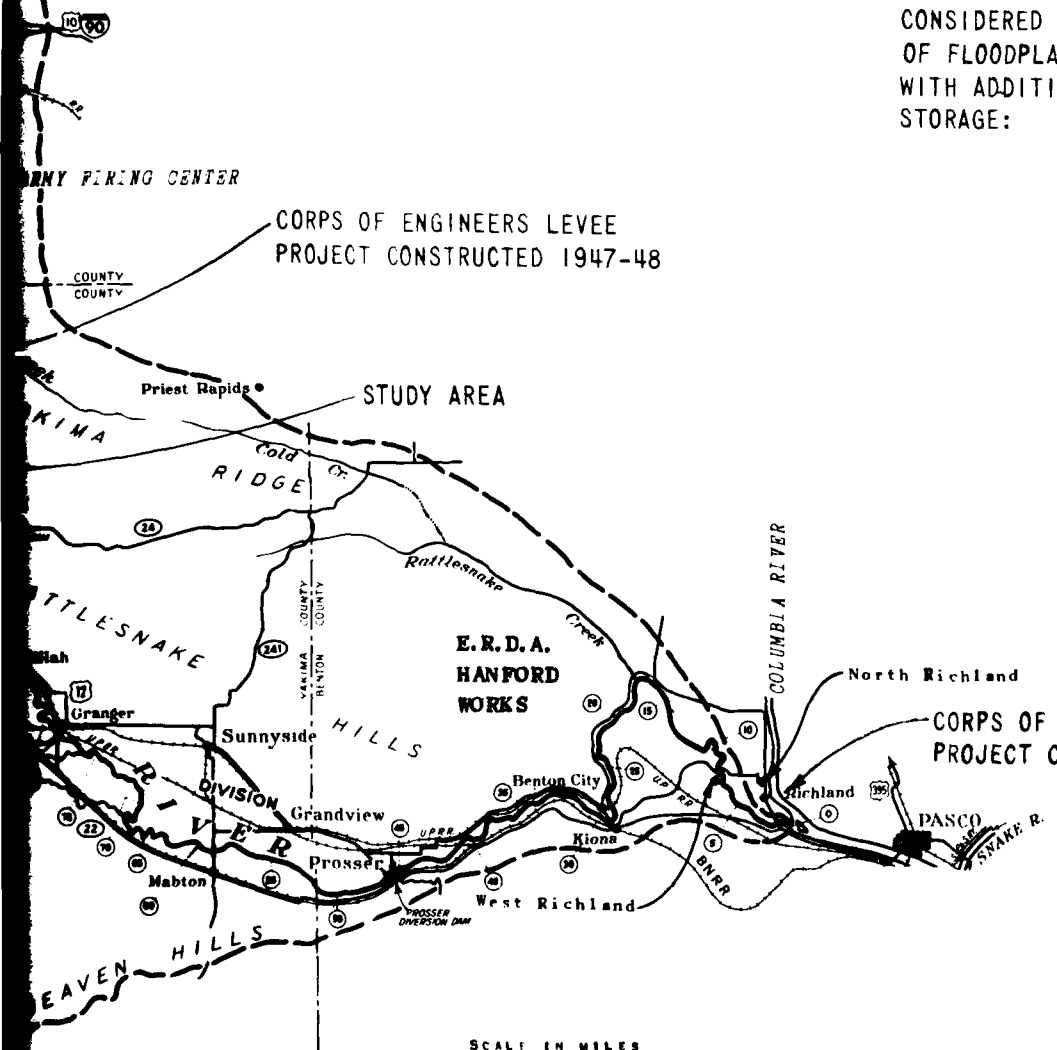
CORPS OF ENGINEERS LEVEE
PROJECT AUTHORIZED 1950



VICINITY MAP

LEGEND

POTENTIAL STORAGE SITES
CONSIDERED FOR ALTERNATIVE
OF FLOODPLAIN MANAGEMENT
WITH ADDITIONAL UPSTREAM
STORAGE:



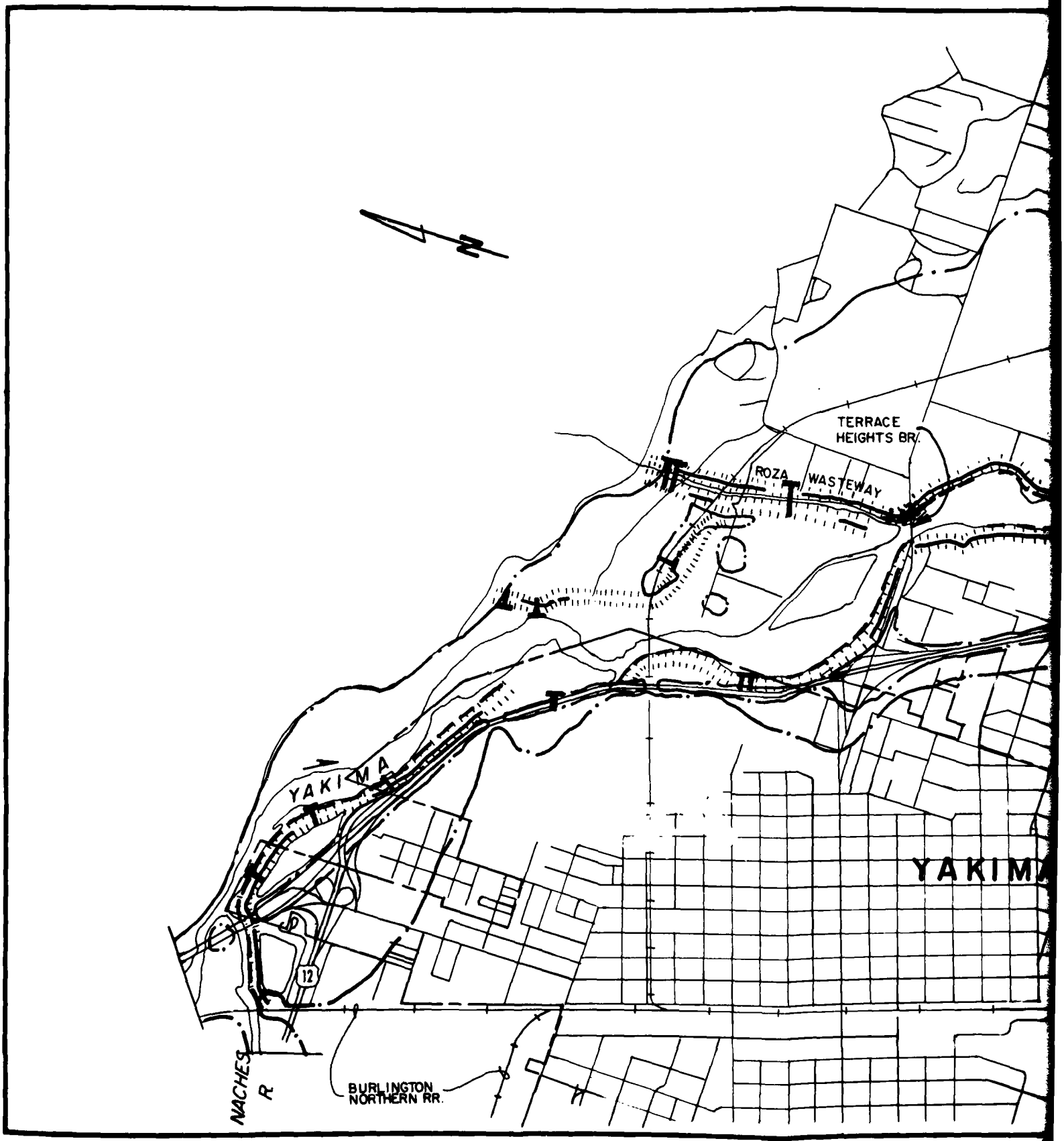
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

