Odessa Subarea Special Study

Final Environmental Impact Statement
Executive Summary

Columbia Basin Project,
Washington

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Columbia-Cascades Area Office
Yakima, Washington

State of Washington
Office of Columbia River
Department of Ecology
Wenatchee, Washington

Ecology Publication No. 12-12-014 August 2012

Mission Statements

The Department of the Interior protects and manages the Nation’s natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The mission of the Department of Ecology is to protect, preserve and enhance Washington’s environment, and promote the wise management of our air, land and water for the benefit of current and future generations.

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Final Environmental Impact Statement Odessa Subarea Special Study
Adams, Lincoln, Franklin, and Grant Counties, Washington

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Cooperating Agency:

Bonneville Power Administration

This Final Environmental Impact Statement (Final EIS) examines the feasibility, acceptability, and environmental consequences of alternatives to replace groundwater currently used for irrigation on approximately 102,600 acres of land in the Odessa Ground Water Management Subarea (Odessa Subarea) with Columbia Basin Project (CBP) surface water. A No Action Alternative, two partial replacement alternatives, two full replacement alternatives, and two modified partial replacement alternative are evaluated.

This Final EIS was prepared in compliance with the National Environmental Policy Act (NEPA) and the State of Washington Environmental Policy Act (SEPA): Chapter 43.21C RCW and the SEPA Rules (Chapter 197-11 WAC). It also provides the public review required under Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) and the National Historic Preservation Act. Results of compliance with the Fish and Wildlife Coordination Act, the Endangered Species Act of 1973, as amended, and the Clean Water Act are included in the evaluations contained in this Final EIS.

SEPA FACT SHEET

Project Title: Odessa Subarea Special Study

Brief Description of Proposal:

The Bureau of Reclamation and Washington State Department of Ecology are studying the potential to replace groundwater currently used for irrigation in the Odessa Subarea Special Study Area (Study Area) with CBP surface water. The alternatives being considered include the No Action Alternative as required by NEPA and SEPA, and six action alternatives that address the Purpose and Need. The six action alternatives fall within three categories:

- **Full Replacement:** This group of delivery alternatives would provide CBP surface water to most groundwater-irrigated acreage in the Study Area (102,600 acres), both north and south of I-90. Lands south of I-90 would be served by enlarging and extending the East Low Canal. Lands north of I-90 would be served by constructing an East High Canal system.
- **Partial Replacement:** This group of delivery alternatives focuses on enlarging and extending the existing East Low Canal and providing CBP surface water to approximately 57,000 acres in the Study Area currently irrigated with groundwater. The acreage served would be south of I-90. No surface water replacement would be provided to most of the remaining groundwater-irrigated acres in the Study Area (north of I-90).
- **Modified Partial Replacement:** This group of delivery alternatives focuses on enlarging the existing East Low Canal and providing CBP surface water to approximately 70,000 acres in the Study Area currently irrigated with groundwater. The acreage served would be both north and south of I-90.

The six alternatives within each of the three replacement alternative categories consist of variations in the water supply options that would be used. **Two supply options are being considered** that would use storage from Banks Lake or Banks Lake and Lake Roosevelt, as follows: **Option A—Banks Lake**, would use storage in and additional drawdowns from Banks Lake, exclusively; **Option B—Banks Lake and Lake Roosevelt (FDR)**, would use storage in Banks Lake and Lake Roosevelt, resulting in drawdowns from both reservoirs.

Location: The Project is located in eastern Washington State and includes portions of Grant, Adams, Lincoln, and Franklin Counties, as well as Lake Roosevelt and Banks Lake. A location map follows this fact sheet.

Proponents and Lead Agencies:

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Bureau of Reclamation
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Schedule: Anticipated that construction would commence in 2014 (earlier if funding becomes available) and continue in a phased manner for about 10 years.

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Permits, Licenses, and Approvals Required for Proposal:

The most common types of permits, licenses, and approvals associated with water resources and habitat that may be required for the proposed Odessa Subarea Special Study alternatives are listed below by the jurisdictional agency:

Federal Permits, Licenses, and Approvals

- Section 404 Permit, Clean Water Act
- Endangered Species Act
- National Historic Preservation Act
- Executive Order 11988: Floodplain Management
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Environmental Justice
- Executive Order 13007: Indian Sacred Sites

State Permits, Licenses, and Approvals

- Water use permits/certificate of water right – Department of Ecology
- Reservoir permits – Department of Ecology
- Construction Stormwater Permit (Section 402) – Department of Ecology
- Section 401 water quality certification – Department of Ecology
- Shoreline conditional use permit, or variance – Department of Ecology
- Hydraulic project approval – Department of Fish and Wildlife

Local Permits, Licenses, and Approvals

- Critical areas permit or approval – Appropriate local jurisdictional agency
- Floodplain development permit – Appropriate local jurisdictional agency
- Shoreline substantial development permit, conditional use permit, or variance – Appropriate local jurisdictional agency
- Building permit – Appropriate local jurisdictional agency
- Clearing and grading permit – Appropriate local jurisdictional agency

Authors and Contributors:

A list of authors and contributors is provided following Chapter 5.

Date of Issue:

August 31, 2012

Document Availability:

The FEIS for the Odessa Subarea Special Study can be viewed online at: http://www.usbr.gov/pn/programs/ucao misc/odessa/index.html. The document may be obtained in hard copy or CD by written request to the SEPA Responsible Official listed above, or by calling 509-454-4239. To ask about the availability of this document in a format for the visually impaired, call the Office of Columbia River at 509-454-4241. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Location of Background Materials:

Background materials used in the preparation of this Final EIS are available online at the following links.

Columbia River Basin Water Management Program – Odessa Subarea Special Study
http://www.ecy.wa.gov/programs/wr/cwp/crwmp.html

Odessa Subarea Special Study, Columbia-Cascades Area Office
http://www.usbr.gov/pn/programs/ucao_misc/odessa/index.html

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ODESSA SUBAREA SPECIAL STUDY
FINAL ENVIRONMENTAL IMPACT STATEMENT

EXECUTIVE SUMMARY

Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and Washington Department of Ecology (Ecology) have jointly prepared this Final Environmental Impact Statement (Final EIS) for the Odessa Subarea Special Study (Study). The purpose of the Study is to evaluate alternatives that would deliver surface water from the Columbia Basin Project (CBP) to irrigated lands that currently rely on a declining groundwater supply in the Odessa Ground Water Management Subarea (Odessa Subarea). The CBP is a multipurpose water development project in the central part of the State of Washington (State), east of the Cascade Range. The Odessa Subarea Special Study Area (Study Area) is shown on Figure 1, as a smaller portion of the overall Odessa Subarea. The relationship of these three areas is also shown in Figure 1. The area of the Study is within the boundaries of the CBP, and includes portions of Lincoln, Adams, Grant, and Franklin counties (Figure 2).

The Study fulfills an agreement by Reclamation, the State, and the three CBP irrigation districts—the East Columbia, South Columbia, and Quincy Columbia Basin Irrigation Districts—to cooperatively conduct the Study as stated in the Columbia River Initiative Memorandum of Understanding (MOU) in December 2004 (Appendix A).

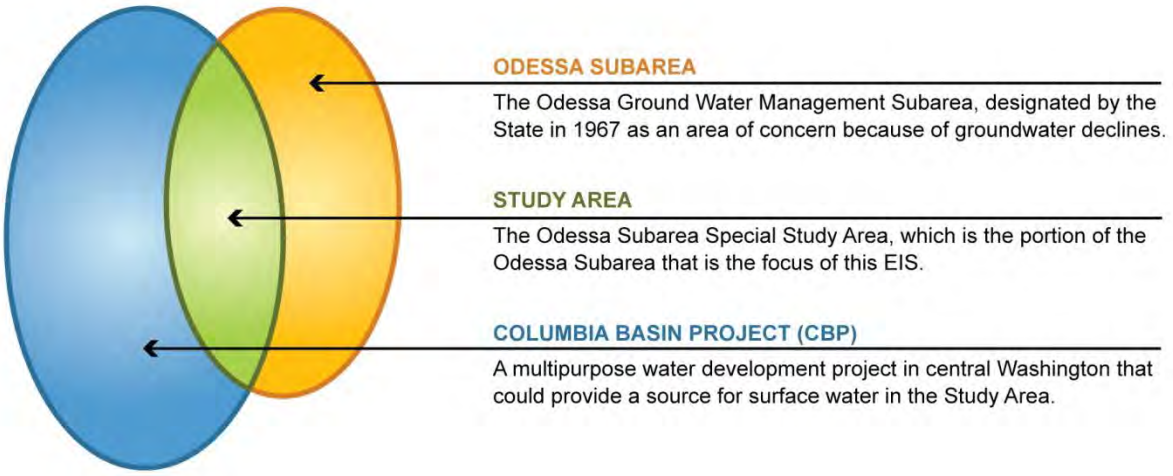

Figure 1. Illustration showing the common terms used in this EIS and the relationships of the three areas.

Drilling groundwater wells to provide irrigation within the Odessa Subarea (including the Study Area) began in the early 1960s, but drilling new wells essentially ended in the late 1980s. Groundwater levels in wells of the Odessa Subarea have declined steadily since pumping began in the 1960s. In 1967, the Washington State Legislature designated the Odessa Subarea as a groundwater management area because of groundwater level declines resulting from pumping (Washington Administrative Code [WAC] 173-128A, Odessa Ground Water Management Subarea).

Since the early 1980s, groundwater levels have progressively dropped by 100 to 200 feet in nearly half of the production wells as shown on Figure 3. For the Final EIS, a review of the groundwater analysis was conducted and information from a USGS 2010 report was used to verify information that was used for the Draft EIS for pumping depths and rate of decline between 1984 and 2009 (Reclamation 2012 Groundwater). As a result of the current conditions of groundwater decline in the Odessa Subarea including the Study Area, as shown on Figure 1, the ability of farmers to irrigate their crops is at risk. Domestic, commercial, municipal, and industrial uses and water quality are also affected. The Study is a cooperative process undertaken by Reclamation, Ecology, and CBP irrigation districts to respond to these risks.

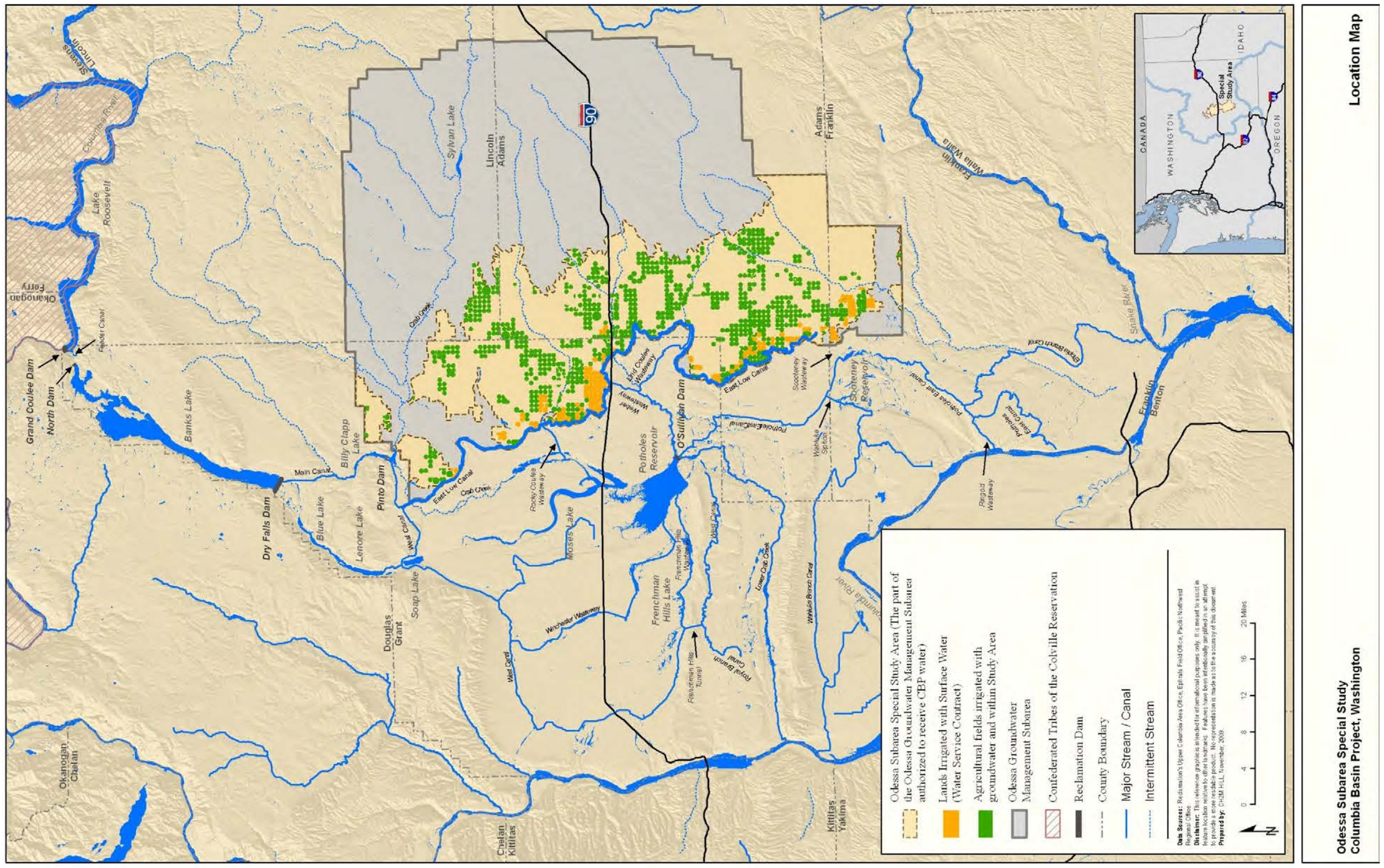

Figure 2. Location map.