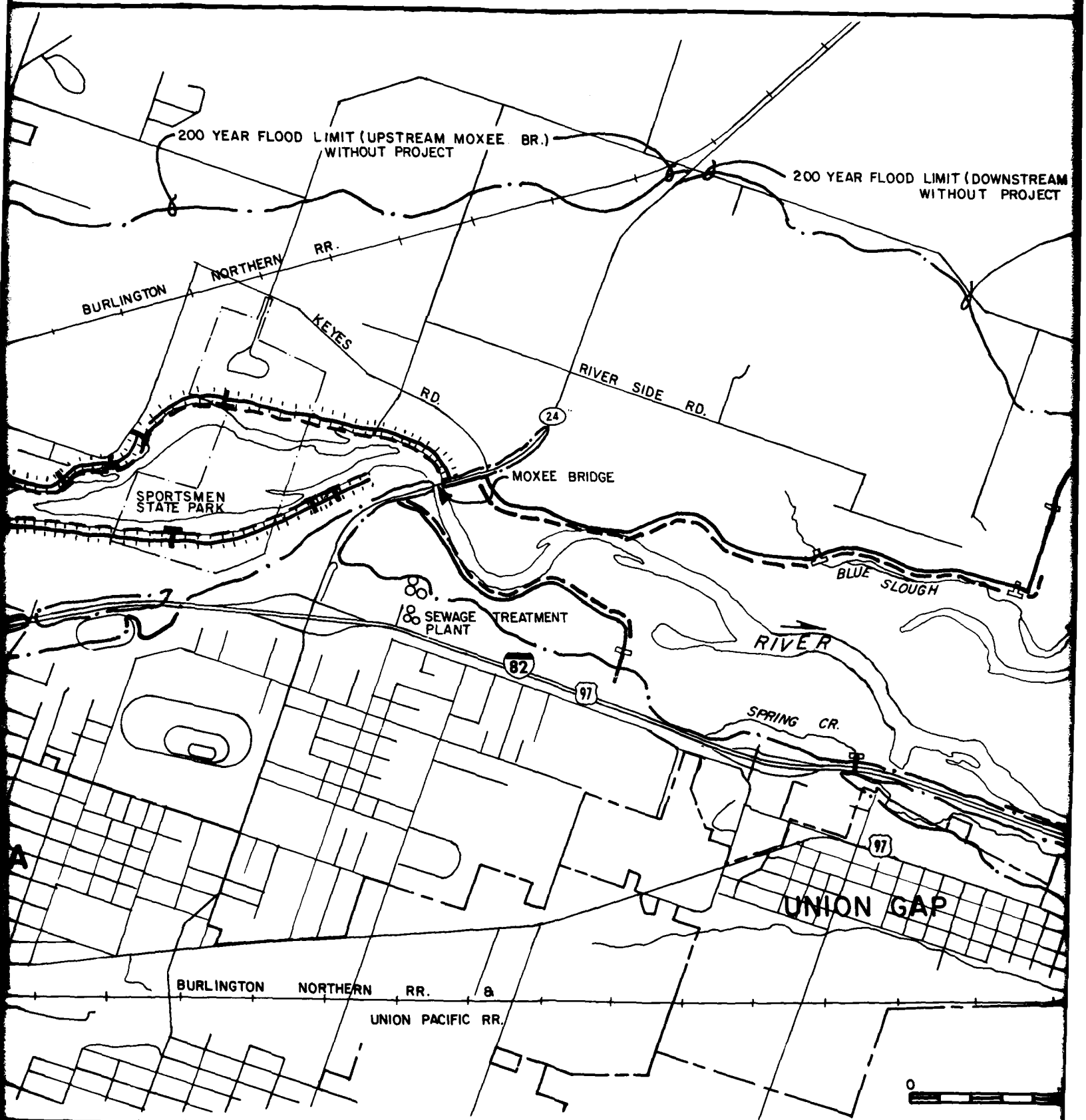
YAKIMA RIVER AND TRIBUTARIES

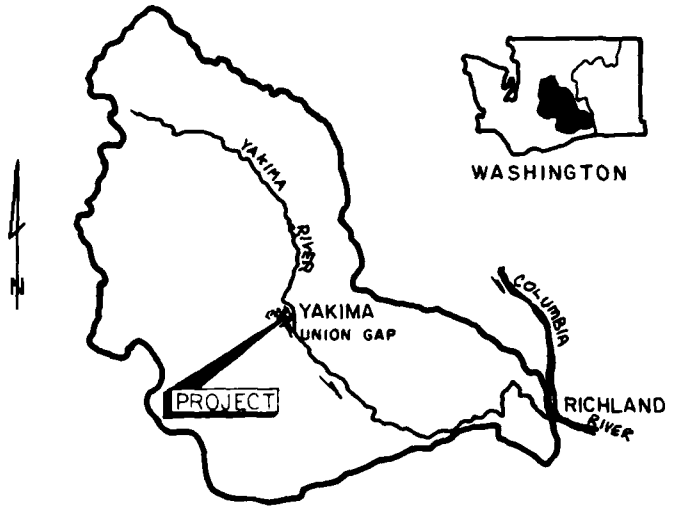
BASIN MAP

SIZE	INVITATION NO	FILE NO	PLATE
		D-8-4-257	1

DSN. MEREDITH CHK. FOSTER DATE


TERRACE
HEIGHTS BR.
ROZA
WASTEWAY
YAKIMA
YAKIM
12
NACHES
R.
BURLINGTON
NORTHERN RR.


200 YEAR FLOOD LIMIT (UPSTREAM MOXEE BR.) WITHOUT PROJECT
200 YEAR FLOOD LIMIT (DOWNSTREAM WITHOUT PROJECT
BURLINGTON NORTHERN RR.
KEYES RD.
RIVER SIDE RD.
24
MOXEE BRIDGE
SPORTSMEN STATE PARK
BLUE SLOUGH
SEWAGE TREATMENT PLANT
RIVER
82
97
SPRING CR.
UNION GAP
BURLINGTON NORTHERN RR. &
UNION PACIFIC RR.
0



YAKIMA RIVER DRAINAGE BASIN

LEGEND

EXISTING		RECOMMENDED
	LEVEE	
	CULVERT	
	GATE	
	CULVERT W/GATE	
	RIP RAP	
	RAILROAD	
	ROADS	
	CITY LIMITS	
	FLOOD PLAIN	

REV. 7-28-78 WEIDENBENER
CHK. SODERLIND

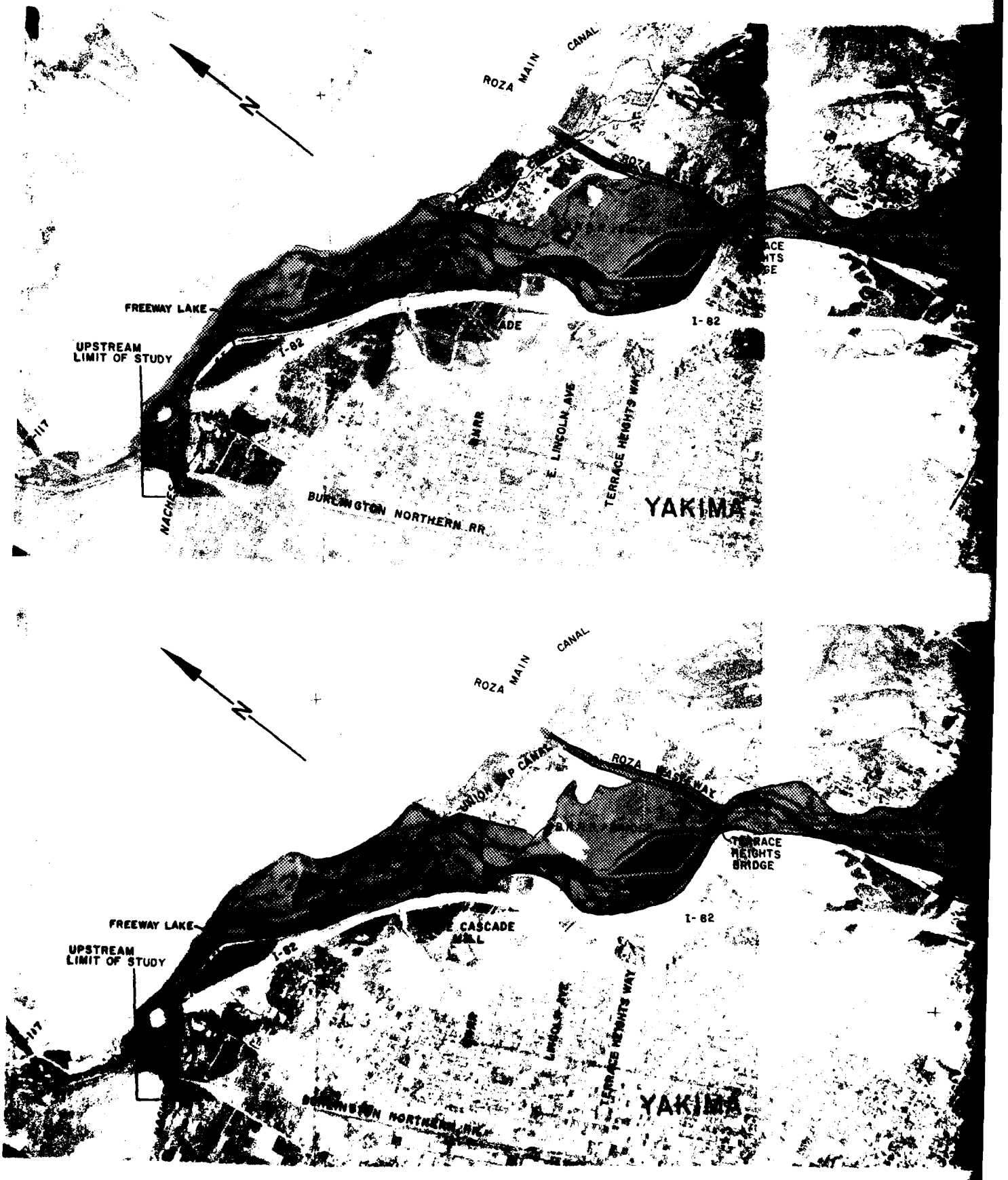
U. S. ARMY ENGINEER DISTRICT SEATTLE
CORPS OF ENGINEERS

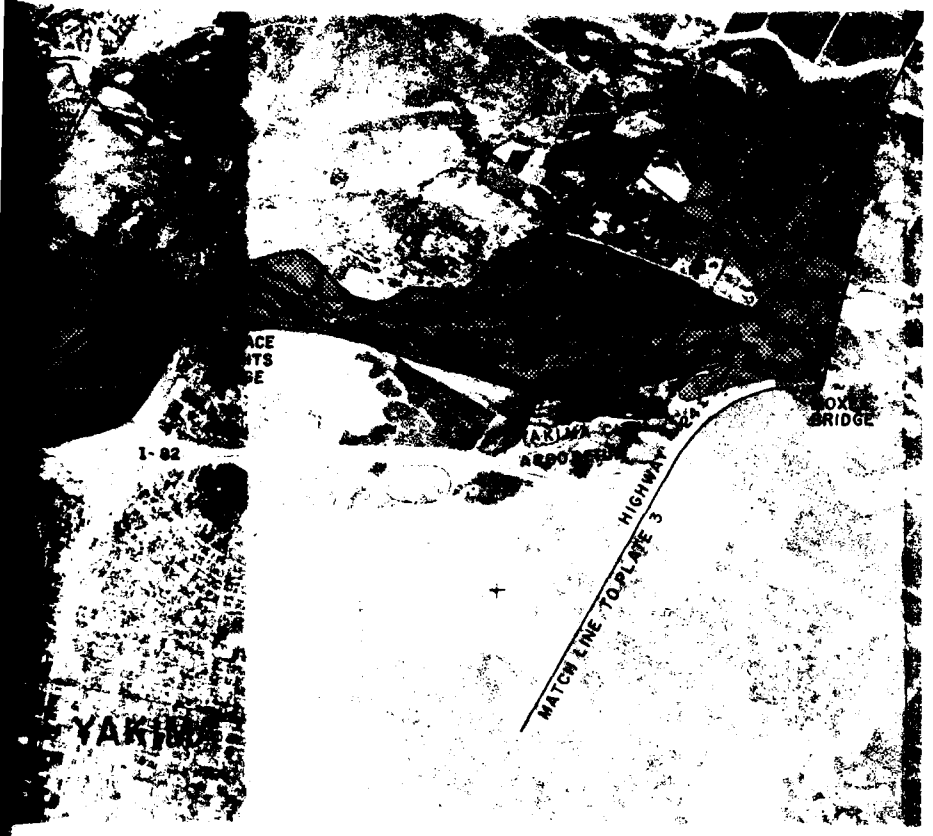
YAKIMA RIVER LEVEE PROJECT
PROJECT AREA
YAKIMA RIVER YAKIMA, WASH.