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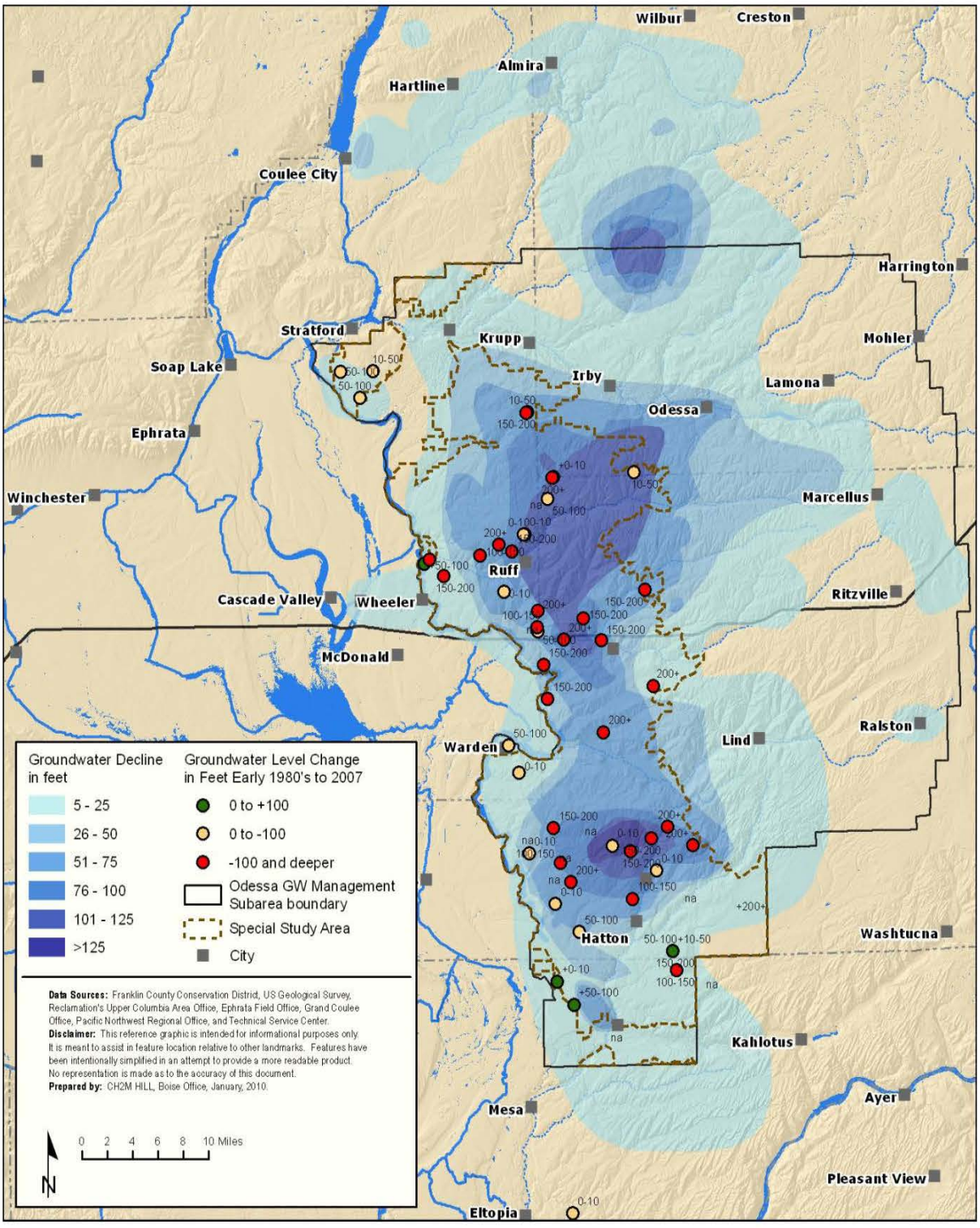

Figure 3. Groundwater level decline in aquifers of the Odessa Subarea, 1981 to 2007.

Photograph 1. Crops currently irrigation by groundwater in the Study Area. This is representative of land that would be eligible for replacement with surface water.

The Proposed Action

Reclamation and Ecology are proposing to replace groundwater currently used for irrigation in the Study Area with surface water by constructing or modifying distribution systems and appurtenant structures (Photograph 1). There are approximately 102,600 acres of currently groundwater-irrigated lands within the Study Area that are eligible to receive CBP water as part of the continued phased development of the CBP. The surface water would be provided by further developing existing CBP water rights which are held by the U.S. for diversion and storage of water from the Columbia River system.

This Final EIS evaluates six action alternatives for delivering CBP water to partially or fully replace groundwater used to irrigate eligible acres in the Study Area. The partial replacement alternatives (described later as 2A and 2B) would deliver approximately 138,000 acre-feet of water annually to irrigate 57,000 acres. The partial replacement alternatives focus on surface water replacement for acreage located primarily south of Interstate Highway 90 (I-90) that can be served by expanding and extending the existing East Low Canal (Figure 1-1).

The full replacement alternatives (described later as 3A and 3B) would deliver approximately 273,000 acre-feet of water to serve all or most of the approximately 102,600 eligible acres in the Study Area. Full replacement would include surface water replacement to both the acreage located south of I-90 and the remaining lands in the Study Area north of I-90. Water

provided to acreage south of I-90 would be conveyed via an expanded and extended East Low Canal while lands north of I-90 would be served by constructing a new East High Canal system.

The modified partial replacement alternatives (described later as 4A and 4B) have been developed in response to a number of concerns raised in comments regarding the Draft EIS. The modified partial replacement alternatives would divert approximately 164,000 acre-feet of water and provide surface water replacement for approximately 70,000 acres of currently groundwater-irrigated lands both north and south of I-90.

If an action alternative is selected during the Record of Decision process, there would likely be a variety of Federal and State actions occurring in order to implement the alternative. Construction of new and modification of existing structures, such as pumping plants, conveyance facilities, and appurtenances, would be required, as well as possible construction of a new reregulation reservoir. Land acquisition, permitting, and other activities would also need to be conducted. The duration of construction for a partial, full, or modified partial alternative is estimated to span a period of about 10 years and could begin as early as 2014. Construction would be conducted in phases for all action alternatives to allow the delivery system to be brought online as early and efficiently as possible. For more detail, Chapter 2 – Alternatives provides a description of these alternatives and associated actions that would be taken if an action alternative is selected for implementation.

Overview of the Final EIS

This Final EIS closely follows the format recommended by the Council of Environmental Quality and is a companion volume to the Final Odessa Subarea Special Study Report (Special Study Report) (Reclamation 2012 Study) that Reclamation completed.[1] The Final EIS is organized into two volumes.

Volume 1:

- Chapter 1 identifies the Proposed Action, the purpose and the need for action; provides background information; and summarizes public involvement activities, and applicable laws and regulations.

[1] The report is available on the web at http://www.usbr.gov/pn/programs/ucao_misc/odessa/index.html. The Special Study Report fulfills the requirements of the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&Gs). The Special Study Report presents the alternatives and the results of the P&G-specific analyses (the National Economic Development, the Regional Economic Development, the Other Social Effects, and the Environmental Quality accounts).

- Chapter 2 presents a No Action Alternative and six action alternatives and summarizes the process of formulating the proposed action alternatives. A table presenting a summary comparison of the alternatives is also included.

- Chapter 3 presents the affected environment and relevant resource components that make up the baseline environment.

- Chapter 4 describes the environmental impacts of the alternatives considered in detail in addition to identifying mitigation measures, cumulative impacts, and Reclamation's environmental commitments.

- Chapter 5 summarizes consultation and coordination activities, including public involvement efforts relevant to the Final EIS, and applicable laws and regulations.

- In addition, the following have been included:
    - Acronyms
    - Bibliography
    - List of Preparers
    - Glossary
    - Index
    - Contact and Distribution List
    - Appendices A – F

Volume 2:

- Public comments on the Draft EIS and Reclamation's responses.

Purpose and Need for Action

The purpose of the Proposed Action is to maintain economic viability by providing surface water from the CBP to replace groundwater from declining wells currently used for irrigation in the Odessa Subarea. This purpose is consistent with the intent of the Columbia Basin Project Act by encouraging "settlement and development of the project, and for other purposes." The CBP is currently authorized for construction and development. Surface water would be provided as part of the continued phased development of the CBP and would come from existing CBP diversion and storage rights for water from the Columbia River.

Need

The Proposed Action is needed to address declining groundwater supply in the Study Area and avoid economic loss to the region's agricultural sector.

Authorization and History

The Study is being conducted under the authority of the Reclamation Act of 1939 and the Columbia Basin Project Act of 1943, as amended. Section 9(a) of the Reclamation Project Act of 1939 gave authority to the Secretary of the Interior (Secretary) to approve a finding of feasibility and thereby authorize construction of a project upon submitting a report to the President and the Congress. The Secretary approved a plan of development for the CBP, known as House Document No. 172 in 1945. House Document No. 172 anticipated that development of the CBP would occur in phases over a 70-year period.

The Proposed Action would be implemented pursuant to these authorities. This Act, authorized by Congress, led to the implementation of the CBP to irrigate a total of 1,029,000 acres, of which about 671,000 acres are currently irrigated. The Acts gave authority to the Secretary of the Interior (Secretary) to assess feasibility, approve plans, and implement construction of the CBP. Construction of the CBP was anticipated to occur in phases over a 70-year period.

The State issued irrigation groundwater permits in the 1960s and 1970s in the Odessa Subarea as a temporary measure to provide water to these lands until the CBP was further developed. Acting for the Secretary, Reclamation is authorized to implement additional development phases of the CBP as long as the Secretary finds each phase to be economically justified and financially feasible. In response to the public's concern about the declining groundwater supply in areas of the CBP and associated economic and other environmental effects, Congress funded Reclamation to investigate the problem. The State partnered with Reclamation by providing funding and collaborating on various technical studies.

With increasing concern over the groundwater supply, the State, Reclamation, and CBP irrigation districts entered into the Columbia River Initiative MOU in December 2004 to engage in a cooperative process for implementing water management improvements within the CBP (Appendix A). The State provided a cost-share through an Intergovernmental Agreement between Ecology and Reclamation in December 2005 to fund this Study.

Subsequent to the signing of the 2004 Columbia River Initiative MOU, the State Legislature passed the Columbia River Basin Water Resource Management Act in February 2006 (RCW 90.90). The Act directs Ecology to aggressively pursue development of water benefiting both instream and out-of-stream uses. Among the activities identified in the legislation,

Ecology is directed to focus on "development of alternatives to groundwater for agricultural users in the Odessa subarea aquifer."

Changes to Draft EIS

The changes identified here are not a comprehensive listing of all changes in the Final EIS and include only the more substantive additions or revisions. Many other changes and corrections have been made throughout the Final EIS to update discussions of existing and anticipated future conditions, as well as to improve descriptions of the effects of the alternatives.

Tiered Review Process

Reclamation and Ecology have clarified that this Final EIS is the initial environmental analysis within a tiered review process under NEPA and SEPA. "Tiering" refers to the process of addressing a broad, general program, policy, or proposal in an initial analyses followed by analyses of a more precisely defined site-specific proposal related to the initial program, policy, or proposal when that proposal is ready to be carried forward (see 40 CFR §§ 1502.20 and 1508.28). Tiering may also be used when an EIS is prepared on a specific action, such as the Proposed Action here, but at an early stage to consider broad issues such as general location, scope, and site selection (40 CFR § 1508.28[b]). In such cases, subsequent NEPA at a later stage in the action may be necessary. The use of tiering is encouraged in large and complex projects such as this, and allows the agencies to focus on the issues ripe for decision.