D-8-4-257 2

DSN. URABECK CHK. GRIFFITH

CORPS OF ENGINEERS





200 YEAR FLOOD
UPSTREAM OF MOXEE BRIDGE
WITH AND WITHOUT PROJECT

SCALE IN FEET
1000 0 1000 2000

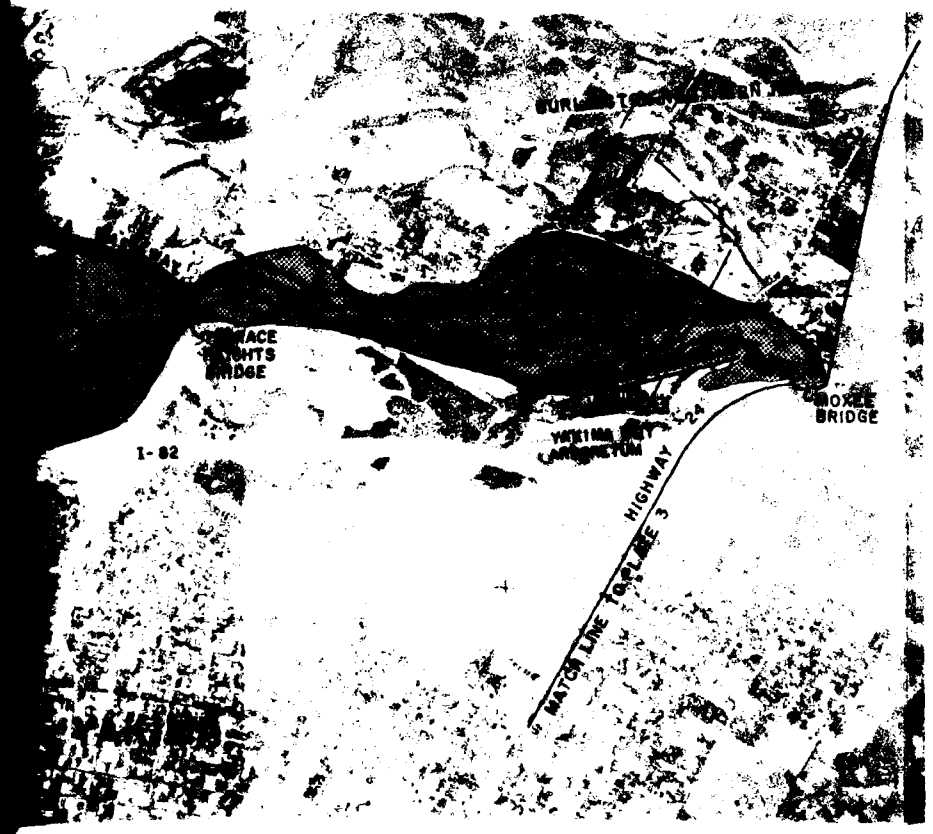
LEGEND

FLOOD PLAIN LIMITS
UNDER EXISTING CONDITIONS

FLOOD PLAIN LIMITS
WITH PROJECT

EXISTING LEVEES

RIVER MILES M-113



100 YEAR FLOOD
UPSTREAM OF MOXEE BRIDGE
WITH AND WITHOUT PROJECT

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

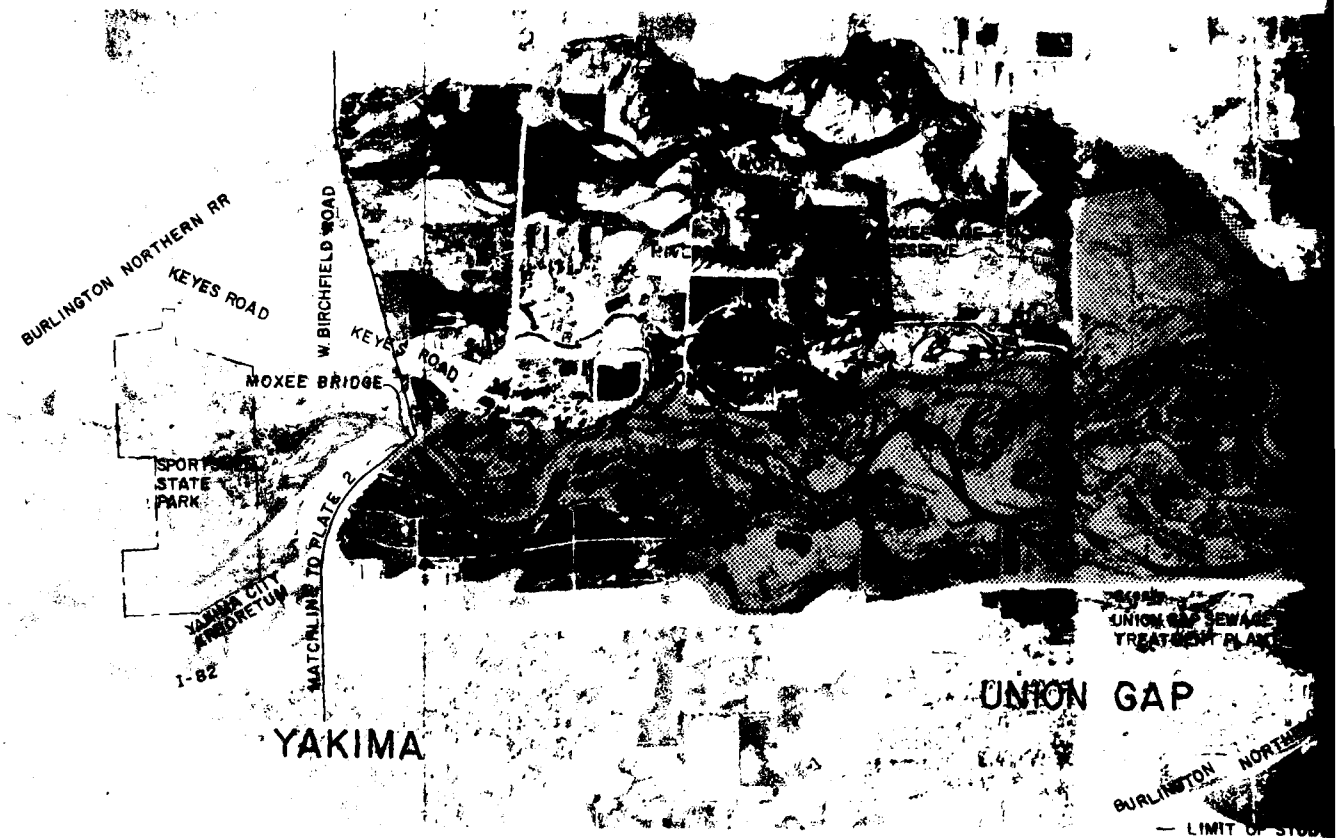
YAKIMA RIVER LEVEE PROJECT

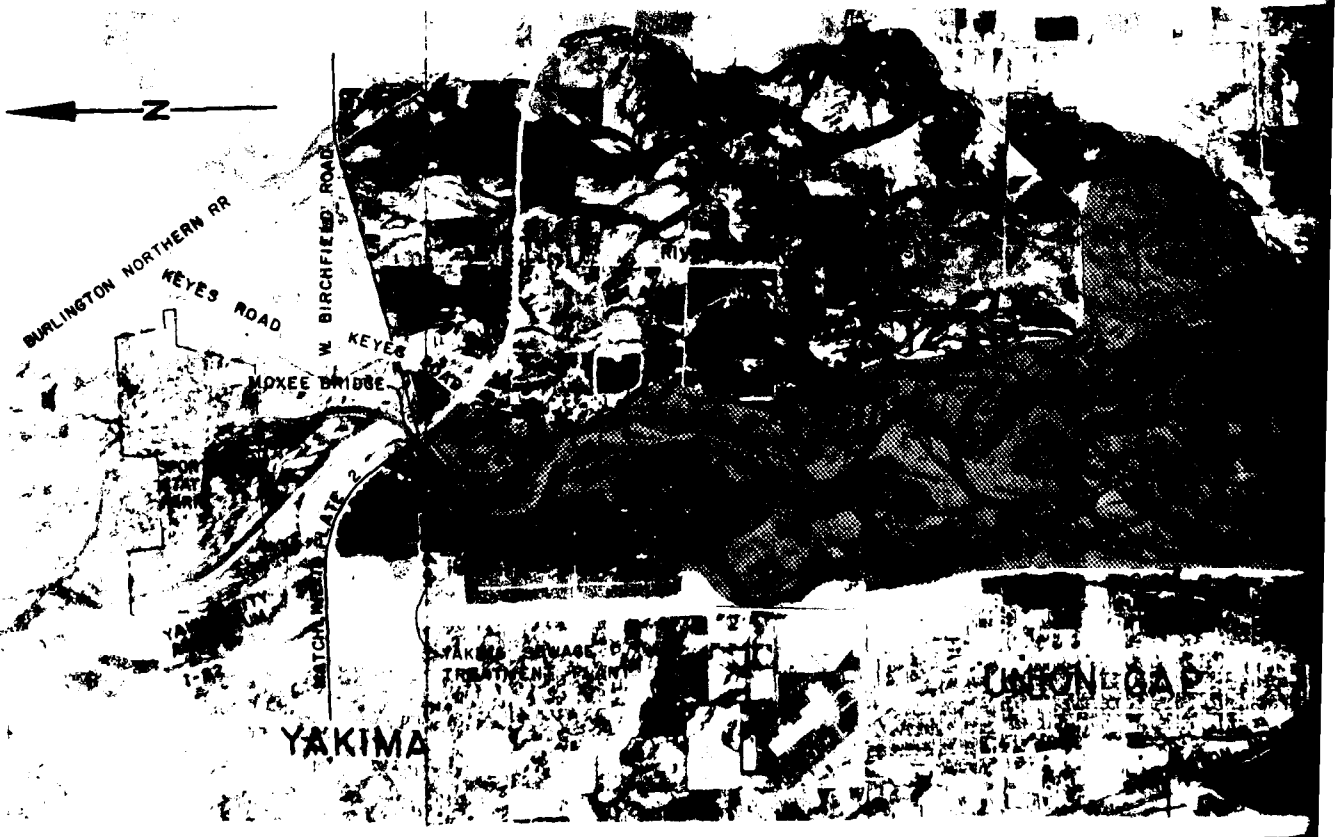
FLOOD PLAIN LIMITS

SIZE	INVITATION NO	FILE NO	PLATE
		D-8-4-257	3

DSGN MEREDITH CHK SESSINGHAUS SHEET

PLATE 3


BURLINGTON NORTHERN RR
KEYES ROAD
W. BIRCHFIELD ROAD
KEYES ROAD
MOXEE BRIDGE
SPORTSMAN STATE PARK
MATCHLINE TO PLATE 2
I-82
YAKIMA
UNION GAP
BURLINGTON NORTH


N
BURLINGTON NORTHERN RR
KEYES ROAD
W. BIRCHFIELD ROAD
KEYES ROAD
MOXEE BRIDGE
MATCHLINE TO PLATE 2
I-82
YAKIMA
UNION GAP

200 YEAR FLOOD DOWNSTREAM
OF MOXEE BRIDGE
WITH AND WITHOUT PROJECT

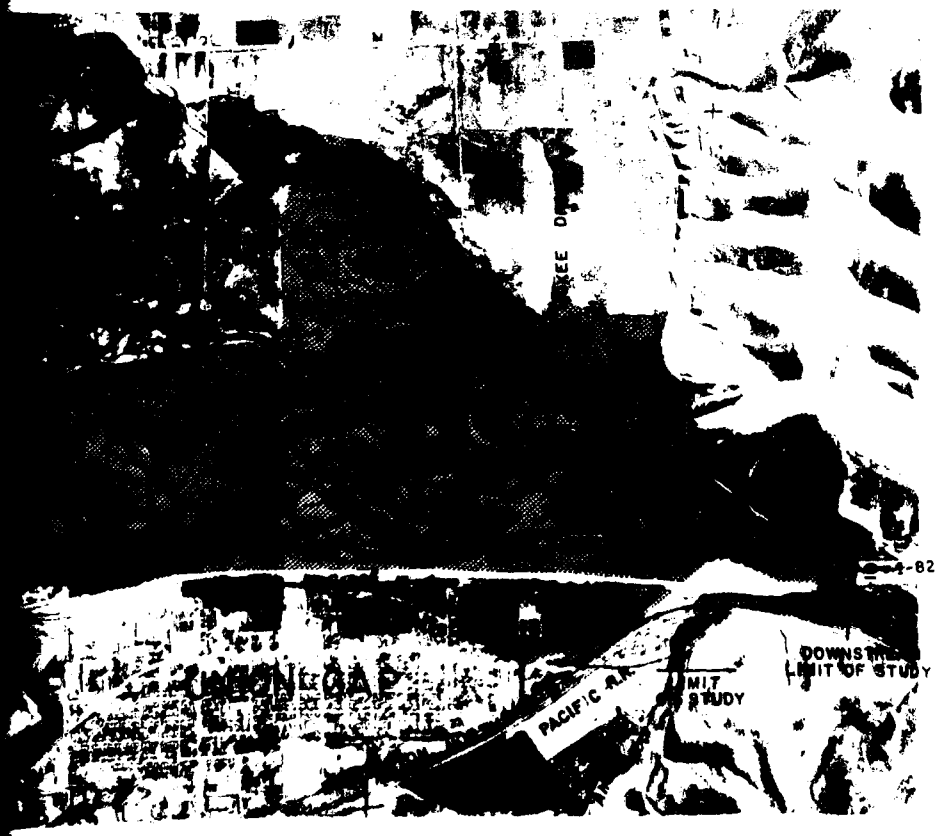
SCALE IN FEET
1000 0 1000 2000

LEGEND

FLOOD PLAIN LIMITS
UNDER EXISTING CONDITIONS

FLOOD PLAIN LIMITS
WITH PROJECT

EXISTING LEVEES



100 YEAR FLOOD DOWNSTREAM
OF MOXEE BRIDGE
WITH AND WITHOUT PROJECT

REV 4 AUG 78 REIDENBENER CHK SODERLIND

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

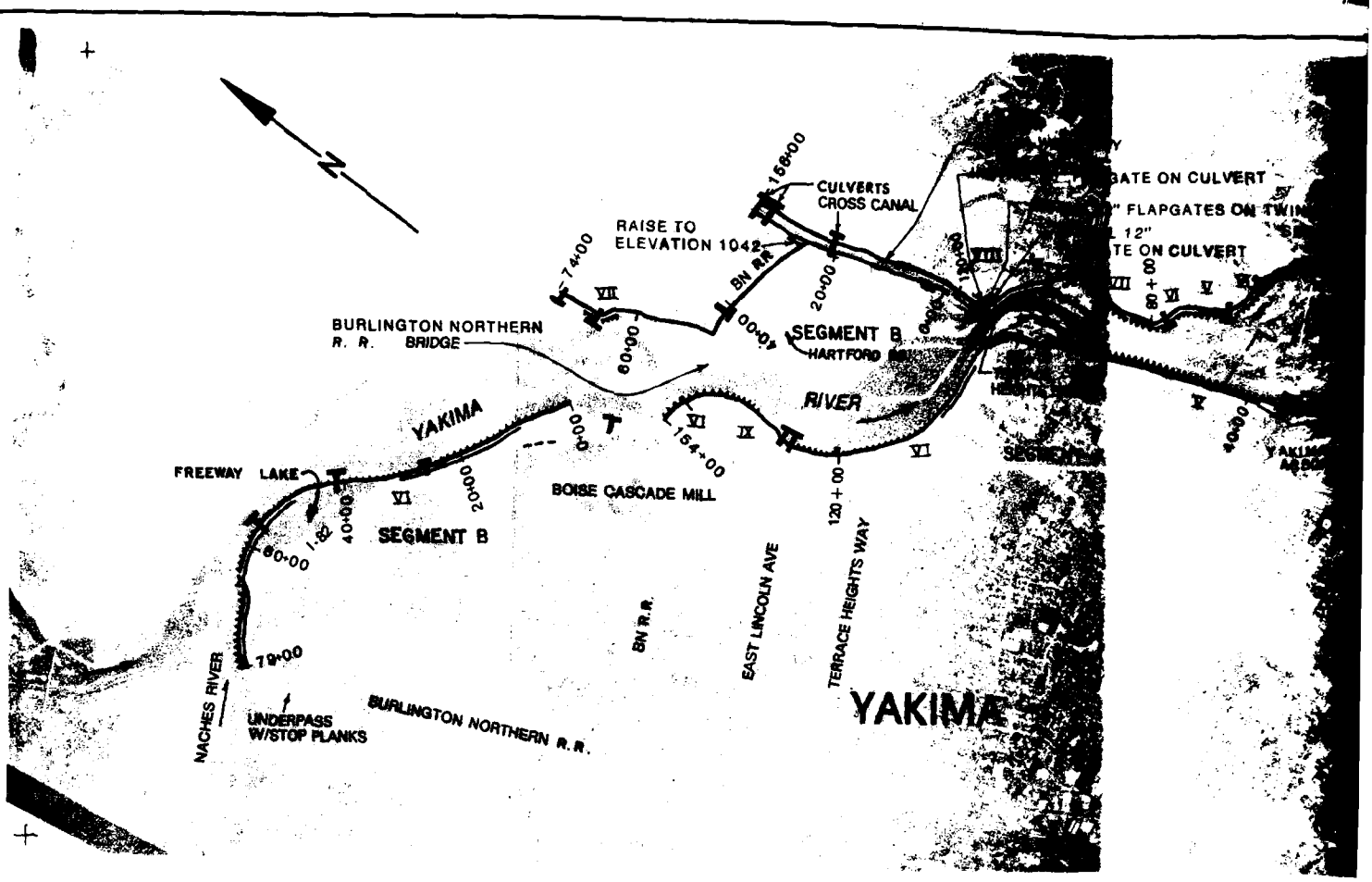
YAKIMA RIVER LEVEE PROJECT

FLOOD PLAIN LIMITS

SYS	INVITATION NO	FILE NO	PLATE
F	DATE MAR 1877	D-8-4-257	4

DSGN MEREDITH CHK SESSINGHAUS SHEET

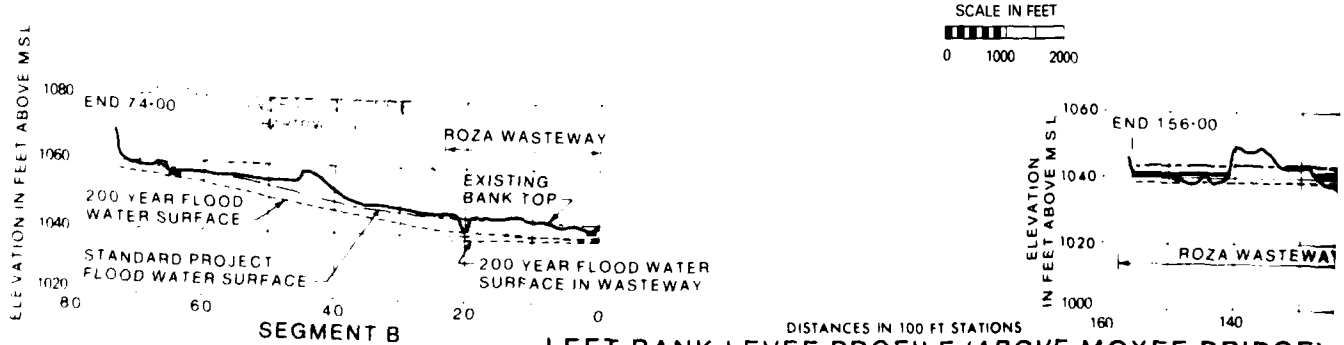
2



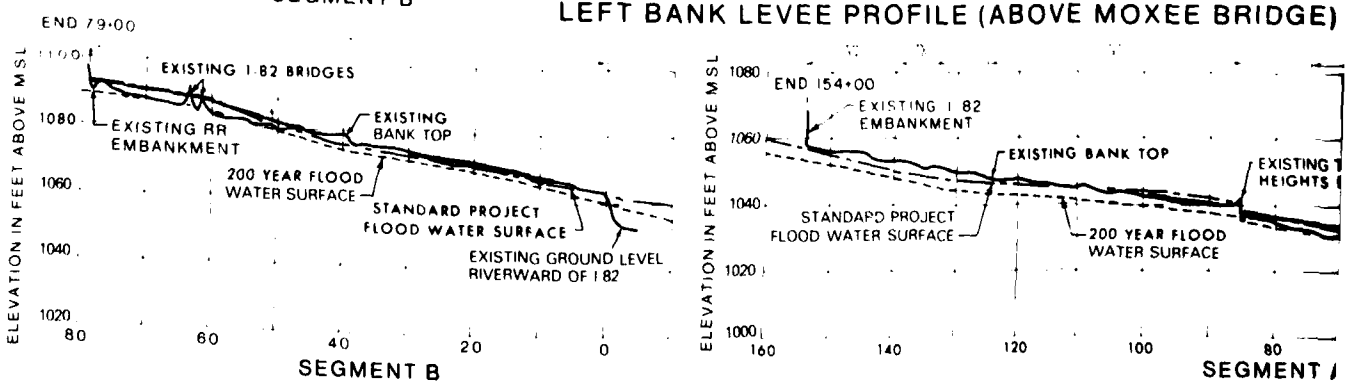
PLAN

SCALE IN FEET

0 1000 2000



LEFT BANK LEVEE PROFILE (ABOVE MOXEE BRIDGE)



RIGHT BANK LEVEE PROFILE (ABOVE MOXEE BRIDGE)

DISTANCES IN 100 FT STATIONS

LEGEND

EXISTING		RECOMMENDED
———	LEVEE	———
▬	CULVERT	▬
▮	GATE	▮
▬▮	CULVERT WITH GATE	▬▮
	EMERGENCY PROTECTION (SEE NOTE 2)	- - - -
	RIPRAP IMPROVEMENT (SEE NOTE 1)	▪▪▪▪▪▪▪▪▪▪
	RAISE HEIGHT OF EXISTING LEVEE	▬▬
	LEVEE TYPE (SEE NOTE 1)	