Reclamation and Ecology expect that some projects or actions advanced out of this first tier EIS may be subject to subsequent second tier, project-level environmental analysis under NEPA and SEPA before being approved for implementation. Any subsequent NEPA project-level analysis could include a combination of EIS(s), supplemental EIS(s), environmental assessments(s), and/or categorical exclusion(s) along with corresponding SEPA reviews, as appropriate, depending on the proposed action, phasing of implementation, and potential for adverse impacts. Actions described in this Final EIS that are analyzed in full will not undergo a second tier NEPA/SEPA review. Decisions relative to the general scope of the action alternative which include acreage, water supply, and general site locations would also not be subject to additional review.

An example of how the tiering process may work, the East Low Canal widening is an example of a project feature that is analyzed under this Final EIS. Locations of pumping plants are an example of projects that may require subsequent NEPA project-level reviews due to the uncertainty associated with the location of the pumping plants at this time.

Modified Partial Replacement Alternatives Developed and Analyzed

In response to public comments and in consultation with the ECBID, Reclamation and Ecology developed the modified partial groundwater irrigation replacement alternatives for the Final EIS in response to a number of concerns regarding the partial and full groundwater replacement alternatives presented in the Odessa Subarea Special Study Draft EIS. The modified partial replacement alternatives are similar to the Alternative C option described in the Appraisal-Level Investigation Summary of Findings (Appraisal Study). Alternative C was considered but eliminated in the Draft EIS because it precluded deliveries to some lands within the SCBID and was not an economically viable option as configured. The Modified Partial Replacement Alternatives 4A and 4B incorporate modifications to Alternative C, which makes them "reasonable" alternatives for the Proposed Action in this Final EIS.

Further review of the PASS Analysis and Appraisal Study indicated that the modified replacement alternatives would not preclude full development. Alternatives 4A and 4B would in fact provide service to some of the SCBID lands. Reclamation and Ecology developed Alternatives 4A and 4B for the Final EIS to address expressed concerns. These alternatives were configured in such a way as to economically serve lands both north and south of I-90 while increasing the number of acres that would no longer pump from the Odessa aquifer (Reclamation 2012 Economics).

The modified partial replacement alternatives (Alternative 4A: Modified Partial – Banks and Alternative 4B: Modified Partial – Banks + FDR) would serve lands north and south of I-90 from the East Low Canal. Alternative 4A has been identified by Reclamation and Ecology as the preferred alternative.

The modified partial replacement alternatives have been fully analyzed in this Final EIS and are within the range of the partial and full groundwater replacement alternatives evaluated in the Draft EIS. The amount of water proposed for diversion is within the range of diversions previously evaluated for action alternatives in the Draft EIS. Similarly the number of acres to be served is within the range covered by the action alternatives in the Draft EIS. The lands proposed to be served south of I-90 were included within partial replacement alternatives in the Draft EIS. The lands proposed to be served north of I-90 are a portion of the lands that would be served by the new East High Canal system under the full replacement alternatives, but instead would be served from the East Low Canal in the modified partial replacement alternatives. The modified partial replacement alternatives involve facilities, diversions, operations, and lands that were either evaluated in the Draft EIS or are within the range of alternatives considered in that document; therefore, the potential impacts associated with the modified partial replacement alternatives are of an equal or lesser magnitude as the effects presented in the Draft EIS and no additional impacts are anticipated.

Other Changes

- As described in Chapter 2, Section 2.8.3.5, the proposed Rocky Coulee Reservoir and action alternatives utilizing this water supply source was eliminated from further consideration.

- In the Draft EIS, the annual diversion requirement from the Columbia River was incorrectly reported as the on-farm delivery amount. On the CBP, because of recapture and reuse on-farm, deliveries are more than river diversions. This error has been corrected in this Final EIS.

- The hydrologic modeling was updated to reflect the changes in diversions discussed above and the updated HYDSIM model (Chapter 4, Section 4.2). Also, the additional diversions available from the Columbia River were modified in fall and winter and eliminated in September.

- Based on informal ESA consultation with NMFS, an additional diversion scenario was analyzed.

- BMPs and environmental impact mitigations are more clearly identified in the Final EIS (Chapter 4, Section 4.31).

- A cumulative impact section has been added in response to comments that requested a unified section for cumulative impact analysis and discussion (Chapter 4, Section 4.27).

- Further refinements to project design resulted in reduced rights-of-way and easements for various proposed facilities for all action alternatives as shown in Table 1.

Table 1. Revised right-of-way and easement acquisition assumptions since the Draft EIS.

Facility Component	Draft EIS Assumption	Final EIS Assumption
Canal-side pumping plants and re-lift stations	7.0 acres	3.0 acres
Distribution pipelines greater than 24 inches in diameter	400 feet	200 feet
Distribution pipelines less than 24 inches in diameter	200 feet	100 feet
East High Canal	600 feet	200 feet

Alternatives

Reclamation and Ecology considered a No Action Alternative, as required by NEPA and SEPA implementing regulations, and a reasonable range of action alternatives to meet the purpose and need. The No Action Alternative and six action alternatives analyzed in this Final EIS are described in Chapter 2 - Alternatives.

The six action alternatives fall into three groups: two partial replacement alternatives, which would replace groundwater supplies south of I-90; two full replacement alternatives, which would replace groundwater supplies throughout the Study Area, both north and south of I-90; and two modified partial replacement alternatives, which would replace groundwater supplies in the western portion of the Study Area both north and south of I-90 (Figure 4). Three of the alternatives evaluate combinations of water supply sources from Banks Lake and Lake Roosevelt (FDR):

1. No Action Alternative
2. Partial replacement alternatives:

    2A: Partial-Banks

    2B: Partial-Banks + FDR
3. Full replacement alternatives:

    3A: Full-Banks

    3B: Full-Banks + FDR
4. Modified Partial replacement alternatives:

    4A: Modified Partial-Banks

    4B: Modified Partial - Banks + FDR

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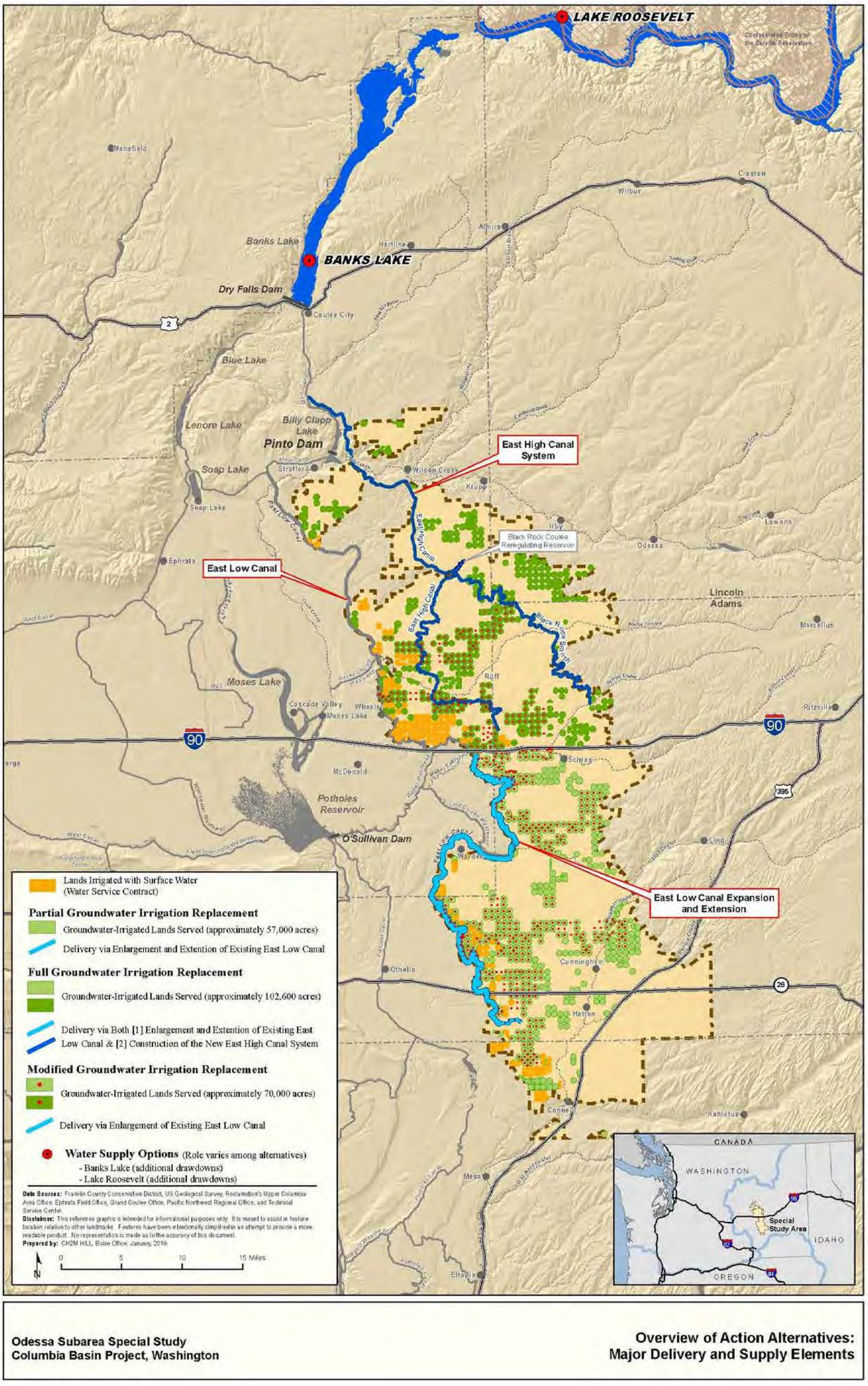
Figure 4. Overview of Action Alternatives: Major Delivery and Supply Elements.



Odessa Subarea Special Study
Columbia Basin Project, Washington

Overview of Action Alternatives:
Major Delivery and Supply Elements

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The six action alternatives within the two delivery categories vary in the water supply options that would be used. Table 2 presents an overview of the water supply and delivery options of the action alternatives.

Table 2. Alternatives overview (see Figure 4).

Alternative – Water Supply	Delivery Options
1 – No Action	
No Action	• Current and ongoing Columbia River and CBP programs, commitments, and operations continue • No CBP surface water provided to any additional groundwater-irrigated lands in the Odessa Subarea • No additional drawdowns at either reservoir • No facility construction required
2 – Partial Groundwater Irrigation Replacement	
2A – Banks Lake **2B – Banks + FDR**	• Current and ongoing Columbia River and CBP programs, commitments, and operations continue • Additional drawdown of Banks Lake (2A and 2B) and FDR (2B) • Approximately 57,000 acres of eligible groundwater-irrigated lands south of I-90 supplied with CBP surface water • Water delivered by enlargement and extension of the existing East Low Canal and construction of a distribution system
3 – Full Groundwater Irrigation Replacement	
3A – Banks Lake **3B – Banks + FDR**	• Current and ongoing Columbia River and CBP programs, commitments, and operations continue • Additional drawdown of Banks Lake (3A and 3B) and FDR (3B) • Approximately 102,600 acres of eligible groundwater-irrigated lands supplied with CBP surface water • Water delivered south of I-90 by enlargement and extension of the existing East Low Canal and construction of a distribution system • Water delivered north of I-90 by construction of a new East High Canal system, with an associated distribution system

Alternative – Water Supply	Delivery Options
4 – Modified Partial Irrigation Replacement	
4A – Banks Lake (Preferred Alternative) **4B – Banks + FDR**	• Current and ongoing Columbia River and CBP programs, commitments, and operations continue. • Additional drawdown of Banks Lake (4A and 4B) and FDR (4B) • Approximately 70,000 acres of eligible groundwater-irrigated lands provided with CBP surface water • Lands supplied with surface water replacement would be both north and south of I-90 • Water delivered by enlargement of the existing East Low Canal and construction of a distribution system

How Would the Columbia River System be Changed by the Alternatives?

None of the six action alternatives in the Final EIS would result in a significant change in Columbia River flows. Water management programs and constraints are in place (i.e., the FCRPS BiOp) for the Columbia River to protect the resource values associated with the mainstem of the Columbia River, including ESA-listed fish species in the river. These would continue to be met as a first priority in all hydrologic conditions.

Providing CBP surface water to lands in the Study Area would require changing reservoir operations during and immediately after the irrigation season at Banks Lake for all action alternatives and at Lake Roosevelt for Alternatives 2B, 3B, and 4B. At both reservoirs, these changes would mean increased drawdowns and therefore, lower pool levels when compared with the No Action Alternative. In all cases, the pool levels would reach their minimum elevations at the end of August.