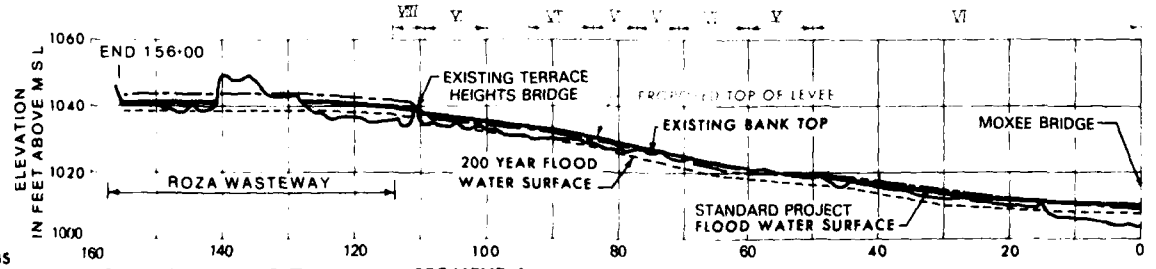
NOTES:

1. FOR LEVEE SECTIONS (TYPES) SEE PLATE 6.
2. SANDBAGS OR TEMPORARY BERM CLOSURE DURING FLOOD

PLAN

SCALE IN FEET

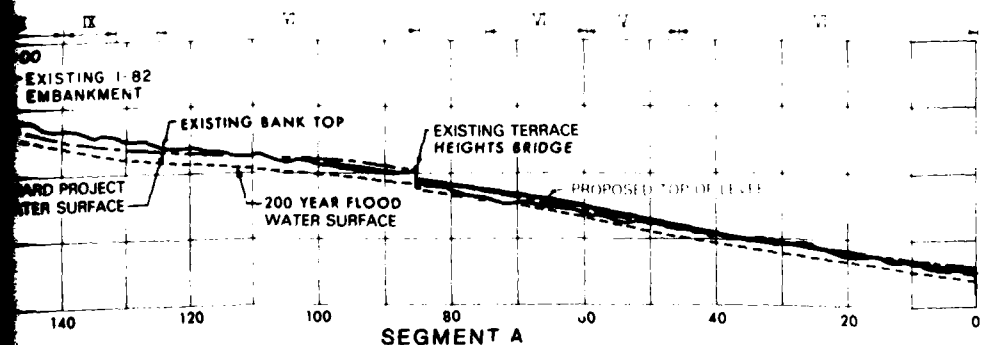
0 1000 2000



CES IN 100 FT STATIONS

ROFILE (ABOVE MOXEE BRIDGE)

SEGMENT A

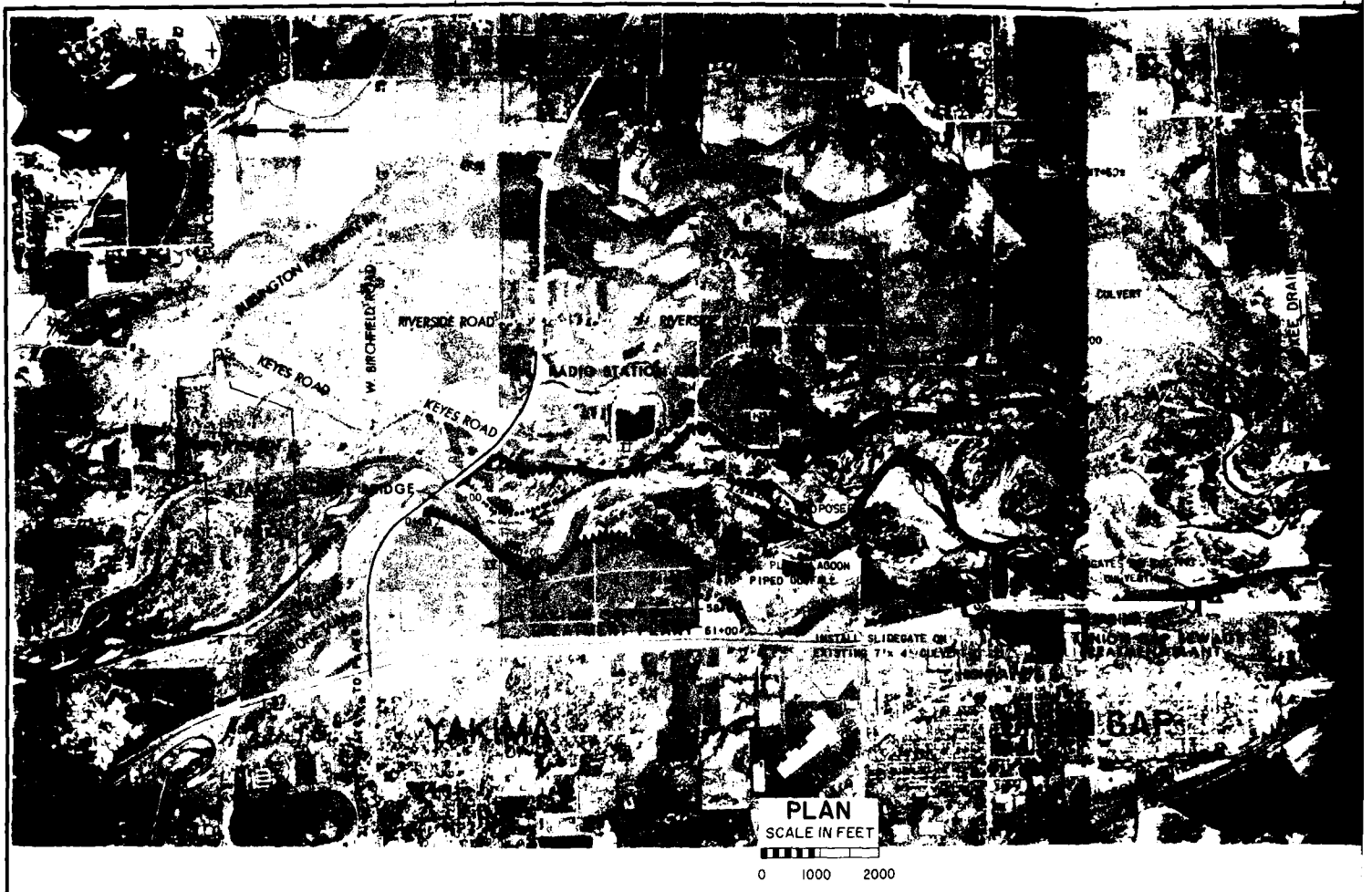


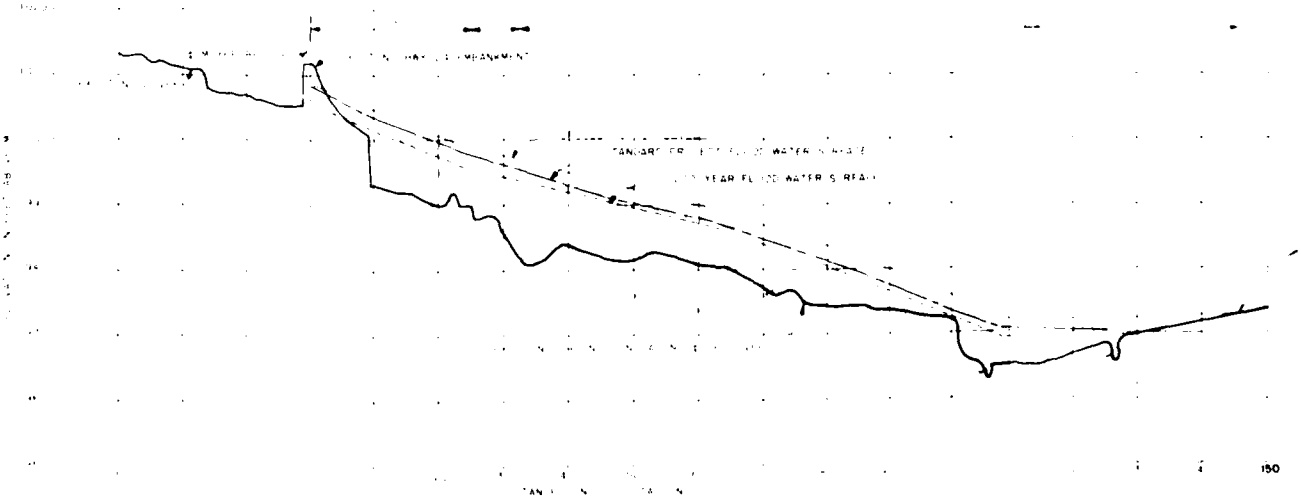
SEGMENT A

E (ABOVE MOXEE BRIDGE)