Supply Options for Action Alternatives

All surface water supplies for the action alternatives would be through diversion from the Columbia River using Reclamation's existing water rights for the CBP and existing storage in Lake Roosevelt and Banks Lake (Figure 4):

- Alternatives 2A, 3A, and 4A would use existing storage in Banks Lake, exclusively.
- Alternative 2B, 3B, and 4B would use existing storage in both Banks Lake and Lake Roosevelt.[2]

The surface water supplies would allow stored water to be used from the reservoirs during the irrigation season. The reservoirs would be refilled during the fall and winter. Spring diversions, when possible (April through June), would be used for direct delivery to the Study Area and refill storage at Banks Lake.

Quantity and Timing of Diversions

Two potential scenarios for diverting water from the Columbia River into the Study Area via Banks Lake are evaluated in this Final EIS for each action alternative:

Spring Diversion Scenario: This scenario is similar to that assumed in the Draft EIS except that the diversion in October through March could take place every year even when the water management objectives are not met in the Columbia River. The maximum amount of diversion in October was increased to 2,700 cfs and additional diversions up to 350 cfs could occur during November through March to refill Banks Lake and Lake Roosevelt. Diversion in April through June would be allowed from the Columbia River when flows exceed 135,000 cfs at Priest Rapids Dam, 260,000 cfs at McNary Dam, and there is adequate pump capacity to pump water from Lake Roosevelt to Banks Lake. This spring limitation is consistent with the previous analysis performed for the Draft EIS.

Limited Spring Diversion Scenario: During informal ESA consultation (June 2012), it was suggested that Reclamation limit diversions in the spring (April through June) for direct delivery to the Study Area to periods when the Columbia River flow immediately downstream of Grand Coulee Dam exceeds 200,000 cfs and there is adequate pump capacity to pump water from Lake Roosevelt to Banks Lake. Diversions in October of up to 2,700 cfs would be allowed and additional diversions up to 350 cfs could occur November through March to refill Banks Lake and Lake Roosevelt. This is within the range of drawdown scenarios for Bank Lake and Lake Roosevelt presented in the Draft EIS.

[2] The State of Washington has committed through agreements with the Confederated Tribes of the Colville Reservation and the Spokane Tribes of Indians to not seek further drawdown of Lake Roosevelt. Therefore, the State does not support Alternatives 2B, 3B, or 4B.

The flows for the Spring and Limited Spring diversion scenarios are summarized in Table 3.

Table 3. Diversion scenario summary.

Diversion Scenario	Spring (April through June)	October	November through March
Spring	Diversions from Columbia River allowed when outflows exceed 135,000 cfs at Priest Rapids Dam, 260,000 cfs at McNary Dam and there is adequate pump capacity at Lake Roosevelt	Diversions up to 2,700 cfs	Up to 350 cfs each month
Limited Spring	Diversions from Columbia River allowed when outflows from Grand Coulee Dam exceed 200,000* cfs and there is adequate pump capacity at Lake Roosevelt	Diversions up to 2,700 cfs	Up to 350 cfs each month
* This flow was not modeled for the Final EIS; however, this occurs in less than 10 percent of the years.			

No Action Alternative (Alternative 1)

In this EIS, no action means that the proposed Federal action would not take place and the resulting conditions from taking no action are compared with the action alternatives. Under the No Action Alternative, Reclamation and Ecology would not replace existing groundwater supplies with CBP surface water. Currently, farmers use groundwater to irrigate about 102,600 farmland acres in the Study Area, as shown in Figure 2.

The No Action Alterative represents the foreseeable future if an action alternative is not implemented and groundwater levels continue to decline in the Study Area aquifers. Under the No Action Alternative, irrigated agriculture in the Study Area that currently relies on groundwater would continue using that source of water. With continued dependence on groundwater, aquifers would further decline in quantity and quality. As groundwater declines, well yield and irrigation capability would progressively diminish in the Study Area, resulting in a reduction of groundwater-irrigated acreage and crop yield.

Consequences of the No Action Alternative

The consequences of the No Action Alternative to various environmental and socioeconomic resources are discussed further in Chapter 4 - Environmental Consequences.

t The consequences of the No Action Alternative over the next 10 years[3] (approximately 2020) (see Chapter 4.3.2.2 *Groundwater Resources*) would include:

- Only 15 percent of the production wells in the Study Area would continue to support irrigation for valuable high-water crops, such as potatoes.
- About 55 percent of the production wells in the Study Area would cease groundwater output and use of these wells would be permanently discontinued.
- The remaining 30 percent of the production wells in the Study Area would no longer support high water use crops, even on reduced acreage.

Under the No Action Alternative, the following would occur related to other water management programs:

- Operations at Lake Roosevelt and Banks Lake would continue as they do currently, providing water supply to meet authorized CBP purposes, including water delivery for irrigation, fish management, municipal and industrial uses, and recreation.
- Actions by the Columbia River Management Program to pursue the development of water supply alternatives to groundwater for agricultural users in the Odessa Subarea would not proceed further under the No Action Alternative since this Study is the direct response to this specific provision of Chapter 90.90 RCW - Columbia River Water Management Act.
- The No Action Alternative would not address existing East Low Canal system constraints that affect ECBID's ability to meet delivery commitments to existing water service contract holders in the Study Area (as described in Section 2.2.3).
- The Coordinated Conservation Program (as described in Section 2.2.3) would continue to implement conservation efforts to create water savings in the Study Area to reduce the use of groundwater for existing irrigation.
- The Lake Roosevelt Incremental Storage Releases Program (as described in Section 2.2.3) would continue to implement additional incremental storage releases from Lake Roosevelt to supplement water supplies for instream flows, existing agricultural lands in the Study Area, and municipal and industrial needs.

[3] Based on information provided by GWMA, as well as others, Reclamation interpreted the rate at which wells would go out of production to be approximately 26 years (Reclamation 2012 Groundwater).

Partial Replacement Action Alternatives (Alternatives 2A and 2B)

The partial replacement alternatives, Alternatives 2A and 2B, would provide CBP surface water supplies to approximately 57,000 acres of lands in the Study Area south of I-90 (Figure 9). The total volume of water diverted from the Columbia River with partial groundwater replacement is estimated at 138,000 acre-feet. A small portion of currently groundwater-irrigated lands north of I-90 nearest the East Low Canal may also be included in the partial replacement alternatives. As the surface water supply system is brought online and this water becomes available to eligible lands, the intent would be to cease operation of associated irrigation wells. Under current State regulations, the irrigation wells would not be decommissioned or abandoned. Instead, superseding state water rights would be issued and the wells would be placed in standby status, remaining operational for use in an emergency (such as an interruption of the Federal surface water delivery system). Any different scenario or mandatory decommissioning would require that the statute to be modified. Alternatives 2A and 2B would involve the same water delivery system facilities and the same quantity of water. The delivery system would involve enlarging and extending the East Low Canal and constructing a distribution system. The alternatives vary only in the option used to store and supply CBP water.

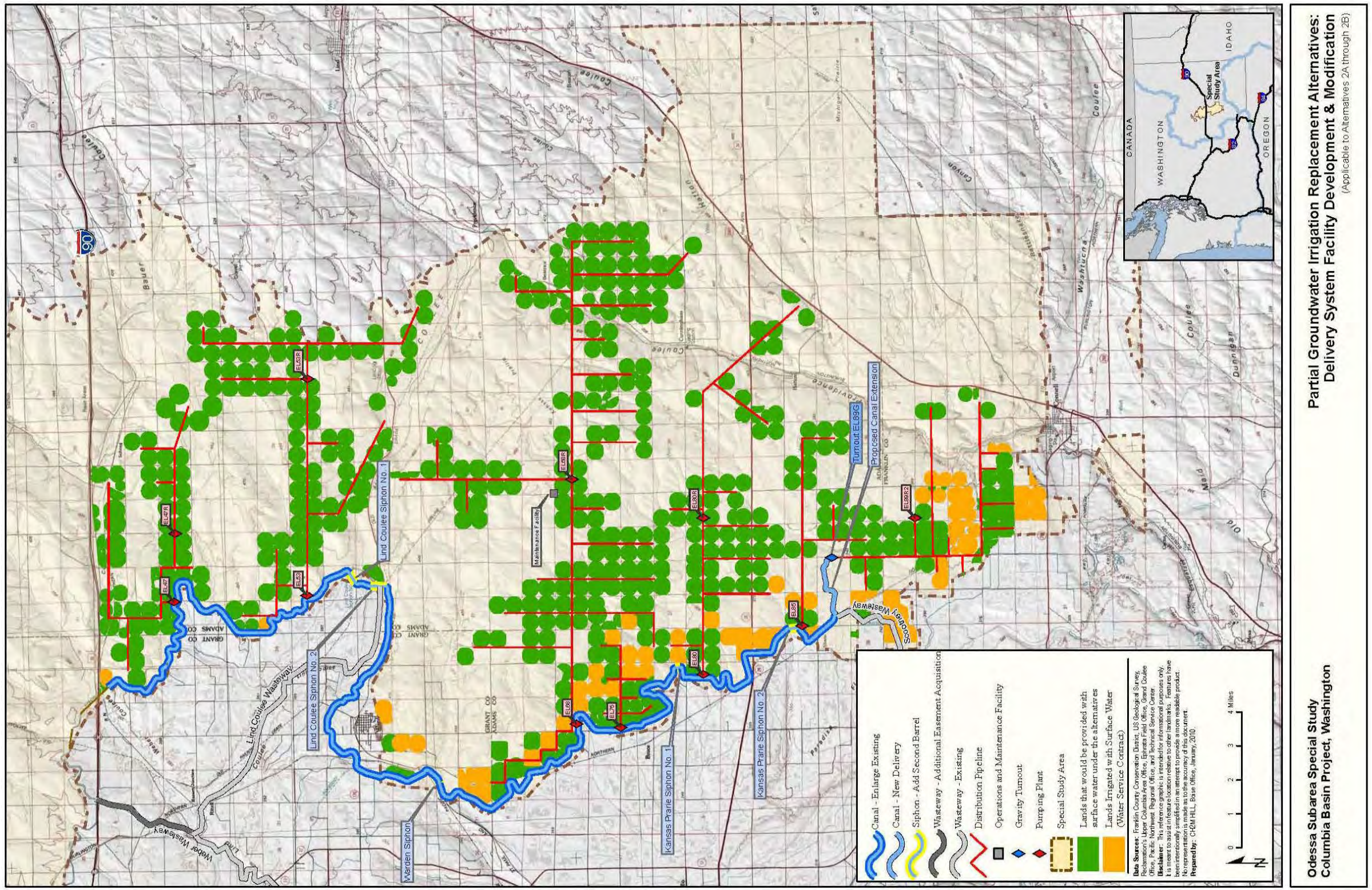

Figure 5. Partial groundwater irrigation replacement alternatives: delivery system facility development and modification.

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Partial Replacement Delivery System Facility Requirements

The water delivery system necessary for Alternative 2A: Partial-Banks and 2B: Partial - Banks + FDR is shown on Figure 9. Facility development would include the following:

- Enlarging the capacity of the 43.3 miles of the East Low Canal south of I-90, including adding a second barrel to all five existing siphons.
- Extending the East Low Canal about 2.1 miles at its southern end.
- Constructing a pipeline distribution system fed by pumping plants along the canal and a gravity-feed turnout at mile 89. This system would require numerous meter and equipment stations along the pipeline routes, primarily at farm delivery points.

Partial Replacement River and Reservoir Operational Changes

Table 4 provides a summary the additional drawdowns that would occur in average years at Banks Lake and Lake Roosevelt with the two partial replacement alternatives in context with the No Action Alternative. In all cases, the additional drawdowns at both of these reservoirs as a result of the alternatives would reach their maximums at the end of August each year. The reservoirs would be refilled outside the juvenile migration season in the fall and winter as flows are available.

Table 4. Partial Replacement Alternatives 2A and 2B – reservoir drawdown changes in a representative average year (1995).

Alternative	End-of-August Drawdowns*	
	Total	Beyond No Action
Banks Lake with Spring diversion scenario		
2A: Partial Replacement —Banks	7.3	2.3
2B: Partial Replacement —Banks + FDR	7.3	2.3
Lake Roosevelt with Spring diversion scenario		
2B: Partial Replacement —Banks + FDR	11.0	0.0
Banks Lake with limited Spring diversion scenario		
2A: Partial Replacement —Banks	9.6	4.6
2B: Partial Replacement —Banks + FDR	8.0	3.0

Alternative	End-of-August Drawdowns*	
	Total	Beyond No Action
Lake Roosevelt with limited Spring diversion scenario		
2B: Partial Replacement —Banks + FDR	11.5	0.5
*Feet in average years		

Full Replacement Action Alternatives (Alternatives 3A and 3B)

Full replacement alternatives would provide CBP surface water supply to replace existing groundwater supply for most lands in the Study Area now irrigated with groundwater (approximately 102,600 acres) both north and south of I-90. The total volume of water diverted from the Columbia River is approximately 273,000 acre-feet. As the surface water supply system is brought online and this water becomes available to eligible lands, operation of associated irrigation wells would cease. Under current State regulations, the irrigation wells would not be decommissioned or abandoned, but instead, superseding state water rights would be issued and the wells would be placed in standby status, remaining operational for use in an emergency (such as an interruption of the Federal surface water delivery system). Any different scenario or mandatory decommissioning would require that the statute to be modified.

Each of the two full replacement alternatives would involve the same water delivery system facilities and the same quantity of water. Delivery would require all facilities described for the partial replacement alternatives, plus development of the East High Canal System north of I-90 and construction of a distribution system (Figure 10). Each of the full replacement alternatives vary only in the option used to store and supply CBP water.

The two full replacement alternatives include the following:

- Alternative 3A: Full-Banks consisting of full replacement using the Banks Lake supply.
- Alternative 3B: Full-Banks + FDR consisting of full replacement using the Banks Lake and Lake Roosevelt supply.

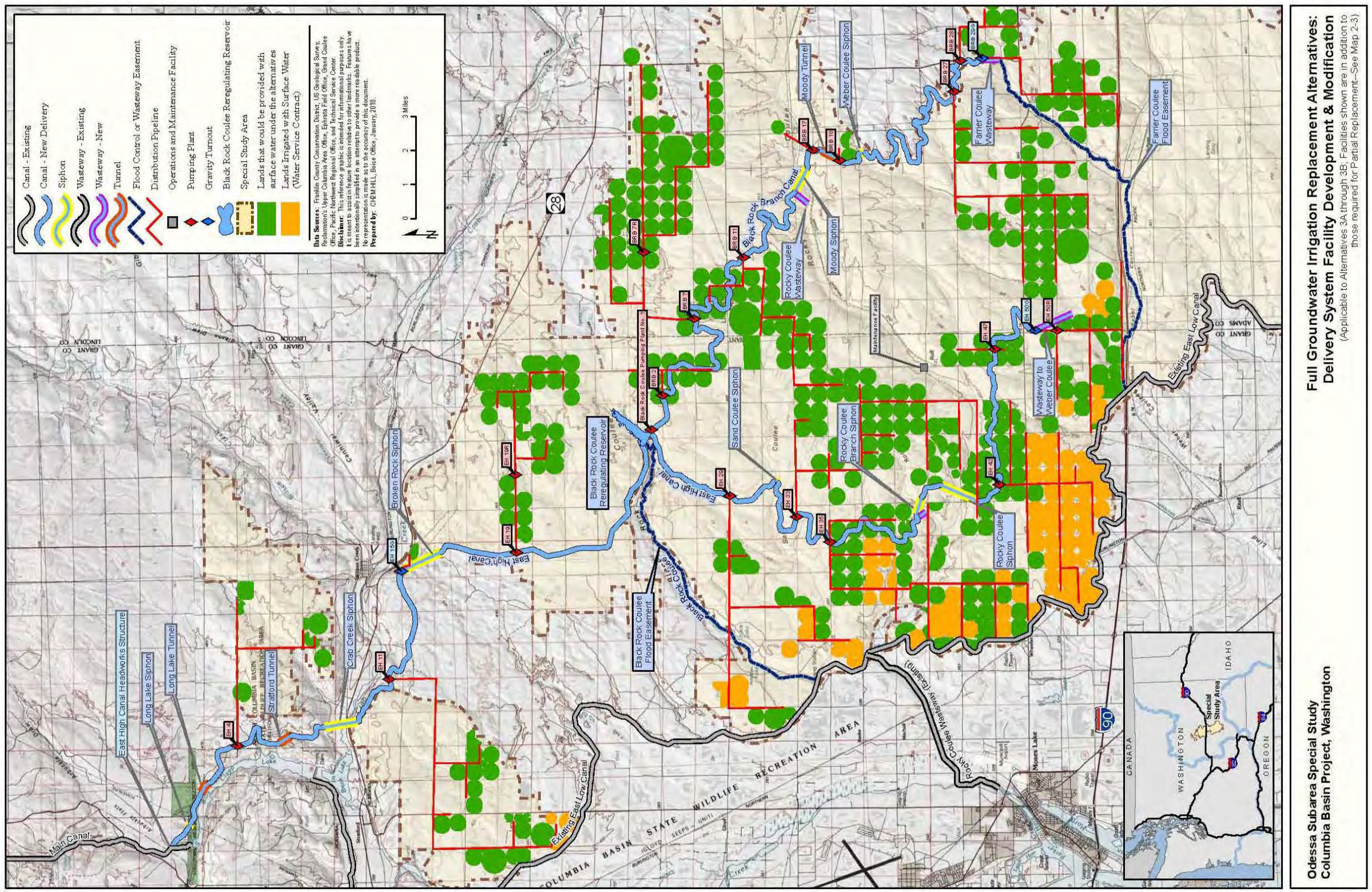

Figure 6. Full groundwater irrigation replacement alternatives: delivery system facility development and modification.

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Full Replacement Delivery System Facility Requirements

The water delivery system for Alternative 3A: Full-Banks would require development of all facilities described for the partial replacement alternatives under Alternative 2A: Partial-Banks (Section 2.5.1) to serve acreage south of I-90. To serve acreage north of I-90, the following additional facilities would be developed (Figure 10).

- 78.4 miles of new canal (including associated siphons and tunnels), comprised of the 44.8 mile East High Canal and the 26.8 mile Black Rock Branch Canal.
- Four new wasteway channels, 2.8 miles long, to manage canal flow.
- A reregulating reservoir in Black Rock Coulee (Black Rock Coulee Reregulating Reservoir), including a pumping plant to lift water from the reservoir to the Black Rock Branch Canal.
- A pipeline distribution system involving 187.3 miles of pipeline fed by 15 pumping plants and 3 gravity turnout facilities along the East High and Black Rock Branch Canals, and 3 re-lift pumping plants (2 associated with the East High Canal and 1 associated with the Black Rock Branch Canal).

Full Replacement River and Reservoir Operational Changes

Table 5 provides a summary of the additional drawdowns that would occur in an average year at Banks Lake and Lake Roosevelt with the two full replacement alternatives in context with the No Action Alternative. In all cases, the additional drawdowns at both of these reservoirs as a result of the alternatives would reach their maximums at the end of August each year.

Table 5. Full Replacement Alternatives 3A and 3B – reservoir drawdown changes in a representative average year (1995).

Alternative	End-of-August Drawdowns*	
	Total	Beyond No Action
Banks Lake with Spring diversion scenario		
3A: Full—Banks	10.6	5.6
3B: Full—Banks + FDR	8.0	3.0
Lake Roosevelt with Spring diversion scenario		
3B: Full—Banks + FDR	11.9	0.9
Banks Lake with limited Spring diversion scenario		
3A: Full—Banks	14.8	9.8
3B: Full—Banks + FDR	8.0	3.0
Lake Roosevelt with limited Spring diversion scenario		
3B: Full—Banks + FDR	11.9	0.9
*Feet in average years		

Modified Partial Replacement Action Alternatives (Alternatives 4A and 4B)

The action alternatives 4A: Modified Partial—Banks (Preferred Alternative) and 4B: Modified Partial — Banks + FDR would provide a CBP surface water supply to approximately 70,000 acres of lands in the Study Area north and south of I-90 (Figure 11). The total volume of water diverted from the Columbia River with the modified partial groundwater replacement alternatives is estimated at 164,000 acre-feet. As the surface water supply system is brought online and this water becomes available to eligible lands, the intent would be to cease operation of associated irrigation wells. Under current State regulations, the irrigation wells would not be decommissioned or abandoned. Instead, superseding state water rights would be issued and the wells would be placed in standby status, remaining operational for use in an emergency (such as an interruption of the Federal surface water delivery system). Any different scenario or mandatory decommissioning would require that the statute to be modified.

As part of these alternatives, the 16,864 acres of existing water service contracts that pump out of the East Low Canal at 34 locations would not be incorporated into the delivery system. This action would have no effect on current system operations or ECBID's ability to meet scheduled deliveries.

Alternatives 4A: Modified Partial—Banks (Preferred) and 4B: Modified Partial — Banks + FDR would involve the same water delivery system facilities and the same quantity of water. The delivery system would involve enlarging the East Low Canal and constructing a distribution system. The alternatives vary in the option used to store and supply CBP water.

A component of the modified partial alternatives would include an "infill" option to allow some groundwater irrigators in areas distant from the East Low Canal to move their operations to previously disturbed lands closer to the canal. It is anticipated that as much as 15 percent of the lands served under the Preferred Alternative would involve relocation of current operations. Relocation would be limited to an acre-per-acre exchange; that is, one acre of currently groundwater-irrigated land would be retired for each acre of relocated irrigated land served with replacement water.

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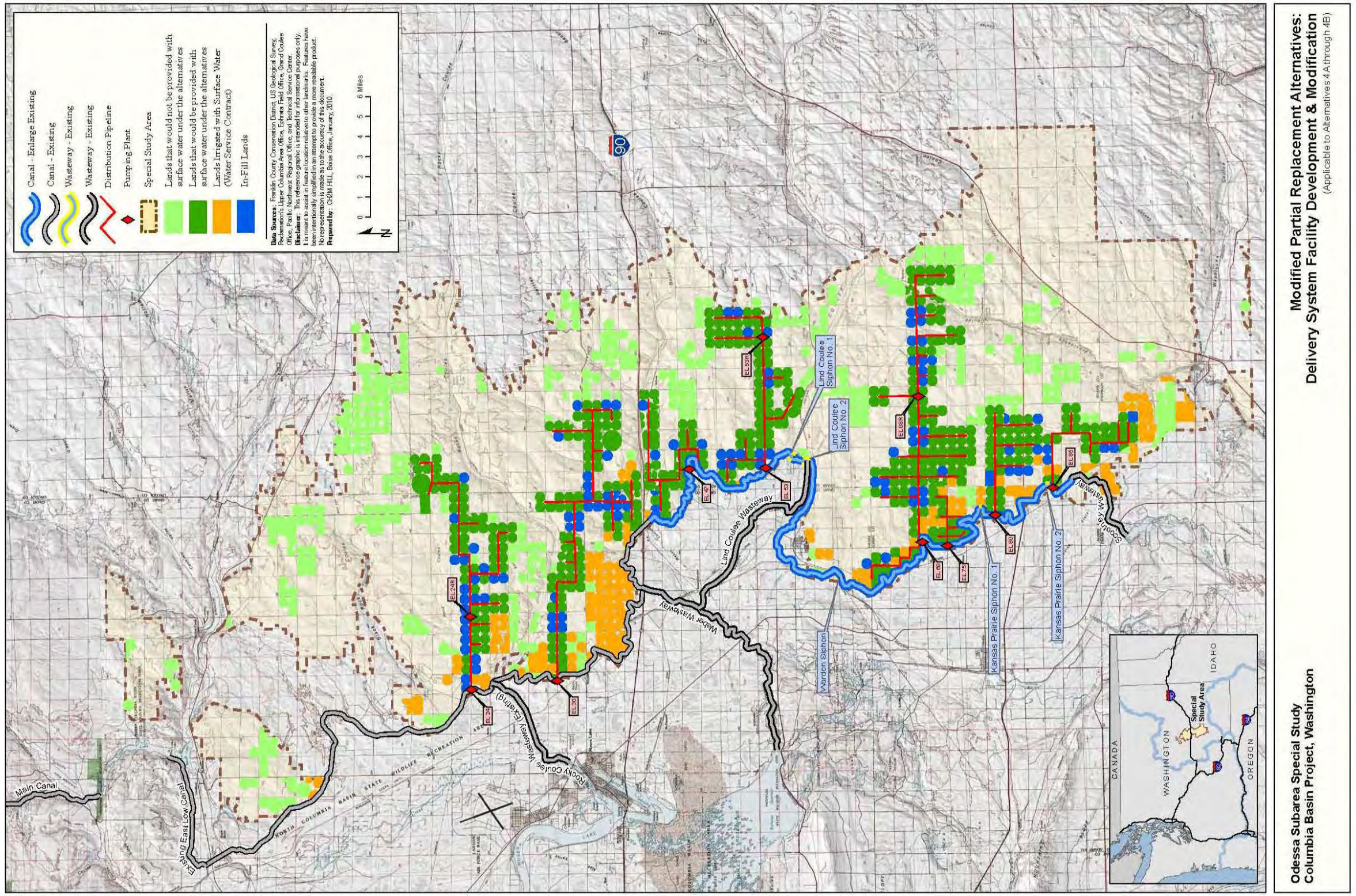

Figure 7. Modified partial replacement alternatives: delivery system facility development and modifications.