0 FT STATIONS

U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON		
YAKIMA RIVER LEVEE PROJECT PLAN AND PROFILES ABOVE MOXEE BRIDGE		
YAKIMA RIVER	YAKIMA, WASHINGTON	
	FILE NO. D-8-4-257	PLATE 5
DRAWN MEREDITH	CH. SESSINGHAUS	





LEFT BANK LEVEE (BELOW MOXEE BRIDGE)
PROFILE

2000

LEGEND

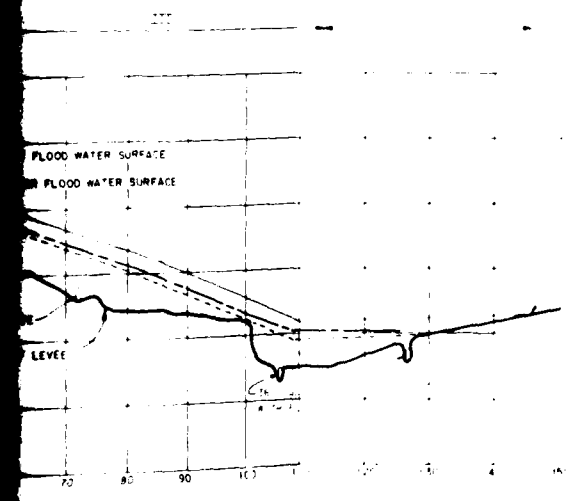
EXISTING		RECOMMENDED
	LEVEE	
	CULVERT	
	GATE	
	CULVERT WITH GATE	
	RIPRAP IMPROVEMENT	
	EMERGENCY PROTECTION (SEE NOTE 2)	
	LEVEE TYPE	

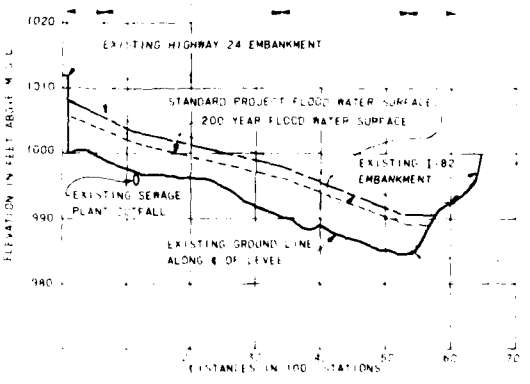
NOTES

1 FOR LEVEE SECTIONS (TYPES) SEE PLATE 6

2 SANDBAG OR TEMPORARY BERM CLOSURE DURING FLOOD

3 SEE APPENDIX I, SECTION E FOR DISCUSSION OF ALTERNATE LEVEE ALIGNMENT(.....)





RIGHT BANK LEVEE (BELOW MOXEE BRIDGE)
PROFILE

E BRIDGE)

REV 28 JULY 78 REIDENBENER | CHK SODERLIND

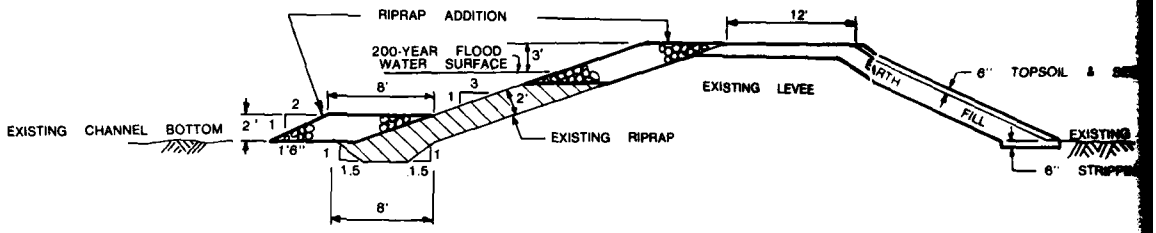
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE WASHINGTON

YAKIMA RIVER LEVEE PROJECT

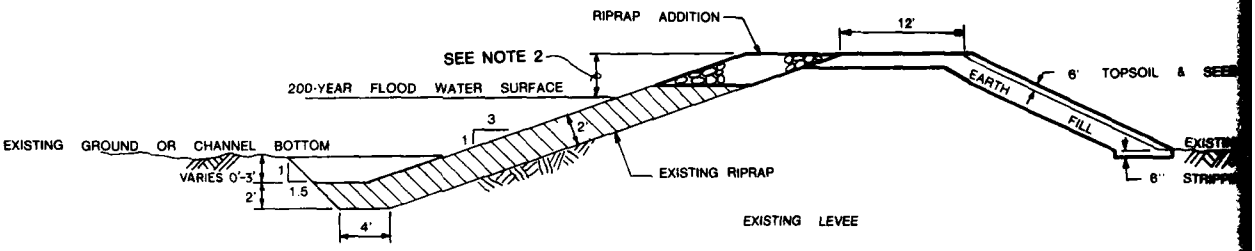
PLAN \ PROFILES
BELOW MOXEE BRIDGE

YAKIMA RIVER — YAKIMA, WASHINGTON

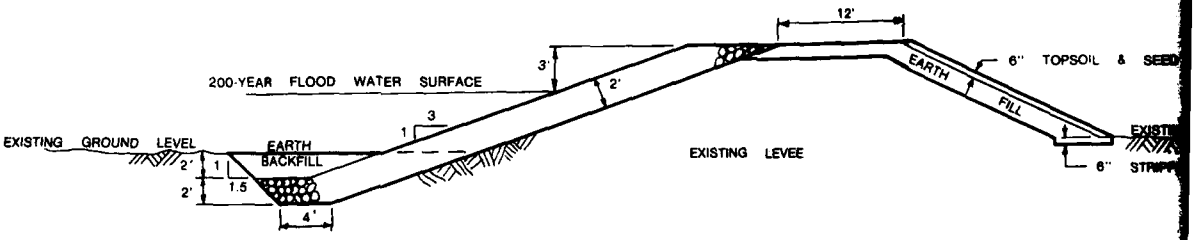
		D-8-4-257	MARCH 77
DRAWN MEREDITH	CHK SESSIONHAUS		



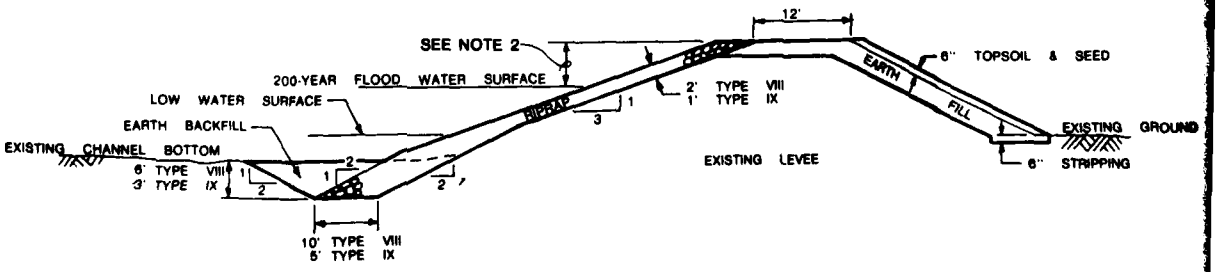
TYPE V



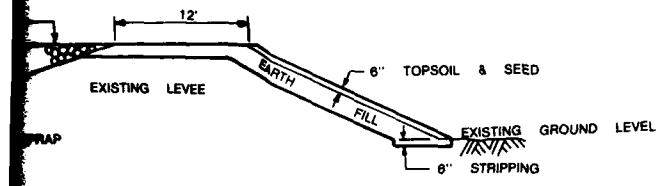
TYPE VI



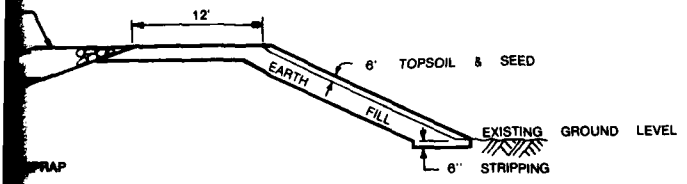
TYPE VII



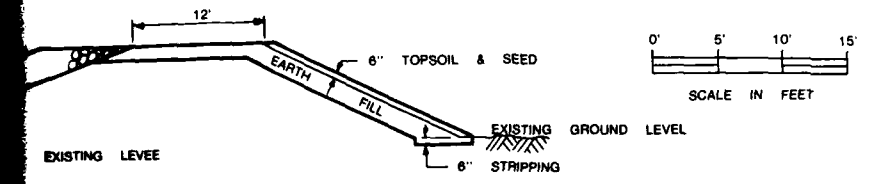
TYPE VIII AND TYPE IX



TYPE V

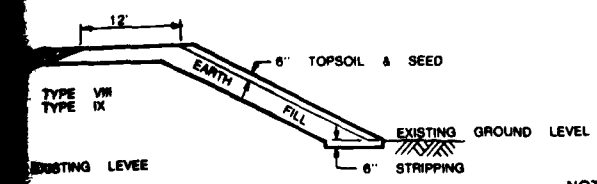


TYPE VI



TYPICAL SECTIONS FOR IMPROVEMENTS TO EXISTING LEVEES

TYPE VII



NOTE:
1. SLOPE OF LEVEE ON LANDWARD SIDE IS 2/1 FOR A LEVEE HEIGHT OF 10' OR LESS AND 3/1 FOR A HEIGHT OVER 10'
2. EXISTING LEVEES ARE TO BE RAISED TO PROVIDE 3' FREEBOARD PLUS ALLOWANCE FOR AGGREDATION AND / OR SWELLHEAD
3. RIPRAPPED AREAS WHERE ROCK NOT EXTENDED INTO FREEBOARD ZONE ARE LISTED IN TABLE E-1

REV. 27 JULY 78 WEIDENBENER	CHK. SODERLIND

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

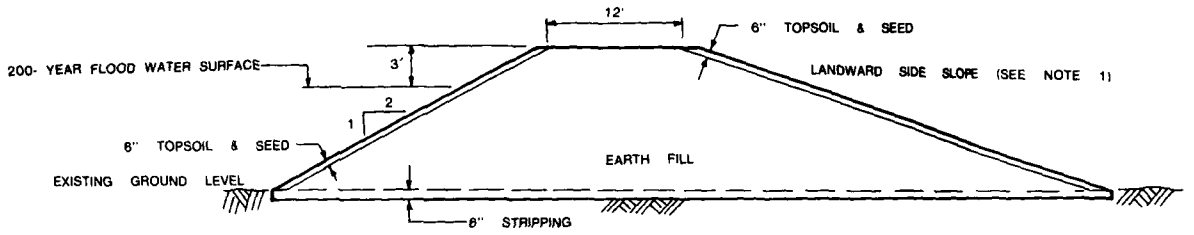
YAKIMA RIVER LEVEE PROJECT

LEVEE SECTIONS
ABOVE MOXEE BRIDGE

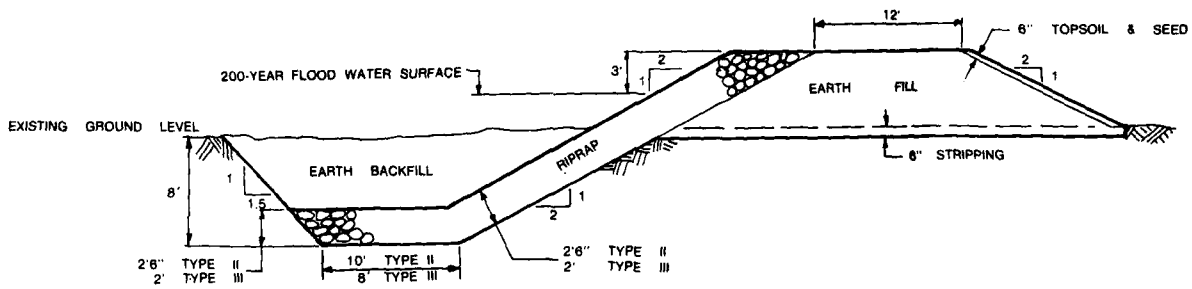
YAKIMA RIVER YAKIMA, WASHINGTON

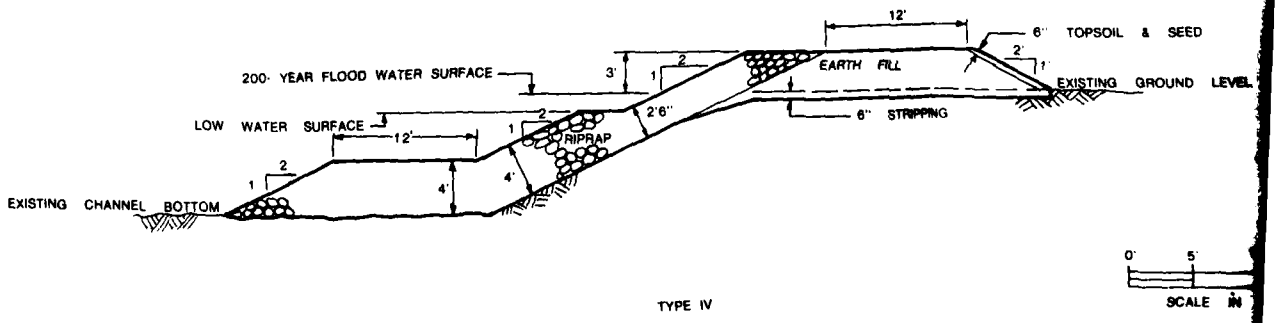
SIZE	INVITATION NO	FILE NO	DATE	PLATE
		D-6-4-257	MAR 77	7

DSGN MEREDITH DR BERRINGHAUS SHEET



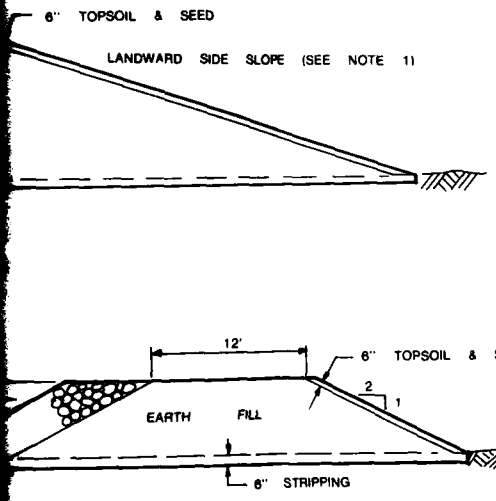
TYPE I

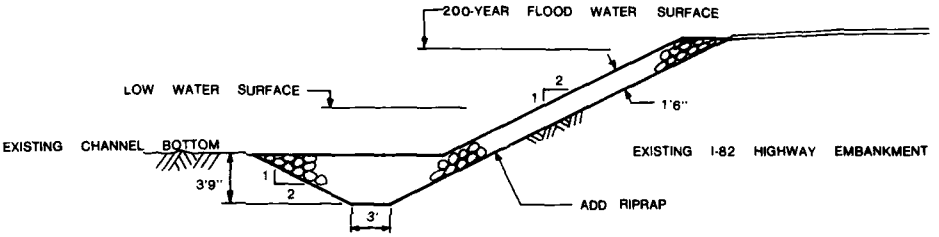




TYPE IV

TYPICAL SECTIONS FOR PROPOSED NEW LEVEES

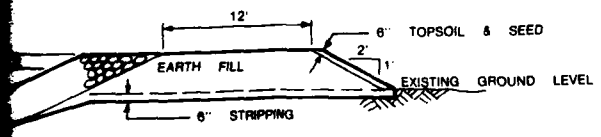


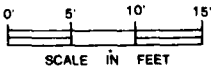


TYPE X

TYPICAL SECTION FOR I-82 HIGHWAY BANK PROTECTION IMPROVEMENT

NOTES:
1. SLOPE OF LEVEE ON LANDWARD SIDE IS 2/1 FOR A LEVEE HEIGHT OF 10' OR LESS AND 3/1 FOR A HEIGHT OVER 10'.
2. NEW LEVEES ARE TO BE CONSTRUCTED WITH 3' OF FREEBOARD
3. RIPRAPPED AREAS WHERE ROCK NOT EXTENDED INTO FREEBOARD ZONE ARE LISTED IN TABLE E-1





E IV

OR PROPOSED NEW LEVEES

REV. 27 JULY 78 WEIDENBENER		CHK. SODERLIND	
U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON			
YAKIMA RIVER LEVEE PROJECT LEVEE SECTIONS BELOW MOXEE BRIDGE			
YAKIMA RIVER		YAKIMA, WASH.	
SIZE	INVITATION NO.	FILE NO. D-8-4-257	DATE MAR 77 / PLATE 8
DSGN MEREDITH		CHK SESSINGHAUS	SHEET


DATE:
TIME