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Modified Partial Replacement Delivery System Facility Requirements

Major facility development would be necessary to deliver CBP water for the two modified partial replacement alternatives. These facilities are shown on Figure 11 and include the following:

- Enlarging the East Low Canal south of I-90, including adding a second barrel to all five existing siphons, with all work occurring within the existing East Low Canal easement.
- Creating a pressurized pipeline distribution system to get the water to farmlands, consisting of buried pipelines, pumping plants, and transmission lines.
- Acquiring additional easement width along the constructed portion of the existing Weber Wasteway south of I-90 and constructing a gravity turnout at the southern end of the East Low Canal.

Alternatives 4A and 4B would involve enlarging the East Low Canal south of I-90 and constructing canal-side pumping plants, re-lift pumping plants, and pressurized pipeline systems both north and south of I-90. Alternative 4A: Modified Partial—Banks (Preferred Alternative), Limited Spring Diversion has been identified as the Preferred Alternative by the co-lead agencies for the Final EIS. The modified partial groundwater replacement Alternative 4A meets the Purpose and Need of the project and was selected as the Preferred Alternative because it:

- Provides the most benefits to the aquifer with the least impacts to other environmental resources as compared to the partial and full replacement alternatives.
- Delivers water to the most acreage as possible with existing infrastructure.
- Has the highest Benefit - Cost Ratio of all the replacement alternatives.
- It is the environmentally preferred alternative.
- Requires no additional drawdown of Lake Roosevelt.

As shown on Figure 11, the main aspects of Alternative 4A include providing water supply from Banks Lake, via the East Low Canal, to currently groundwater-irrigated lands north and south of I-90. Major facility development associated with this alternative would be limited to enlargement of the East Low Canal south of I-90 and installation of a distribution system to

deliver the water from the canal to farmlands. Neither modified partial replacement alternative involves extension (lengthening) of the East Low Canal.

Modified Partial Replacement River and Reservoir Operational Changes

Table 6 provides a summary the additional drawdowns that would occur in an average year at Banks Lake and Lake Roosevelt with the two modified partial replacement alternatives in context with the No Action Alternative. In all cases, the additional drawdowns at both of these reservoirs as a result of the alternatives would reach their maximums at the end of August each year. Reservoirs will be refilled outside the juvenile migration as flows are available.

Table 6. Modified Partial Replacement Alternatives 4A and 4B – reservoir drawdown changes in a representative average year (1995).

Alternative	End-of-August Drawdowns*	
	Total	Beyond No Action
Banks Lake with Spring diversion scenario		
4A: Modified Partial—Banks	8.1	3.1
4B: Modified Partial —Banks + FDR	8.0	3.0
Lake Roosevelt with Spring diversion scenario		
4B: Modified Partial l—Banks + FDR	11.0	0
Banks Lake with limited Spring diversion scenario		
4A: Modified Partial —Banks	11.0	6.0
4B: Modified Partial—Banks + FDR	8.0	3.0
Lake Roosevelt with limited Spring diversion scenario		
4B: Modified Partial —Banks + FDR	12	1.0
*Feet in average years		

Alternatives Costs

Table 7 provides a summary of the estimated costs for the alternatives. These cost estimates should only be used to compare alternatives. All the alternatives used the same assumptions and unit prices so these are directly comparable from a cost standpoint.

Table 7. Summary of alternative cost estimates (millions of dollars).

Alternative	Construction & Land Acquisition Costs	IDC Costs	Total	Maximum Annual OMR&P Costs (Year 2025+)*
1: No Action	--	--	--	$3.3
2A: Partial—Banks	$691.3	$89.1	$780.5	$6.6
2B: Partial—Banks + FDR	$691.3	$89.1	$780.5	$6.6
3A: Full—Banks	$2,457.7	$327.8	$2,785.6	$15.0
3B: Full—Banks + FDR	$2,457.7	$327.8	$2,785.6	$15.0
4A: Modified Partial—Banks (Preferred)	$736.5	$91.0	$827.5	$7.9
4B: Modified Partial—Banks + FDR	$736.5	$91.0	$827.5	$7.9
* Since the construction periods vary by phase, this maximum annual OMR&P cost does not occur until year 2025 after all construction phases are completed.				

Benefit-Cost Analysis

This section summarizes the results of a benefit-cost analysis (BCA) of the Proposed Action alternatives. For a more detailed discussion of the BCA, see the Odessa Special Study Report (Reclamation 2012 Study).

A BCA compares the benefits of a proposed project to its costs. The total costs of the project are subtracted from the total benefits to measure net benefits. If the net benefits are positive, implying that benefits exceed costs, the project would be considered economically justified. In studies where multiple alternatives are being considered, the alternative with the greatest positive net benefit would be preferred strictly from an economics perspective. Another way of displaying this benefit-cost comparison involves dividing total project benefits by total project costs—resulting in the benefit-cost ratio (BCR). A BCR greater than one is analogous to a positive net benefit.

The benefit-cost results were developed by alternative and estimated using two hydrologic scenarios and two municipal benefit estimates. The hydrologic scenarios include a "With Spring Diversion" option and a "Limited Spring Diversion" option. The municipal benefit options vary based on the water supply transition path assumed for each town. Option 1 assumes towns ultimately move to either a deep well system or a combined deep well and

surface water system. Option 2 assumes all towns move to a deep well system. Since these different scenarios result in four benefit-cost estimates for each alternative, the decision was made to present only the high and low results in the tables below. For the entire range of benefit-cost results for each alternative, see the Economics Technical Report (Reclamation 2012 Economics).

Table 8. Results of BCA based on original CBP planning rate of 4.0 percent, millions of dollars.

	Partial Replacement Alternatives (2A/2B)		Full Replacement Alternatives (3A/3B)		Modified Partial Replacement Alternatives (4A/4B)	
	High Estimate (With Spring Diversion & Municipal Benefit Option 1)	Low Estimate (Limited Spring Diversion & Municipal Benefit Option 2)	High Estimate (With Spring Diversion & Municipal Benefit Option 1)	Low Estimate (Limited Spring Diversion & Municipal Benefit Option 2)	High Estimate (With Spring Diversion & Municipal Benefit Option 1)	Low Estimate (Limited Spring Diversion & Municipal Benefit Option 2)
1) Total Benefits:	1,109.3	1,102.4	2,006.0	1,982.5	1,378.9	1,366.9
a) Agriculture	1,070.0	1,070.0	1,884.9	1,884.9	1,315.4	1,315.4
b) Municipal	34.1	27.2	116.2	92.7	58.6	46.6
c) Industrial	5.2	5.2	4.9	4.9	4.9	4.9
2) Total Costs (including Lost Benefits):	1,250.0	1,271.9	3,920.8	3,952.4	1,367.9	1,399.6
a) Canal & Reservoir Construction & IDC Costs	886.0	886.0	3,169.3	3,169.3	942.0	942.0
b) Canal & Reservoir OMR&P Costs	192.5	192.5	428.1	428.1	228.7	228.7
	3.2	3.2	3.9	3.9	2.5	2.5
e) Reduced Hydropower Benefits	168.3	190.2	319.5	351.1	194.7	226.4
3) Net Benefits (row 1 minus row 2)	(140.7)	(169.5)	(1,914.8)	(1,969.9)	11.0	(32.7)
4) Benefit-Cost Ratio (row 1 divided by row 2)	.887	.867	.512	.502	1.008	.977

Summary of Environmental Consequences

The environmental consequences of the alternatives, including the No Action Alternative, are fully described in Chapter 4 of the Final EIS. Table 9 provides a summary of impacts and benefits associated with the No Action, Partial Replacement, Full Replacement, and Modified Partial Replacement alternatives for specific areas within affected resource topics. In addition, Table 9 details the relative magnitude of benefits and adverse impacts expected under each of the seven alternatives.

Resources that would have potential benefits or minimal to significant impacts include, but are not limited to, groundwater resources; vegetation and wetlands, wildlife and wildlife habitat; fisheries and aquatic habitat; land and shoreline use, recreation; energy; visual resources; and cultural resources.

Resource areas that would have no notable beneficial effects or negative impacts include, but are not limited to, surface water quantity; water rights; geology; soils; threatened and endangered species; air quality; public services and utilities; public health; Indian trust assets; and environmental justice.

Table 9. Summary of the benefits and impacts associated with the No Action, Partial Replacement, Full Replacement, and Modified Partial Replacement alternatives.

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Surface Water Quantity							
Instream flow requirements	No impact	Minimal Impact with both diversion scenarios.	Minimal Impact with both diversion scenarios.	Minimal Impact with both diversion scenarios.	Minimal Impact with both diversion scenarios.	Minimal Impact with both diversion scenarios.	Minimal Impact with both diversion scenarios.
Reduction of surface water elevations in Lake Roosevelt	No impact	No impact with both diversion scenarios	Minimal additional drawdown in late August and September with both diversion scenarios. Minimal hydrologic impact.	No impact with both diversion scenarios	Minimal additional drawdown in late August and September with both diversion scenarios. Minimal hydrologic impact.	No impact with both diversion scenarios	Additional drawdown in August and September with both diversion scenarios. Minimal hydrologic impact.
Reduction of surface water elevations in Banks Lake	No impact	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.	Drawdown starting April through late September with both diversion scenarios. Minimal hydrologic impact.
Changes to flows, geomorphology, or connectivity from inundation under a planned reservoir or spillway flow from a reservoir	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	Inundation by Black Rock Coulee Reregulating Reservoir. Minimal impact with both diversion scenarios.	Inundation by Black Rock Coulee Reregulating Reservoir. Minimal impact with both diversion scenarios.	Minimal impact with both diversion scenarios.	Minimal impact with both diversion scenarios.
Changes to areas that receive water from the wasteways	No impact	Minimal impact with both diversion scenarios.	Minimal impact with both diversion scenarios.	Minimal impact in Black Rock Coulee with both diversion scenarios	Minimal impact in Black Rock Coulee with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Groundwater Resources							
Groundwater level declines	Continued decline in levels and high level of discontinued use in next 10-20 years. Adverse impact.	Conservation of about 138,000 ac-ft/year of groundwater; level declines continue, but at slower rate with both diversion scenarios. Beneficial impact.	Conservation of about 138,000 ac-ft/year of groundwater; level declines continue, but at slower rate with both diversion scenarios. Beneficial impact.	Conservation of about 273,000 ac-ft/year of groundwater; level declines continue and may rise slightly with both diversion scenarios. Beneficial impact.	Conservation of about 273,000 ac-ft/year of groundwater; level declines continue and may rise slightly with both diversion scenarios. Beneficial impact.	Conservation of about 164,000 ac-ft/year of groundwater; level declines continue, but at slower rate with both diversion scenarios. Beneficial impact.	Conservation of about 164,000 ac-ft/year of groundwater; level declines continue, but at slower rate with both diversion scenarios. Beneficial impact.
Recharge or seepage in Black Rock Coulee	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	Local recharge to shallow groundwater from reservoir with both diversion scenarios	Local recharge to shallow groundwater from reservoir with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Municipal and industrial users	Continued decline in levels. Adverse impact.	Reduced rate of declining groundwater levels. Beneficial effect south of I-90. Continued decline in levels north of I-90 with both diversion scenarios. Adverse impact.	Reduced rate of declining groundwater levels. Beneficial effect south of I-90. Continued decline in levels north of I-90 with both diversion scenarios. Adverse impact.	Reduced rate of declining groundwater levels as shallow aquifer seeps into deep aquifer with both diversion scenarios. Beneficial impact.	Reduced rate of declining groundwater levels as shallow aquifer seeps into deep aquifer with both diversion scenarios. Beneficial effect.	Reduced rate of declining groundwater levels with both diversion scenarios. Beneficial effect.	Reduced rate of declining groundwater levels with both diversion scenarios. Beneficial effect.

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Water Quality							
Temperature (FDR)	No impact	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios
Dissolved oxygen (FDR)	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Heavy metals (FDR)	No impact	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios
Temperature (Banks)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact, but greater than 2A with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact, but greater than 2A with both diversion scenarios	Minimal impact with both diversion scenarios
Dissolved oxygen (Banks)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact, but greater than 2A with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact, but greater than 2A with both diversion scenarios	Minimal impact with both diversion scenarios
Turbidity (Banks)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Temperature (Columbia)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Total dissolved gas (Columbia)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Temperature (CBP)	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
pH (CBP)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Salinity (CBP)	No impact	Minor beneficial effect with both diversion scenarios	Minor beneficial effect with both diversion scenarios	Minor beneficial effect with both diversion scenarios	Minor beneficial effect with both diversion scenarios	Minor beneficial effect with both diversion scenarios	Minor beneficial effect with both diversion scenarios
Nutrients (CBP)	Potential minor beneficial effect	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Water Rights							
Loss or curtailment of groundwater rights	No impact	Minor impacts with both diversion scenarios	Minor impacts with both diversion scenarios	Minor impacts with both diversion scenarios	Minor impacts with both diversion scenarios	Minor impacts with both diversion scenarios	Minor impacts with both diversion scenarios
Columbia River and Lake Roosevelt Tribal water rights	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Geology							
Commitment of geologic resources	No impact	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios
Geologic hazards	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Unique geologic features	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Soils							
Farmland Protection Policy Act	No impact	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures	No impacts with both diversion scenarios with implementation of legal requirements, BMPs, and mitigation measures
Vegetation and Wetlands							
Impact on native plant communities	No impact	Adverse impact on native plant communities with both diversion scenarios	Adverse impact on native plant communities with both diversion scenarios	Significant impact with both diversion scenarios, including Black Rock Coulee Reregulating Reservoir	Significant impact with both diversion scenarios, including Black Rock Coulee Reregulating Reservoir	Adverse impact on native plant communities with both diversion scenarios	Adverse impact on native plant communities with both diversion scenarios
Fragmentation of native plant communities	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Adverse impact with both diversion scenarios with construction of new canals	Adverse impact with both diversion scenarios with construction of new canals	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Impact on special status plants	No impact	Potential impacts with both diversion scenarios; not yet quantified	Potential impacts with both diversion scenarios; not yet quantified	Potential impacts with both diversion scenarios; not yet quantified, but approximately an order of magnitude greater than 2A	Potential impacts with both diversion scenarios; not yet quantified, but approximately an order of magnitude greater than 2A	Potential impacts with both diversion scenarios; not yet quantified	Potential impacts with both diversion scenarios; not yet quantified
Habitat restoration	No impact	Long time periods for restoration of disturbed habitat with both diversion scenarios	Significant requirement for restoration of disturbed habitat with both diversion scenarios	Long time periods for restoration of disturbed habitat over larger areas than 2A with both diversion scenarios	Significant requirement for restoration of disturbed habitat over larger areas than 2A with both diversion scenarios	Long time periods for restoration of disturbed habitat with both diversion scenarios	Significant requirement for restoration of disturbed habitat with both diversion scenarios
Long-term loss of wetland area	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Adverse impact at Banks Lake with both diversion scenarios	Adverse impact at Banks Lake with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Long-term loss or degradation of wetland function	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal to adverse impact at Banks Lake depending on water year with both diversion scenarios	Minimal to adverse impact at Banks Lake depending on water year with both diversion scenarios	Minimal impact at Banks Lake depending on water year with both diversion scenarios	Minimal impact at Banks Lake depending on water year with both diversion scenarios

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Wildlife and Wildlife Habitat							
Impact on intact shrub-steppe habitat	Minimal impact on wildlife that use farm lands because wheat fields would be fallowed every other year	Adverse impact with both diversion scenarios with removal of shrub-steppe habitat	Adverse impact with both diversion scenarios with removal of shrub-steppe habitat	Significant impact with both diversion scenarios over substantially larger area than with Alternative 2A	Significant impact over substantially larger area than with Alternative 2A	Adverse impact over slightly larger area than with Alternative 2A	Adverse impact over slightly larger area than with Alternative 2A
Barriers to unrestricted movement by wildlife	No impact	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios	Significant impact with both diversion scenarios from extended canal system	Significant impact with both diversion scenarios from extended canal system	No impact to minimal impact with both diversion scenarios	No impact to minimal impact with both diversion scenarios
Impact on special status species, including migratory birds	No impact	Significant impact on multiple species with both diversion scenarios. Impacts to grebes would be more pronounced with the limited spring diversion scenario.	Significant impact on multiple species with both diversion scenarios. Impacts to grebes would be more pronounced with the limited spring diversion scenario.	Significant impact on multiple species with both diversion scenarios, involving substantially larger area and a number of species than with Alternative 2A	Significant impact on multiple species with both diversion scenarios, involving substantially larger area and a number of species than with Alternative 2A	Significant impact on multiple species with both diversion scenarios, involving slightly larger area and a number of species than with Alternative 2A	Significant impact on multiple species with both diversion scenarios, involving slightly larger area and a number of species than with Alternative 2A
Habitat fragmentation and population viability	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	Significant impact from extended canal system	Significant impact from extended canal system	No impact with both diversion scenarios	No impact with both diversion scenarios
Fisheries and Aquatic Resources							
Columbia River: Downstream migration of salmonid smolts (mid-April to August)	No impact	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	No to minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario
Columbia River: Upstream migration of adult salmon and steelhead (September to October for Fall Chinook, Steelhead)	No impact	No to minimal impact under both diversion scenarios	No to minimal impact under both diversion scenarios	No to minimal impact under both diversion scenarios	No to minimal impact under both diversion scenarios	No to minimal impact under both diversion scenarios	No to minimal impact under both diversion scenarios
Columbia River: Chum salmon spawning below Bonneville Dam (November to mid-April)	No impact	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios
FDR: Zooplankton production	No impact	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios
FDR: Rainbow trout net pen program	No impact	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios
FDR: Kokanee salmon spawner access to San Poil River	No impact	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	No impact to minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Banks Lake: Fish and zooplankton entrainment	No impact	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal to adverse impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal to adverse impact under both diversion scenarios	Minimal impact under both diversion scenarios
Surface areas of littoral habitat temporarily exposed during drawdowns	No impact	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Significant impact from greater drawdown under both diversion scenarios.	Minimal impact under both diversion scenarios	Minimal to adverse impact under both diversion scenarios	Minimal impact under both diversion scenarios
Banks Lake: Overall condition of the fishery	No impact	Minimal under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal to adverse impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal to adverse impact under both diversion scenarios	Minimal impact under both diversion scenarios
Threatened and Endangered Species							
Pygmy rabbits	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Downstream migration of salmonid smolts	No impact	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario	Minimal impact Spring Diversion Scenario No impact Limited Spring Diversion Scenario
Upstream migration of adult salmon, steelhead, and bull trout	No impact	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios	Minimal impact under both diversion scenarios
Chum salmon spawning below Bonneville Dam	No impact	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios	No impact under both diversion scenarios
Air Quality							
Primary air quality standards	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Secondary air quality standards	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Attainment area classification	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Land Use and Shoreline Resources							
Changes in land ownership and land status	Potential for consolidation of farms	About 5,150 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact	About 5,150 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact	About 17,360 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact	About 17,360 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact	About 4,740 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact	About 4,740 acres acquired (easements and fee title) with both diversion scenarios. Adverse impact
Changes in land or shoreline uses: Protection of irrigated agriculture	Adverse impact with significant change from irrigated to dryland agriculture.	57,000 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.	57,000 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.	102,600 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.	102,600 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.	70,000 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.	70,000 acres of irrigated agriculture preserved with both diversion scenarios. Beneficial effect.

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Consistency with relevant plans, policies and programs	Adverse impact from inconsistent plans across 102,614 acres.	Supports county comprehensive plans across 57,000 acres with both diversion scenarios. Beneficial effect.	Supports county comprehensive plans across 57,000 acres with both diversion scenarios. Beneficial effect.	Supports county comprehensive plans across 102,600 acres with both diversion scenarios. Beneficial effect.	Supports county comprehensive plans across 102,600 acres with both diversion scenarios. Beneficial effect.	Supports county comprehensive plans across 70,000 acres with both diversion scenarios. Beneficial effect.	Supports county comprehensive plans across 70,000 acres with both diversion scenarios. Beneficial effect.
Recreation							
FDR: Loss of boating capacity	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	In dry years, 6 of 22 launches unavailable for 1-3 weeks. Slight increase in impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	No impact with both diversion scenarios	Minimal impact with both diversion scenarios
FDR: Exposure of boating hazards	No impact	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios
FDR: Loss of fishing opportunities	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
FDR: Loss of usability at developed swimming areas	No impact	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Minimal impact.	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Adverse impact.	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Minimal impact.
FDR: Decrease in usability or aesthetic quality at developed camping or day use facilities	No impact	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Minimal impact.	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Adverse impact.	No impact with both diversion scenarios	Increased distance to water's edge with both diversion scenarios. Minimal impact.
FDR: Dispersed recreation	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	Minimal impact with both diversion scenarios
FDR: Loss of opportunity for hunting, wildlife viewing, hiking, etc. on lands surrounding the reservoirs	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Banks: Loss in boat launch capacity and related impacts on fishing access, camping, and day use	No impact	In dry years, two of five high-capacity launches unavailable for 3-4 weeks with both diversion scenarios. Adverse impact.	With both diversion scenarios, minimal impact at high-capacity ramps, but low-capacity ramps would be out of service for up to 5 weeks	All but one boat ramp unavailable for 6 weeks with both scenarios. Adverse impact.	With both diversion scenarios, minimal impact at high-capacity ramps, but low-capacity ramps would be out of service for up to 5 weeks	In dry years, high capacity ramps unavailable for 1-4 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	With both diversion scenarios, minimal impact at high-capacity ramps, but low-capacity ramps would be out of service for up to 5 weeks

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
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Banks: Exposure of boating hazards	Minimal impact	Drawdown exposure of hazards would last for about 3-6 weeks. Potential for increased hazard exposure with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Drawdown exposure of hazards would last for about 6-7 weeks. Potential for increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Drawdown exposure of hazards would last for about 10-13 weeks. Potential for increased hazard exposure with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Drawdown exposure of hazards would last for about 10-13 weeks. Potential for increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Drawdown exposure of hazards would last for about 4-7 weeks. Potential for increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Drawdown exposure of hazards would last for about 6-7 weeks. Potential for increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.
Banks: Loss of fishing opportunities (because of impact on fishery; impact on fishing access reflected in boating capacity indicator)	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal Impact with both diversion scenarios.	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Banks: Loss of usability at developed swimming areas	No impact	Three of four swimming areas unusable for about 6 weeks. Slight increase in impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Three of four swimming areas unusable for about 5-6 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario Adverse impact.	All four swimming areas would be unusable for up to 12 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Three of four swimming areas unusable for about 5-6 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Three of four swimming areas unusable for about 6 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Three of four swimming areas unusable for about 5-6 weeks. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.
Banks: Decrease in usability or aesthetic quality at developed camping or day use facilities	Minimal impact	Distance to water's edge would be about 20-260 feet for dry years with both diversion scenarios. Adverse impact.	Distance to water's edge would be about 20-260 feet for dry years with both diversion scenarios. Adverse impact.	Distance to water's edge would be about 50-850 feet in dry years. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Distance to water's edge would be about 20-260 feet for dry years with both diversion scenarios. Adverse impact.	Distance to water's edge would be about 50-450 feet in dry years. Potential increased hazard exposure with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Distance to water's edge would be about 20-260 feet for dry years with both diversion scenarios. Adverse impact.
Banks: Decrease in usability of aesthetic quality at dispersed recreation sites	Minimal impact	Distance to water's edge would be about 20-445 feet for dry years with both diversion scenarios. Adverse impact.	Distance to water's edge would be about 20-420 feet for dry years with both diversion scenarios. Adverse impact.	Distance to water's edge would be over 50-890 feet for dry years. Potential increased impact with limited spring diversion scenario than with spring diversion scenario. Adverse impact.	Distance to water's edge would be about 20-420 feet for dry years. Adverse impact.	Distance to water's edge would be about 25-470 feet for dry years. Adverse impact.	Distance to water's edge would be about 20-420 feet for dry years. Adverse impact.
Banks: Loss of opportunity for hunting, wildlife viewing, hiking, etc. on lands surrounding the reservoirs	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Loss of hunting and/or wildlife viewing opportunities in Odessa Special Study Area	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Irrigated Agriculture							
Gross Farm Income 2025 Study Area Compared to Four-County Analysis Area	Adverse long-term impact: gross farm income drops from about $119.1 million to $54.5 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $156.8 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $156.8 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $243.5 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $243.5 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $182.6 million	Beneficial long-term effect: gross farm income increases from about $119.1 million to $182.6 million
Socioeconomics							
Change in regional employment (number of jobs) within the four-county analysis area	Minimal long–term impact: less than 1 percent decrease in jobs	Short–term beneficial effects: less than one percent increase in jobs. Net long–term beneficial effects: less than 1 percent increase in jobs. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 4 percent increase in jobs. Net long–term beneficial effects: less than 1 percent increase in jobs. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 4 percent increase in jobs. Net long–term beneficial effects. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than 1 percent increase in jobs. Ag: less than 2 percent in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than 1 percent increase in jobs. Ag: less than 2 percent increase in jobs.
Change in regional labor income within the four-county analysis area	Minimal long–term impact: less than 0.5 percent decrease in labor income	Short–term beneficial effects: less than 2 percent increase in labor income. Net long–term beneficial effects. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 2 percent increase in labor income. Net long–term beneficial effects: less than 1 percent increase in labor income. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 6 percent increase in labor income. Net long–term beneficial effects: less than 1 percent increase in labor income. Ag: less than 3 percent increase in jobs.	Short–term beneficial effects: less than 6 percent increase in labor income. Net long–term beneficial effects. Ag: less than 3 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than 1 percent increase in jobs. Ag: less than 2 percent in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than 1 percent increase in jobs. Ag: less than 2 percent increase in jobs.
Change in regional sales within the four-county analysis area	Minimal long–term impact: less than 0.5 percent decrease in sales	Short–term beneficial effects: less than 1 percent increase in sales. Net long–term beneficial effects. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in sales. Net long–term beneficial effects. Ag: less than 2 percent increase in jobs.	Short–term beneficial effects: less than 4 percent increase in sales. Net long–term beneficial effects: less than 1 percent increase in sales. Ag: less than 4 percent increase in jobs.	Short–term beneficial effects: less than 4 percent increase in sales. Net long–term beneficial effects. Ag: less than 4 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than one percent increase in jobs. Ag: less than 3 percent increase in jobs.	Short–term beneficial effects: less than 1 percent increase in jobs. Net long–term beneficial effects: O&M: less than 1 percent increase in jobs. Ag: less than 3 percent increase in jobs.
Transportation							
Short- or long-term increases in traffic (general average daily and peak hour) on regional or local roads	No impact	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
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Increases in large and/or heavy-load vehicle traffic on regional or local roads	No impact	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios	Minimal Impact with both diversion scenarios
Existing roads and railroads: crossings by new surface facilities or inundation by new reservoirs	No impact	Minimal impact given committed Transportation Management Plan (TMP)	Minimal impact given committed TMP	Minimal impact given committed TMP	Minimal impact given committed TMP	Minimal impact given committed TMP	Minimal impact given committed TMP
Energy							
Change in net energy available in region	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Keys PGP reserves, reliability and diurnal load shifting	No impact	Adverse to significant impact with both diversion scenarios	Adverse impact with both diversion scenarios	Significant impact with both diversion scenarios	Adverse impact with both diversion scenarios	Significant impact with both diversion scenarios	Adverse impact with both diversion scenarios
Public Services and Utilities							
Exceedance of service or utility capacity (long-term)	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Disruption of services or utilities for existing residents and landowners (short-term, construction-phase)	No impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact
Impact on emergency response times (short-term, construction-phase)	No impact	Minimal Impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact
Noise							
Short-term (construction) increases in noise levels	No impact	Localized adverse impact	Localized adverse impact	Localized adverse impact	Localized adverse impact	Localized adverse impact	Localized adverse impact
Long-term increases in noise levels	No impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact	Minimal impact
Public Health (Hazardous Materials)							
Hazardous sites	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Mosquito habitat	No impact	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios	Minimal impact with both diversion scenarios
Visual Resources							
Landscape-level change: conversion from irrigated agriculture to dryland or fallow over approximately 30-year period	About 100,000 acres would convert to dryland or fallow. Adverse impact.	About 48,000 acres would convert to dryland or fallow. Adverse impact.	About 48,000 acres would convert to dryland or fallow. Adverse impact.	General landscape appearance does not change.	General landscape appearance does not change.	About 35,000 acres would convert to dryland or fallow. Adverse impact.	About 35,000 acres would convert to dryland or fallow. Adverse impact.

Resource Indicator, Topic, or Measurement	No Action	Partial Groundwater Irrigation Replacement Alternatives		Full Groundwater Irrigation Replacement Alternatives		Modified Partial Groundwater Irrigation Replacement Alternatives	
		2A: Partial—Banks	2B: Partial—Banks + FDR	3A: Full—Banks	3B: Full—Banks + FDR	4A: Modified Partial—Banks	4B: Modified Partial—Banks + FDR
Introduction of new developed facilities	No impact	Pumping plants and regulating tanks south of I-90 only. Adverse impact.	Pumping plants and regulating tanks south of I-90 only. Adverse impact.	Canal, laterals, pumping plants, and regulating tanks north and south of I-90. Adverse impact.	Canal, laterals, pumping plants, and regulating tanks north and south of I-90. Adverse impact.	Pumping plants and regulating tanks north and south of I-90. Adverse impact.	Pumping plants and regulating tanks north and south of I-90. Adverse impact.
Changes in reservoir drawdown patterns at Banks Lake and Lake Roosevelt	Minimal Impact	Adverse impact at Banks Lake generally related to depth of additional drawdown. Adverse impact with both diversion scenarios.	Adverse impact at Banks Lake generally related to depth of additional drawdown. Adverse impact with both diversion scenarios.	Adverse impact at Banks Lake generally related to depth of additional drawdown. Impacts would be slightly more pronounced with the limited spring diversion scenario.	Adverse impact at Banks Lake generally related to depth of additional drawdown. Impacts would be slightly more pronounced with the limited spring diversion scenario.	Adverse impact at Banks Lake generally related to depth of additional drawdown. Adverse impact with both diversion scenarios.	Adverse impact at Banks Lake generally related to depth of additional drawdown. Adverse impact with both diversion scenarios.
Cultural and Historic Resources *Potential for construction to encounter and impact significant cultural resources*							
Miles of new linear facilities with high potential	No impact	166 miles. Adverse impact.	166 miles. Adverse impact.	245 miles. Adverse impact.	245 miles. Adverse impact.	162 miles. Adverse impact.	162 miles. Adverse impact.
Acres of facility site acquisition with high potential	No impact	38 acres. Adverse impact.	38 acres. Adverse impact.	100 acres. Adverse impact.	100 acres. Adverse impact.	27 acres. Adverse impact.	27 acres. Adverse impact.
Additional acreage exposed by drawdowns at Banks Lake	No impact	About 560 acres exposed with spring diversion scenario and about 1,079 acres with limited spring diversion scenario. Adverse impact.	About 560 acres exposed with spring diversion scenario and about 700 acres with limited spring diversion scenario. Adverse impact.	About 1,395 acres exposed with spring diversion scenario and about 2,433 acres with limited spring diversion scenario. Adverse impact.	About 700 acres exposed with spring diversion scenario and about 700 acres with limited spring diversion scenario. Adverse impact.	About 790 acres exposed with spring diversion scenario and about 1,479 acres with limited spring diversion scenario. Adverse impact.	About 700 acres exposed with spring diversion scenario and about 700 acres with limited spring diversion scenario. Adverse impact.
Indian Sacred Sites							
Potential for facility development to impact known sacred sites	No impact	Potential impacts; not yet quantified	Potential impacts; not yet quantified	Potential impacts; not yet quantified	Potential impacts; not yet quantified	Potential impacts; not yet quantified	Potential impacts; not yet quantified
Indian Trust Assets							
Potential for facility development to impact known ITAs	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios
Environmental Justice							
Disproportionate impact to minority or low-Income populations	No impact	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios	No impact with both diversion scenarios

Cumulative Impacts

Cumulative impacts are the sum of all effects that may result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what public agency or private party in responsible for such other actions (40 CFR 1508.7). Many of the potential cumulative effects associated with the Study Proposed Action are examined under the various environmental elements in Chapters 3 and 4 of this Final EIS. Those analyses discuss the effects of past processes and trends that have cumulatively influenced or led to the resource conditions that exist today. In addition, they examine ongoing or reasonably foreseeable actions that are considered to be part of the No Action Alternative and all action alternatives.

The cumulative impacts discussion presented in this section expands on the discussions of past processes, trends, and current actions by focusing on reasonably foreseeable future actions that are not considered part of the No Action Alternative or action alternatives.

The following cumulative actions have been identified for potential cumulative effects:

- Columbia River Basin Water Management Program and its anticipated component actions (considered as part of No Action Alternative).
- Lake Roosevelt Incremental Storage Releases (considered as part of No Action Alternative).
- Coordinated Conservation Program (considered as part of No Action Alternative).
- 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (considered as part of No Action Alternative).
- Potholes Supplemental Feed Route Project (considered as part of No Action Alternative).
- Groundwater withdrawals of municipalities, communities, and irrigators (considered as part of No Action Alternative).
- John W. Keys III Pump-Generating Plant Modernization Project (a reasonably foreseeable future action)
- Assured Annual Flood Control provision of the Columbia River Treaty (a reasonably foreseeable future action).

- Yakima River Basin Integrated Water Resource Management Plan (a reasonable foreseeable future action).

- Umatilla Basin Aquifer Recovery (a reasonably foreseeable future action).

No other reasonably foreseeable future actions have been identified that would contribute to cumulative effects during the same time frame or in the same geographic area as the Study Proposed Action and alternatives.

Environmental Commitments

Reclamation and Ecology are required to follow a variety of State and Federal regulations and policies intended to protect people and the environment during construction and operation of any of the alternatives. These requirements would prevent some potential impacts from occurring or minimize the extent to which an impact would affect people or places. Reclamation and Ecology have also committed to implement BMPs intended to further avoid or minimize impacts. The analysis of impacts assumes that the legal requirements and BMPs would be successfully implemented. However, not all impacts would be avoided by following these measures.

Environmental commitments are measures or practices adopted by a project proponent to reduce or avoid adverse affects that could result from project operations. These commitments are "action" specific; therefore it is appropriate to include within an array of documents including but not limited to construction contracts, management agreements with resource agencies, water contracts, and management plans. In addition, Reclamation, Ecology, and WDFW have entered into a Memorandum of Understanding (Appendix C) that will facilitate coordination and communication concerning these mitigation measures and environmental commitments; Reclamation and Ecology share the responsibility to ensure obligations to protect natural resources are fulfilled.

The scale of which these mitigation measures and commitments would be implemented would likely occur in phases and would be dependent of what actions are being undertaken by Reclamation and Ecology. Reclamation and Ecology have also committed to implementing mitigation measures to compensate for some impacts that cannot be avoided or minimized through legal requirements and BMPs.

Consultation and Coordination

Concurrent with preparation of this document, agency consultation and coordination have been conducted in accordance with the Endangered Species Act (ESA) of 1973, as amended, the Fish and Wildlife Coordination Act (FWCA) as amended, the National Historic Preservation Act (NHPA) of 1966, and the Clean Water Act (CWA).

As explained in Chapter 5 of the Final EIS, Reclamation and Ecology established a public involvement program early in the process. The program was designed to provide the public and agencies with a variety of methods to learn about, participate in, and comment on the Study. The program included scoping notices, multiple public scoping meetings, Scoping Summary Report (Reclamation 2008 Scoping), and informal Public Hearings. Extensive coordination with agencies and organizations occurred prior to initiation of the NEPA/SEPA processes and during preparation of the Draft EIS and Final EIS. Bonneville Power Administration served as a cooperating agency throughout the process.

Commitment to Continued Coordination

Reclamation and Ecology have encouraged participation by Tribes and resource agencies as part of this environmental review process. Reclamation and Ecology remain committed to this ongoing coordination and welcome the continued opportunity to work with the Tribes, U.S. Fish and Wildlife Service (USFWS), NMFS, Washington Department of Fish and Wildlife (WDFW), State Historical Preservation Officer (SHPO), CBP irrigation districts, and other stakeholders to identify appropriate mitigation, monitoring, evaluation, and adaptive management programs. Both agencies have successfully collaborated on natural resource enhancements in the past with Tribes, resource agencies, and CBP Irrigation Districts and believe such collaboration is a critical element to future phased development of the CBP. In addition, this Final EIS is a tiered document where, in coordination with jurisdictional agencies and/or Tribal governments, additional NEPA/SEPA analysis would be conducted, as appropriate, prior to construction of each phase of the proposed project.

Public Dissemination of the Final EIS

The release of this Final EIS was announced on Reclamation's and Ecology's websites and in local and regional newspapers. These announcements include the dates and locations the document will be available for public review. The Final EIS is posted on the Odessa Study website at: http://www.usbr.gov/pn/programs/ucao_misc/Odessa/.

Preparation of the Final EIS

Reclamation and Ecology have carefully considered all comments received on the Draft EIS and responded to substantive comments in the Final EIS by adjusting alternatives, supplementing or improving the analysis, or making factual corrections. Two public hearings were held during the public review period for the Draft EIS, as described on the Fact Sheet. Participants were encouraged to provide comments through several mechanisms—written comment cards, letters, e-mails, and oral comments at the meetings. All comments received on the Draft EIS, regardless of how submitted, were given equal consideration. Volume 2 of this Final EIS displays the comment letters received on the Draft EIS as well as Reclamation and Ecology's responses to those comments.

Record of Decision

In accordance with Federal guidelines, a ROD is prepared after the Final EIS is completed and distributed to the public. It explains the decision and discusses the reasoning and rationale used in making the decision. The ROD cannot be issued until at least 30 days after the EPA publishes its notice of availability for the Final EIS in the Federal Register.